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TIP STRATEGIES

DELAWARE'S IT TALENT STRATEGY

A ROADMAP FOR BUILDING AN INCLUSIVE TECH WORKFORCE

Delaware Prosperity Partnership

ACKNOWLEDGMENTS

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CONTENTS

Executive Summary	1
Summary of Recommendations	4
Summary of Delaware’s IT Talent Strategy Recommendations	4
Introduction	5
Background	6
Why This Strategy	6
Approach	6
1. The IT Talent Landscape	7
IT Pressures Experienced By Employers	8
IT Talent Profile	9
SWOT Summary	20
2. Dynamic and Inclusive Opportunities to Fill IT Talent Needs	22
Best Practice Characteristics of a Demand-Driven Talent Strategy	23
Desired Vision and Elements of a Talent System	24
Building In Diversity and Inclusiveness from the Start	26
Diversity and Inclusion Goals of the IT Talent Strategy	27
Implementing an IT Strategy in COVID-19 and Post-COVID-19 Environments	29
3. IT Talent Strategy Framework	30
Recommendations for Developing a Robust IT Talent Pipeline	31
Guiding Principles	31
Summary of Recommendations	32
Policy Recommendations	33
Strategy A. Develop a Coordinated and Demand-driven Approach to IT Talent Development	34
Strategy B. Retrain Residents and Upskill IT Workers	40
Strategy C. Expand IT Career Opportunities for Youth	50
Performance Metrics	56
Immediate Implementation Steps	57
Appendices	59
Appendix A. IT Occupation Overview	60
Appendix B. Job Posting Methodology Overview	62
Appendix C. Sector Council Roles and Characteristics of Organizations Assuming Those Roles	63



EXECUTIVE SUMMARY

Expanding Delaware’s information technology (IT) talent pipeline is essential to the state’s short-term and long-term economic prosperity and critical to the post-coronavirus disease 2019 (COVID-19) pandemic economic recovery. IT occupations play a pivotal role in almost every sector in Delaware, supporting industries such as agriculture, financial services, and advanced manufacturing. They are the backbone of the digital economy, especially in areas such as telehealth, government services, online education, e-commerce, and more. These jobs range from those requiring only limited training to those with advanced degrees, offering opportunities for people from all backgrounds, geographies, and skill levels. **Yet the projected growth rate of IT jobs in Delaware outpaces the supply of workers with adequate skills to fill these positions.**

In 2019, there were over 17,000 IT jobs in Delaware, and these jobs are projected to grow swiftly in the years to come. The average wage of these jobs was over \$94,000. Two-thirds of IT jobs in the state are outside the tech sector in industries such as finance, manufacturing, healthcare, government, and management of companies.

This IT strategy is based on a shared vision articulated by the employers and providers engaged in this project. This vision is described in five measurable objectives.

- Delaware employers can quickly find and hire qualified talent, because training and education programs are flexible and demand driven.
- There are efficient ways to continuously upskill IT workers to provide Delaware companies a competitive edge.
- Youth and adults are aware of IT careers and the pathways to enter them, creating a well-defined pipeline of new entrants.
- The IT talent pool is diverse and inclusive, where people with economic and social barriers can access training and are actively supported by mentors and support services.
- Public and private resources are effectively leveraged with state policies that promote a demand-driven workforce system.

The state’s ability to put people back to work will depend on the agility and responsiveness of the workforce system—how public and private organizations are structured and connected, what policies are in place to encourage (or discourage) system innovations and adaptation, and how well the talent supply chain is coordinated. Just doing more of the same will be inadequate and costly.

Further, the COVID-19 pandemic has hit certain populations and communities harder than others, increasing poverty levels and creating instability for millions of Americans. A critical issue facing states will be helping those most affected by unemployment quickly regain their footing and create new opportunities to diversify the longer-term talent pipeline.

The research conducted for this project and input from Delaware employers and training providers points to five overarching issues and challenges that must be addressed in the IT talent strategy.

Delaware employers and job projections indicate five high-demand IT occupational groupings.

- Software and web development
- Networks and cloud computing
- Data management and analytics
- Cybersecurity and systems analysts
- Customer and technical support



HIGHLIGHTED DIVERSITY AND INCLUSION PRACTICES

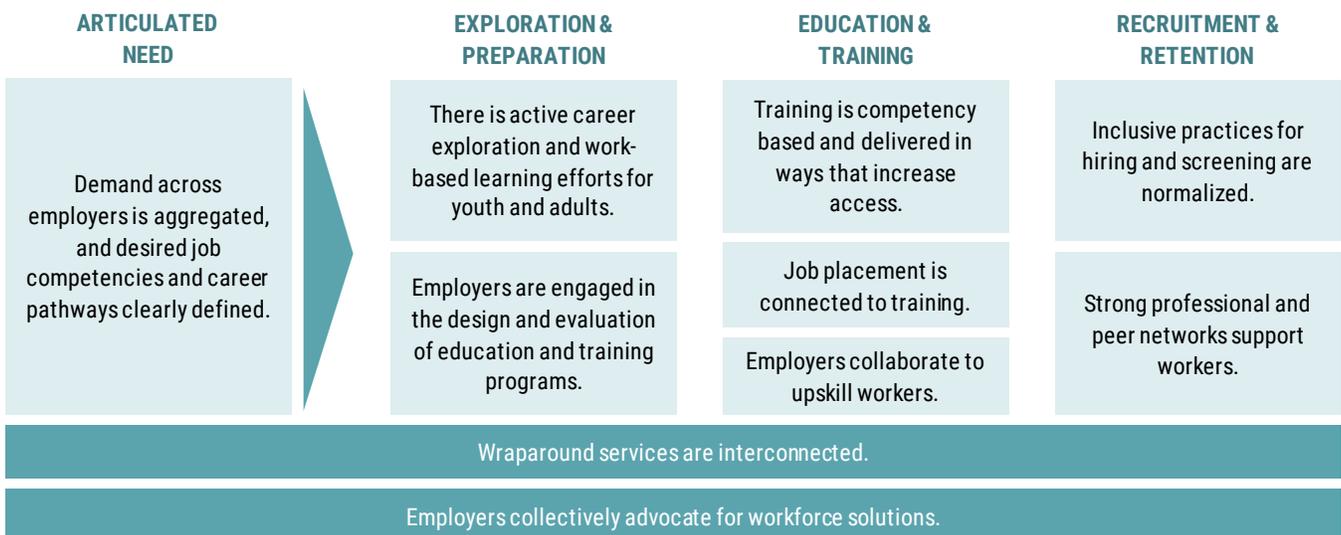
- Diverse leadership in IT councils and strategies
- Widespread use of mentoring and peer programs
- An understanding of the community context surrounding underrepresented populations
- The connection of wrap around services to training and onboarding
- Use of benchmarking practices to promote best practices

- The pace and scale of training needed to fill jobs is demanding new and expanded ways of delivering training.
- Training is no longer just the domain of the public education system; employer and industry-led solutions will be essential.
- With 80 percent of workers needed 10 years from now already in the workforce, solutions require a significant focus on upskilling and retooling adults.
- Inclusion and diversity must be woven into the fabric of all recommendations rather than positioned as separate programs.
- Investments need to be made in system-level infrastructure, not just programs.

Now is the time to use this economic downturn to prepare for the future: to upskill existing IT workers, to retool those unemployed and underemployed, and to make the necessary innovations in training and education practices to increase access to diverse populations.

Overcoming these challenges requires a system with programs and policy elements that are well connected. Figure 1 describes the elements of an IT talent strategy that is the basis for recommendations detailed in Part 3.

FIGURE 1. DESIRED ELEMENTS OF AN IT TALENT STRATEGY



Delaware's size and interconnectedness of organizations provide a unique circumstance to create a more resilient environment for understanding and responding to the changing skill needs of employers in the state. And IT occupations offer the ability to showcase innovative and high-impact practices that can be used for other occupations and industry sectors.

SUMMARY OF RECOMMENDATIONS

Recommendations for addressing IT talent pipeline priorities are categorized in three strategic areas.

1. System-level operations and policies that are foundational to the support of all recommendations.
2. Enhanced efforts to address the skill and training needs of working and unemployed adults, with explicit focus on enhancing the representation of women, rural residents, and people of color in IT occupations.
3. Efforts that further encourage diverse youth to enter and complete IT educational pathways.

Under each of these strategic pillars are recommendations for creating a robust IT talent pipeline by expanding what is currently working, filling high-priority gaps, and creating a systems level approach that leverages resources and enhances access to a more diverse workforce. With recent federal grants and recovery funding, there is a unique opportunity to use expanded resources to fill key gaps and expand programs that are producing results.

SUMMARY OF DELAWARE'S IT TALENT STRATEGY RECOMMENDATIONS



OVERALL GOAL

Delaware has a widely recognized and inclusive it talent pipeline, creating a competitive advantage for the state.



STRATEGY A

Develop a coordinated and demand-driven approach to it talent development

GOAL:

Delaware's systematic approach to addressing IT talent needs leads to responsive and high-impact solutions.

OBJECTIVES:

- A.1.** Establish an IT Sector Council to aggregate employers' needs and create a demand-driven approach to IT talent development.
- A.2.** Significantly enhance awareness of IT careers among both youth and adults.
- A.3.** Develop an IT resource hub that promotes the sharing of information and collaboration among workforce programs and employers.



STRATEGY B

Retrain Residents and Upskill IT Workers

GOAL:

Delaware residents have the IT skills needed by Delaware employers.

OBJECTIVES:

- B.1.** Increase the speed and scale to upskill workers.
- B.2.** Provide greater opportunities for career changers and unemployed residents to enter IT careers.
- B.3.** Transform training structures and supports to help adult learners successfully complete training and find jobs.
- B.4.** Promote the formation and support of mentoring programs and peer networks, especially those that promote diversity in IT.
- B.5.** Expand the scope and scale of foundational skills training required for entry into IT training programs.



STRATEGY C

Expand IT Career Opportunities for Youth

GOAL:

To strengthen student's access to and successful completion of IT education and training.

OBJECTIVES:

- C.1.** Ensure IT career options are widely understood by underserved youth and underscored with work-based learning opportunities.
- C.2.** Expand IT career pathways and boost student enrollment and employer participation.
- C.3.** Increase the number of qualified technology instructors.

Align state policies and resources to accelerate the impact of the IT talent strategy.



INTRODUCTION

BACKGROUND

The Delaware Prosperity Partnership (DPP) commissioned the *IT Talent Strategy* to develop and enable a more inclusive tech talent pipeline, which meets the needs of Delaware businesses and also creates meaningful and gainful opportunities for previously underrepresented Delaware residents. The effort was funded by a workforce readiness grant DPP received from the JPMorgan Chase Foundation in October 2019.

DPP engaged TIP Strategies, Inc. (TIP), an Austin-based economic development and workforce strategy consultancy, to assist in the preparation of the strategy. The consulting team also included workforce professionals Lisa Nisenfeld, president of Working Designs NW, and Pat Scruggs, president of Scruggs & Associates. Over the course of the engagement, the consulting team worked closely with DPP and a project working group of key stakeholders in the state who helped guide and inform the design of the IT talent strategy.

WHY THIS STRATEGY

The purpose of this IT talent strategy is twofold: (1) to support the development of a more robust and flexible IT talent training system, and (2) to strengthen the diversity of IT talent by enhancing the on-ramps for underrepresented populations and rural communities.

Expanding Delaware's IT talent pipeline is essential to the state's short-term and long-term economic prosperity and will be critical to the post-COVID-19 economic recovery. IT occupations play a pivotal role in almost every industry sector in Delaware. They are essential to economic and community infrastructure: enabling telehealth, government services, online education, and remote work; running the software services for online commerce and distribution; and developing the digital technologies that spur innovation in agriculture, financial services, and advanced manufacturing.

With jobs ranging from those requiring only limited training to those with advanced degrees, IT careers offer opportunities for people from all backgrounds, geographies, and skill levels. **Yet, the projected growth rate of IT jobs in Delaware outpaces the supply of workers with adequate skills to fill these positions.**

Delaware has made laudable progress in expanding the pipeline of young people pursuing IT education through its statewide career pathways system. And while work remains to be done (and funded), Delaware must also turn its attention to training and retraining those already in the workforce or out of school to meet existing and future demand for IT jobs and to enhance the diversity and inclusion of the IT workforce.

APPROACH

The design of the IT talent strategy is based on a three-pronged approach. First, a quantitative analysis was performed using public and proprietary data and existing research to develop a tech talent profile for the state. This analysis looked at the occupational composition of Delaware's IT workforce, employment trends, demand for IT jobs, and IT educational program awards and certificates in the state. Second, stakeholder input was conducted with numerous community partners and subject matter experts to gather information about trends, barriers, opportunities, and assets related to Delaware's IT talent pool and to help shape recommendations for making the talent pool more inclusive and diverse. The stakeholder input included multiple virtual roundtable discussions followed by individual interviews and follow-up conversations with representatives from Delaware businesses, nonprofits, educational institutions, and workforce development in all three counties. Third, national best practices and studies were researched and cited as examples for specific strategies within the plan.



1 THE IT TALENT LANDSCAPE

IT PRESSURES EXPERIENCED BY EMPLOYERS

In months leading up to the COVID-19 crisis, IT job postings in Delaware were robust. And recent research by national organizations and input from Delaware employers indicate a continued and, in many cases, deepened need for IT talent. The IT gap is further exacerbated because IT jobs are not just the domain of the private sector: government and education are also large employers of IT talent, including entry-level positions not requiring a 4-year degree. While the number of IT workers looking for work might have increased due to recent spikes in unemployment, employers remain concerned that applicants might not have the desired combination of skill sets needed to move forward. These skills include an increased understanding of cybersecurity, data analytics, and cloud computing, to name a few. Further, as the economy recovers, the demand will again soon outpace the supply of skilled workers.

Crafting IT training solutions requires an understanding of what is driving demand. In April 2020, McKinsey and Company asked chief information officers (CIOs) across the country about IT concerns for their companies. Companies reported challenges regarding the development and rapid deployment of collaboration tools and remote working environments, increased cybersecurity threats, strain on the IT infrastructure and service levels, and new tech-enabled business models. Responding to these challenges has pushed companies to stabilize IT service backbones, refocus IT priorities, and redeploy IT talent to areas of increased need.¹ In Delaware, employers noted similar IT struggles, all while trying to staff expansions with little or no new workforce or budget.

In the interviews and roundtables conducted for this project, employers identified specific trends in the COVID-19 crisis and a post-COVID-19 environment that will affect the type and scale of IT talent needed in Delaware. These pressures included the following.

- Deployment of applications, backbone systems, and infrastructure to support expanding online channels for customers and suppliers.
- Sustained IT support for remote working that is stable and secure.
- Expansion of automated business processes fueled by artificial intelligence and data analytics.
- Intensification of cybersecurity to ensure systems and the information contained within them is fully protected.
- Push to enhance efficiency and lower operating costs of the IT infrastructure and service channels, reassessing legacy systems, and increasing cloud services.

80 percent of workers needed 10 years from now are already in the workforce.

Having the right talent increasingly relies on upskilling those already working.

To meet these challenges, employers recognize that solutions will need to include a combination of rapidly upskilling existing workers and training new adult workers, in addition to educational initiatives to increase new graduates. Input from employers, as well as an assessment of job posting data in the following section, emphasized IT talent needs in five key areas.²

1. Software and web development
2. Networks and cloud computing
3. Data management and analytics
4. Cybersecurity and systems analysts
5. Customer and technical support

¹ Sven Blumberg, Peter Peters, and Christian Stüer, "[After the First Wave: How CIOs Can Weather the Coronavirus Crisis](#)," McKinsey Digital, April 9, 2020. Sven Blumberg, Peter Peters, Gérard Richter, and Christian Stüer, "[A Practical Way for CIOs to Manage IT Costs through the COVID-19 Crisis](#)," McKinsey Digital, April 2020, .

² Additional needs in IT strategy and planning were identified, yet many of these were specialized functions and required high levels of experience.

IT TALENT PROFILE

Information technology (IT) has become the backbone to digital society. Prior to the COVID-19 crisis, the US Bureau of Labor Statistics projected that IT jobs were estimated to grow three times faster than the average for all other occupations. Even in the wake of the COVID-19 pandemic, openings go unfilled because workers do not have up-to-date skills. In addition, recent research³ indicates that the COVID-19 pandemic has accelerated the digital transformation of the US economy, increasing the need for more workers with advanced digital skills.

To help inform the recommendations, the consulting team used public and proprietary data sources and existing research to create a profile of the IT talent in Delaware and the relationship of this key talent pool to Delaware's existing workforce. This includes compiling the historic and projected employment trends for IT jobs in the state and the estimated share of these positions that are currently unfilled. The team also used published data to understand how Delaware's workforce aligns with the job market. In addition, the number of awards conferred for credit (degree and certificates) by Delaware institutions was compiled for relevant IT fields of study to understand how current capacity aligns with demand. Finally, the team reviewed existing reports and studies, including a December 2019 report published by the Rodel Foundation of Delaware, to identify other key characteristics of Delaware's IT talent pipeline.

SUMMARY OF KEY FINDINGS

Delaware's IT workforce is substantial.

Over 17,000 jobs in Delaware are filled by IT professionals. In 2019, that was about 1 of every 29 jobs in the state. Delaware has 6 percent more IT jobs than the national average, yet slower growth in recent years might reduce the state's advantage.

Diversity of IT occupations vary by race and gender.

Overall, IT jobs in Delaware are dominated by white males. Women account for one-quarter of all IT jobs. Among minority populations, Asians are overrepresented within IT occupations, while black and Latinx workers are underrepresented.

IT talent supports an array of industries in Delaware.

Half of IT jobs are found outside the traditional tech sector in areas of finance, healthcare, manufacturing, education, and government. Delaware's concentration of IT jobs in the finance sector is more than three times the national average, indicating a key strength for the state.

Recent growth in IT occupations has outpaced overall state job growth by 77 percent.

From 2014 to 2019, IT occupations grew by 13.5 percent compared to 6 percent for the state overall. This growth was primarily in software application developers and information security operations research analysts. IT occupational growth has been dominated by key sectors for the state, including financial services and management of companies and administrative services.

³ Chris Bradley, Martin Hirt, Sara Hudson, Nicholas Northcote, and Sven Smit, "[The Great Acceleration](#)," McKinsey & Company, July 2020. Aamer Baig, Klemens Hjartar, and Steve Van Kuiken, "[The CIO's Moment: Leadership through the First Wave of the Coronavirus Crisis](#)," McKinsey Digital, March 18, 2020. [The Next Normal series](#), McKinsey & Company.

Job posting analytics show strong demand for IT hiring in Delaware.

From August 2019 to July 2020, Delaware averaged over 4,000 IT job postings and 474 hires per month. From a job-posting perspective, IT jobs account for 6 to 9 percent of advertised jobs in the state.

The number of IT degrees completed in Delaware is rising.

In 2019, five Delaware colleges and universities awarded 1,007 degrees in computer science and information technology, representing an increase of approximately 20 percent from 2 years prior.

OVERALL IT OCCUPATIONAL DATA

Delaware's IT workforce is substantial.

Over 17,000 jobs in Delaware are filled by IT professionals. In 2019, that was about 1 of every 29 jobs in the state. Using the overview of IT outlined in 0, these occupations are grouped into seven distinct classifications as shown in Figure 2 and Figure 3. Programmers and developers form the largest pool of Delaware's IT talent. TIP research counted nearly 7,000 jobs—40 percent of Delaware's IT labor pool in 2019—filled by programmers or developers.

FIGURE 2. DEFINING DELAWARE IT JOBS, 2019

IT CLASSIFICATION	DESCRIPTION	2019 JOBS	2019 MEDIAN WAGE	ANNUAL OPENINGS	TYPICAL ENTRY EDUCATION
Programmers/Devs.		6,963		580	
	Software Devs., Applications	4,748	\$50.45	411	Bachelor's degree
	Computer Programmers	1,081	\$37.56	72	Bachelor's degree
	Software Devs., Systems Software	709	\$57.13	61	Bachelor's degree
	Web Developers	425	\$30.47	36	Associate's degree
Analysts		3,097		241	
	Computer Systems Analysts	2,507	\$45.35	189	Bachelor's degree
	Information Security Analysts	590	\$51.73	52	Bachelor's degree
Network		2,442		185	
	Network & Computer Systems Admins.	1,358	\$37.38	99	Bachelor's degree
	Computer Network Architects	604	\$60.81	43	Bachelor's degree
	Computer Network Support Specialists	480	\$27.86	43	Associate's degree
Support	Computer User Support Specialists	1,984	\$27.09	184	Some college*
Specialized		1,009		83	
	Operations Research Analysts	949	\$40.93	78	Bachelor's degree
	Computer & Info. Research Scientists	60	\$53.91	5	Graduate degree
Data	Database Administrators	822	\$43.92	60	Bachelor's degree
Other	Computer Occs., All Other	879	\$38.25	73	Bachelor's degree
TOTAL IT OCCS.		17,196		1,406	
TOTAL STATEWIDE		496,708		62,717	

*Some college or non-degree credential.

Source: TIP Strategies analysis of Economic Modeling Specialists International (Emsi) 2020.2—Quarterly Census of Employment and Wages (QCEW) Employees, Non-QCEW Employees, and Self-Employed.

Delaware IT wages are slightly higher than national average, yet lower when adjusted for cost of living.

In 2019, the median compensation for computer occupations in Delaware was \$89,840 or 3 percent more than the national median wage. However, the actual purchasing power was 6 percent less when adjusted for regional cost of living (which is 10 percent higher than average). This might make it harder to attract talent to the region (source: Emsi).

Delaware has 6 percent more IT jobs than the national average, yet slower growth in recent years might reduce the state's advantage.

While Delaware has a slightly higher concentration of IT jobs (6 percent higher compared to the national average), the recent growth rate has been lower than the US in general. From 2014 to 2019, Delaware grew IT jobs by 13.5 percent compared to 17.3 percent for the nation. If this trend line continues, Delaware will begin to lose its economic advantage.

More than half of IT workers are software developers (including web development) or analysts (including cybersecurity).

Computer support and network administration account for another 25 percent of IT occupations (Figure 3).

DIVERSITY OF THE IT WORKFORCE

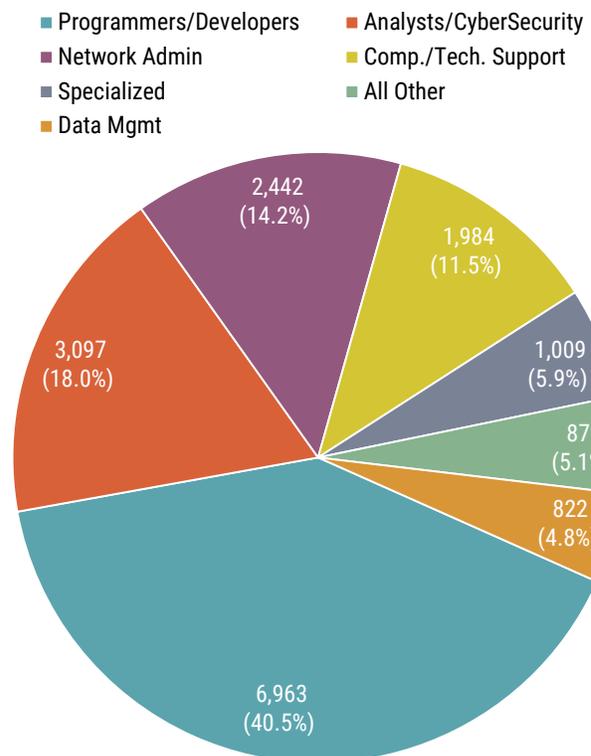
Diversity of IT occupations vary by race and gender.

Overall, IT jobs are dominated by men, with women making up only 26 percent of the IT workforce (Figure 4). In areas like programming, women make up only one in five jobs. While the overall percentage of nonwhite workers exceeds the state's average for all jobs, the mix among races is not proportional. Figure 4. Race, gender, and Age (2019) shows that Asians make up 25 percent of IT workers (nine times the concentration for all other jobs) while black and Latinx workers are underrepresented. A more detailed analysis of diversity by type of IT occupation shows that occupations like software programmers and developers have a more varied make-up than other IT occupations.

There are more IT workers in the prime workforce age brackets of 25–54 than in other jobs.

While there are fewer workers 55 and older, indicating a lower exposure to retirement, the larger percentage of those in prime working-age brackets emphasizes the need to have strong programs that can continually retool the skills of existing IT workers who will remain in the workforce for decades. The below-average percentage of those under 25 is typical of occupations requiring higher education levels.

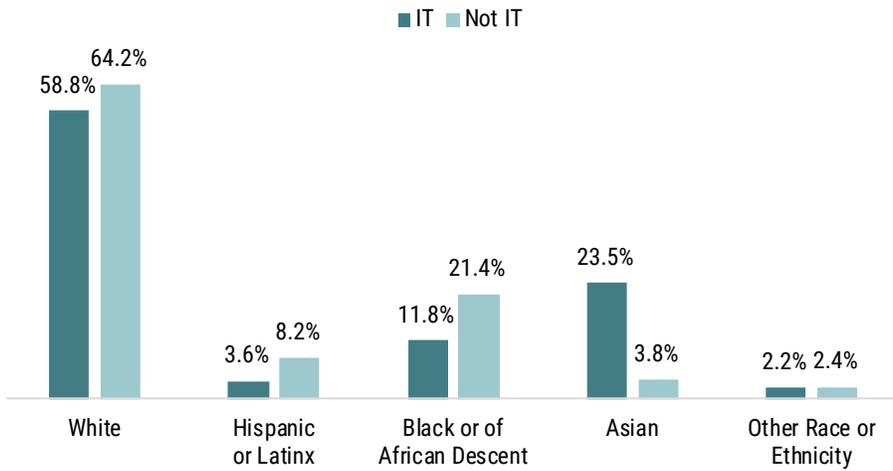
FIGURE 3. DELAWARE IT JOBS BY MAJOR OCCUPATIONS, 2019



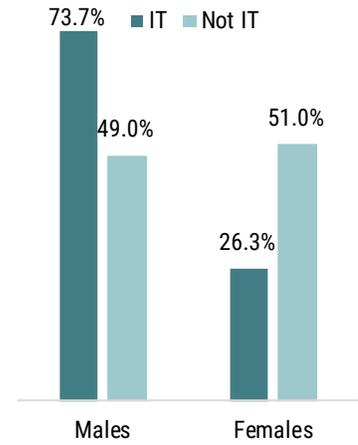
Source: Emsi 2020.2 – QCEW Employees, Non-QCEW Employees, and Self-Employed.

FIGURE 4. RACE, GENDER, AND AGE (2019)

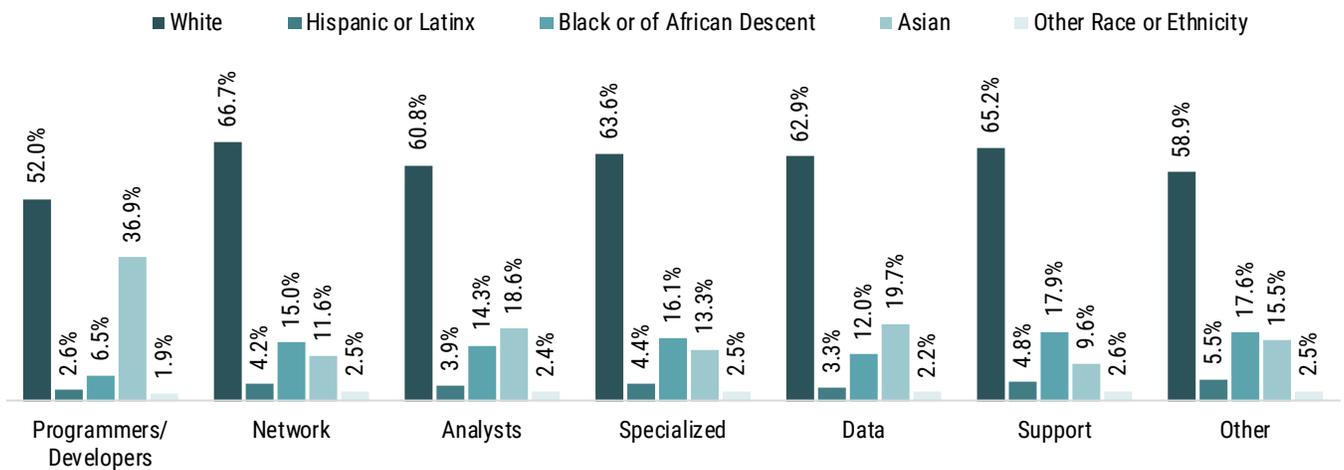
DIVERSITY OF IT WORKERS BY RACE



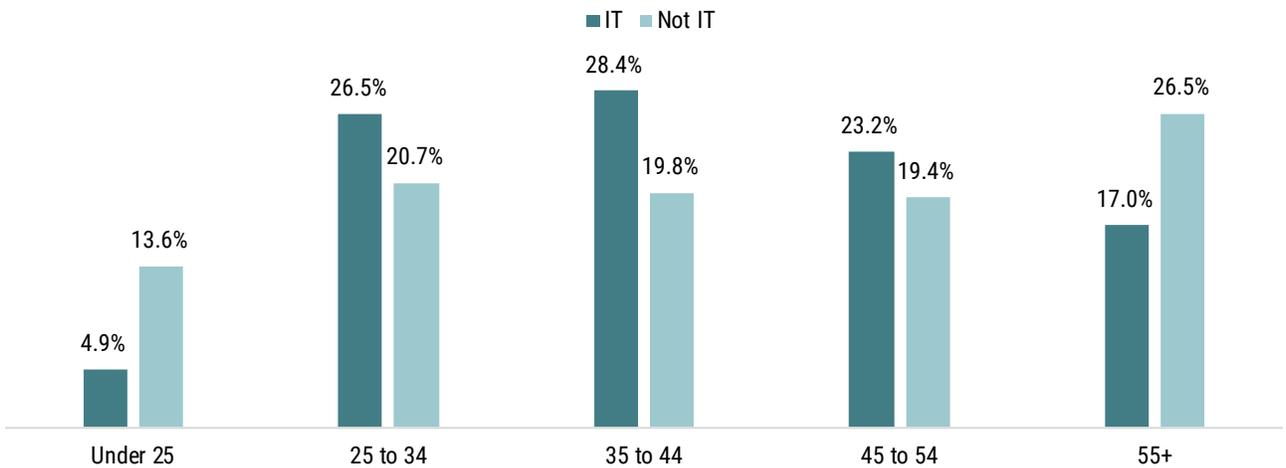
GENDER REPRESENTATION OF IT JOBS



DIVERSITY WITHIN IT OCCUPATIONS



AGE DISTRIBUTION OF IT WORKERS



Source: TIP Strategies analysis of Emsi 2020.2—QCEW Employees, Non-QCEW Employees, and Self-Employed.

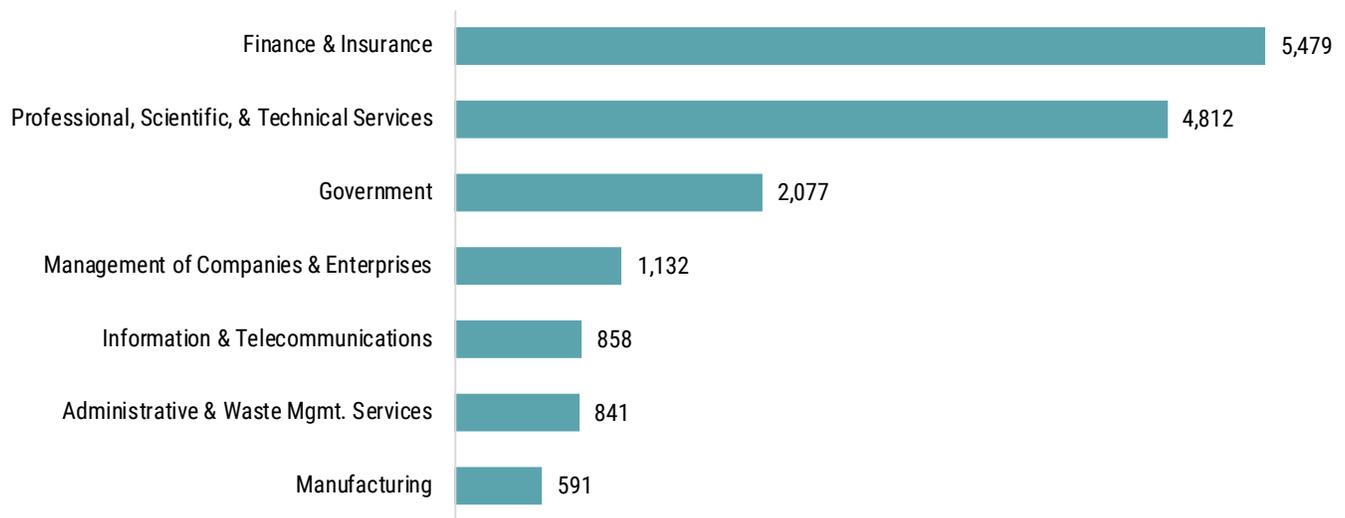
INDUSTRY DISTRIBUTION

Most IT workers do not work in tech firms.

IT jobs can be found in firms across different industries. This is especially true in Delaware, where more than 70 percent of IT jobs fall outside of traditional computer and software companies (found in professional and technical services). As

Figure 5 indicates, financial services account for more IT jobs than professional and technical services. This concentration of IT jobs in the finance sector is more than three times the national average, indicating a key strength for the state. IT and mathematical occupations employ more than 800 workers in administrative services, management of companies, and government, each.

FIGURE 5. DISTRIBUTION OF IT OCCUPATIONS IN DELAWARE BY INDUSTRY, 2019



Source: TIP Strategies analysis of Emsi 2020.2—QCEW Employees, Non-QCEW Employees, and Self-Employed.

OCCUPATIONAL GROWTH PROFILE

Recent growth in IT occupations has outpaced overall state job growth by 77 percent.

From 2014 to 2019, IT occupations grew by 13.5 percent compared to 6.2 percent for the state overall. This growth was primarily in software application developers, information security operations research analyst, and other computer occupations not elsewhere classified (these are typically newer occupations or occupations combining IT skills). These fast-growing occupations highlight areas where additional training capacity should be explored. Like other occupational sectors, there are declining or low-growth jobs. In Delaware's IT occupations, these include traditional computer programming and systems software, areas of potential focus for retooling existing IT workers with current in-demand skills.

Growth in IT occupations has been dominated by key sectors for the state, including financial services, management of companies, and administrative services.

IT job growth in these sectors has outpaced national growth rates, while growth in manufacturing, healthcare, and government is consistent with national trends. However, the state has lost jobs in traditional IT sectors of professional and technical services and information and media, while other regions in the nation grew these sectors.

Swift growth for IT occupations in Delaware is anticipated in the years ahead.

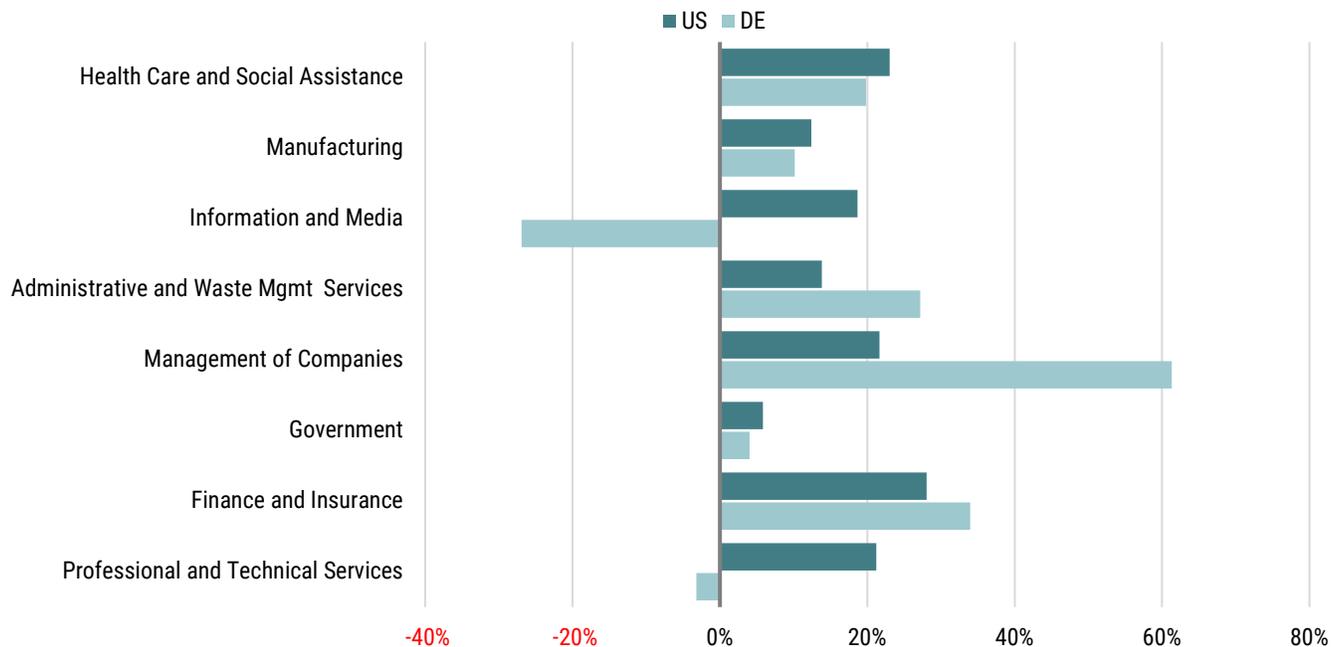
Over 1,400 IT openings are projected each year. This does not include people moving to different jobs or workers moving up within the industry. These projections could be conservative, because they were projected prior to the COVID-19 crisis and the resulting increase in digital infrastructure and jobs.

FIGURE 6. JOB GROWTH IN SELECTED IT OCCUPATIONS, 2014–2019

DESCRIPTION	GROWTH RATE
Computer Occupations, All Other	59.6%
Information Security Analysts	50.0%
Software Developers, Applications	41.4%
Operations Research Analysts	36.4%
Computer User Support Specialists	7.8%
Database Administrators	7.8%
Computer and Information Research Scientists	3.2%
Computer Network Architects	3.2%
Network and Computer Systems Administrators	1.3%
Computer Systems Analysts	1.1%
Computer Network Support Specialists	-0.9%
Web Developers	-2.5%
Software Developers, Systems Software	-7.1%
Computer Programmers	-23.2%
All IT Occupations	13.5%

Source: TIP Strategies analysis of Emsi 2020.1—QCEW Employees, Non-QCEW Employees, and Self-Employed.

FIGURE 7. GROWTH OF COMPUTER OCCUPATION JOBS BY INDUSTRY SECTOR, 2014–2019 (SOC 15-0000)*



Source: TIP Strategies analysis of Emsi 2020.2—QCEW Employees, Non-QCEW Employees, and Self-Employed.

* Standard Occupational Classification system, a federal statistical standard used by federal agencies to classify workers into occupational categories.

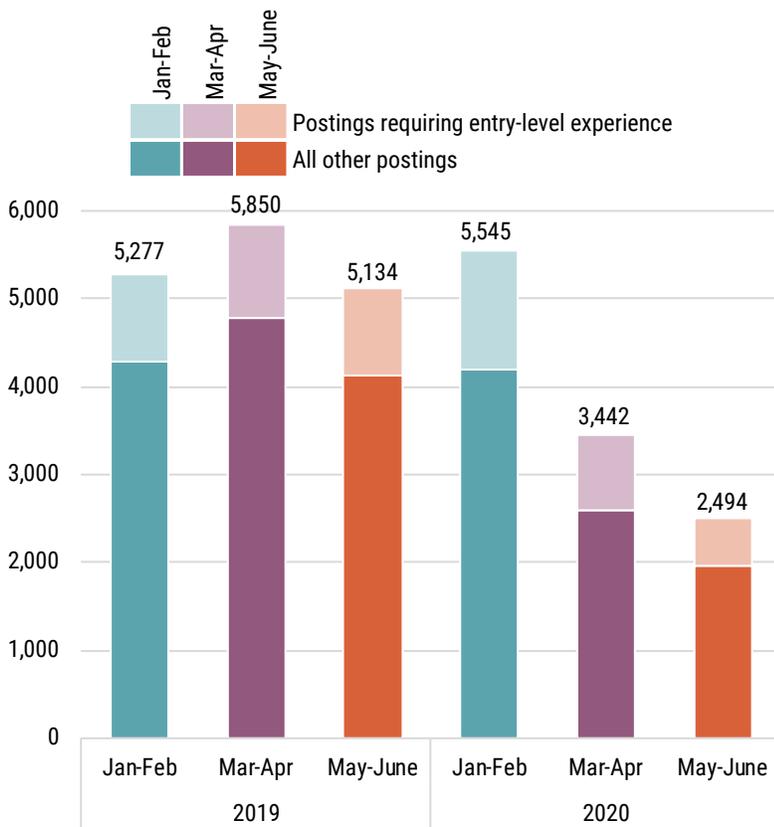
JOB POSTINGS

Job posting analytics show strong demand for IT hiring in Delaware.

From August 2019 to July 2020 Delaware averaged over 4,000 IT job postings and 474 hires per month.⁴ IT occupations account for 3.5 percent of Delaware’s employment base (or 1 in 29 workers as noted above). Yet from a job posting perspective, IT jobs account for 6 to 9 percent of advertised jobs. To understand demand using job postings data, TIP analyzed three periods in 2019 and the same three periods in 2020 to include the impact of the COVID-19 pandemic. Between January and June 2019, nearly 9 percent of all job postings advertised in Delaware were IT positions. Even with the COVID-19 crisis, hiring patterns in 2020 still show relatively high demand for IT jobs—accounting for 6 percent of all jobs advertised—well above the 3.5 percent of state employment that these jobs represent.⁵

An analysis of job postings by experience level can help to estimate the proportion of training that might be needed for upskilling existing workers versus companies looking for new graduates. At any given time, between 15 percent and 20 percent of these postings require less than 2 years of experience, helping to identify the supply for new entrants into the IT field.

FIGURE 8. TARGETED IT JOB POSTINGS IN DELAWARE, 2019 VS. 2020



Source: TIP Strategies analysis of job postings from Gartner TalentNeuron; and Emsi Job Posting Analytics of postings August 2018–July 2020.

Note: Entry-level experience is defined as 0–2 years of previous experience.

JOB POSTING TITLES IN ORDER OF FREQUENCY

1. Software Engineers
2. Java Developers & Engineers
3. Project Managers
4. .NET Developers
5. Full Stack Developers
6. Software Developers
7. Systems Engineers
8. Solutions Architects
9. DevOps Engineers
10. Business Systems Analysts
11. Data Engineers
12. Systems Administrators
13. Scrum Masters
14. Web Developers
15. Front End Developers
16. Big Data Engineers
17. UI Developers
18. IT Specialists
19. Application Developers
20. Big Data Developers
21. Hadoop Developers
22. Network Engineers
23. Python Developers
24. Data Scientists
25. Data Architects
26. Information Security Analysts

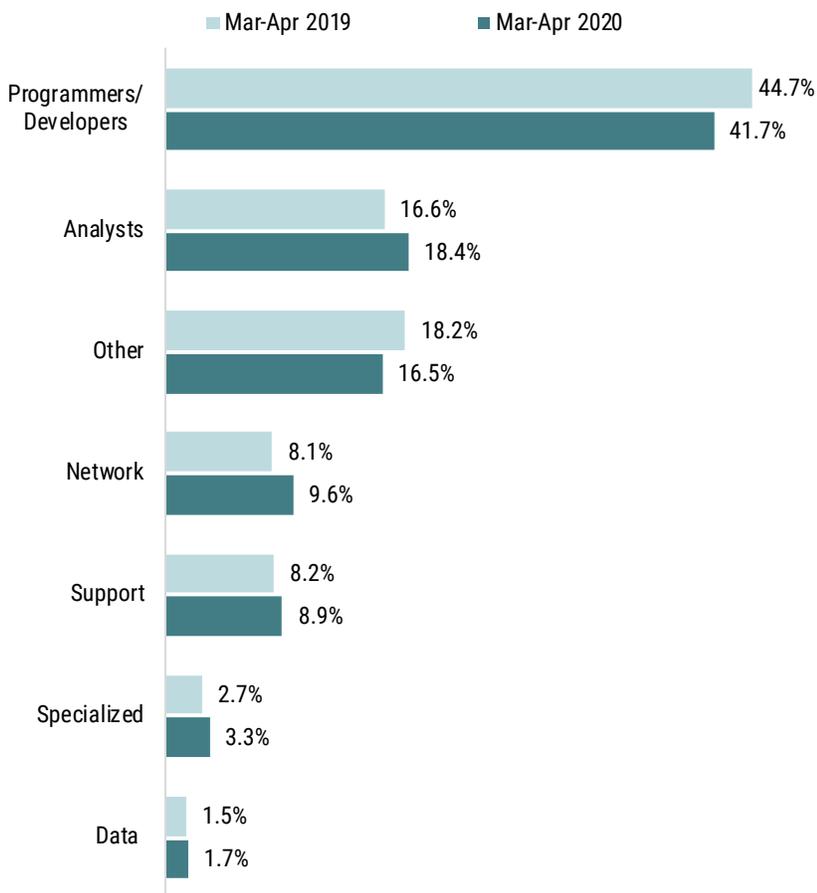
⁴ Source: Emsi job posting data 2020. Job postings are typically much higher than hires due to a variety of factors, however, trends over time provide key insights into demand patterns.

⁵ Readers should note that not all jobs are filled through positions posted online. The type and intensity of jobs posted might differ from actual hiring patterns and existing employment distributions. Nevertheless, job postings are closely followed because they provide a real-time window into employer demand patterns despite any inherent drawbacks in their analytical relevance. TIP analysis of IT job postings was carefully crafted to minimize analytical flaws. For more on the search methodology, see Appendix B.

Even as the number of job postings vary, the distribution of postings among IT occupations remains steady.

While job postings for IT jobs, like all jobs, has declined during the COVID-19 crisis, the distribution of job postings among IT occupations did not change significantly. This is helpful in projecting demand by specific occupation and for aligning education and training programs.

FIGURE 9. DISTRIBUTION OF IT JOBS POSTINGS BY OCCUPATION GROUP



*Significant postings for new entrants

Source: TIP Strategies analysis of job postings from Gartner TalentNeuron.

COMPANIES WITH CONSISTENT IT JOB POSTINGS

- JPMorgan Chase & Co.*
- US Bank
- Capital One*
- Bank of America
- Humana Inc.
- American Express
- ChristianaCare*
- Dupont
- M&T Bank
- Computer Sciences Corporation
- TD Bank
- Citi
- Fiserv
- Anthem, Inc.*
- IBM
- Siemens
- US Army*
- Change Healthcare, Inc.
- Incyte Corporation
- Cognizant Technology Solutions
- Nemours Children's Health System
- Collegiate Funding Solutions
- CarMax*
- AstraZeneca
- University of Delaware*

Gaps in supply and demand can exacerbate competitive situations.

The 2019 Rodel report raised concerns about the competitive landscape for IT talent. As anecdotal evidence, the report cited Barclays' (investment bank and financial services) recent reassignment of more than 500 positions from Delaware to out-of-state job sites. Rodel's report implied a correlation in Barclays' move with job posting activity. Postings slowed in Delaware in 2018, even as they grew rapidly in surrounding states during the same time period. The report used this to underscore the current competitive environment for a skilled, talented workforce.⁶

⁶ Rodel, *Developing Delaware's IT Talent Pipeline Strategic Plan*, December 2019, p. 13.

EDUCATION AWARDS

Education and training data are difficult to compare to the demand for occupations because degrees can sometimes cross into multiple job categories. Furthermore, national databases often only include colleges and universities that participate in federal programs and exclude other training programs, such as coding schools or organizations providing industry certifications. What education and training data can indicate is a basic capacity in a region to train workers within an occupational segment. To understand education and training capacity for IT in Delaware, primary research will be required in the form of a provider survey or similar methods to collect enrollment, completion, placement, diversity, and other data relevant to building a robust IT pipeline in the region. With that said, the following represents snapshots of supply-side data as it corresponds to specific databases.

The number of college and university IT degrees completed in Delaware is rising.

Integrated postsecondary education data system (IPEDS)⁷ data indicates that, in 2019, five Delaware colleges and universities awarded 1,007 degrees in computer science and information technology. This represents an increase of approximately 20 percent from 2 years prior, all coming from an increase in Wilmington University's programs that prepare individuals to assess the security needs of computer and network systems. There was a decrease in completions in general computer and engineering degrees as well as management information systems (MIS) programs.

FIGURE 10. IPEDS DELAWARE IT COMPLETION DATA BY TYPE OF AWARD/DEGREE

AWARD LEVEL	COMPLETIONS (2019)	PERCENT
Associate's Degree	108	10.7%
Bachelor's Degree	338	33.6%
Master's Degree	529	52.5%
Doctoral Degree	32	3.2%

Source: National Center for Education Statistics (NCES) IPEDS, Emsi 2020.2.

FIGURE 11. IT COMPLETION DATA FOR SELECTED DELAWARE COLLEGES AND UNIVERSITIES

CIP CODE*	PROGRAM	COMPLETIONS			
		2015	2016	2017	2018
11.1003	Computer & Info. Systems Security/Info. Assurance	117	98	100	489
11.0101	Computer & Info. Sciences, General	283	367	300	180
14.0901	Computer Engineering, General	66	80	90	100
52.1201	Management Info. Systems, General	109	146	152	65
11.0801	Web Page, Digital/Multimedia, & Info. Resources Design	44	80	78	50
11.0803	Computer Graphics	22	29	30	26
11.1005	Info. Technology Project Management	0	0	0	23
11.0401	Information Science/Studies	25	18	15	20
11.0103	All Other IT & Computer Science Programs	38	36	38	54
TOTAL		704	854	803	1,007

* The NCES Classification of Instructional Programs (CIP) track, assess, and report fields of study and program completions.

Source: NCES IPEDS, Emsi 2020.2.

Note: 2018 was not included due a reporting error in data.

⁷ IPEDS is a system of surveys conducted annually by the US Department of Education National Center for Education Statistics (NCES) to colleges and universities that participate in the federal student financial aid programs.

Delaware's pipeline of degrees is part of a larger regional education system.

In a small state like Delaware, located near large metro regions with significant educational resources, it is necessary to examine education capacity within a broader laborshed. For this analysis, TIP included both the greater Philadelphia and Baltimore metro areas. IPEDS for program awards and certificates in computer and information sciences in the 2014–2017 period shows Delaware's contribution in the larger regional pipeline for IT studies.⁸ The analysis shows that only 12 out of 89 educational institutions with IT programs are located in Delaware, with only a handful of those awarding 20 or more awards per year.

FIGURE 12. NUMBER OF INSTITUTIONS BY REGION

REGION	INSTITUTIONS	INSTITUTIONS WITH IT
Greater Wilmington (Delaware plus Cecil, Maryland, & Salem, New Jersey)	22	12
Greater Philadelphia	168	64
Greater Wilmington-Philadelphia-Baltimore	220	89

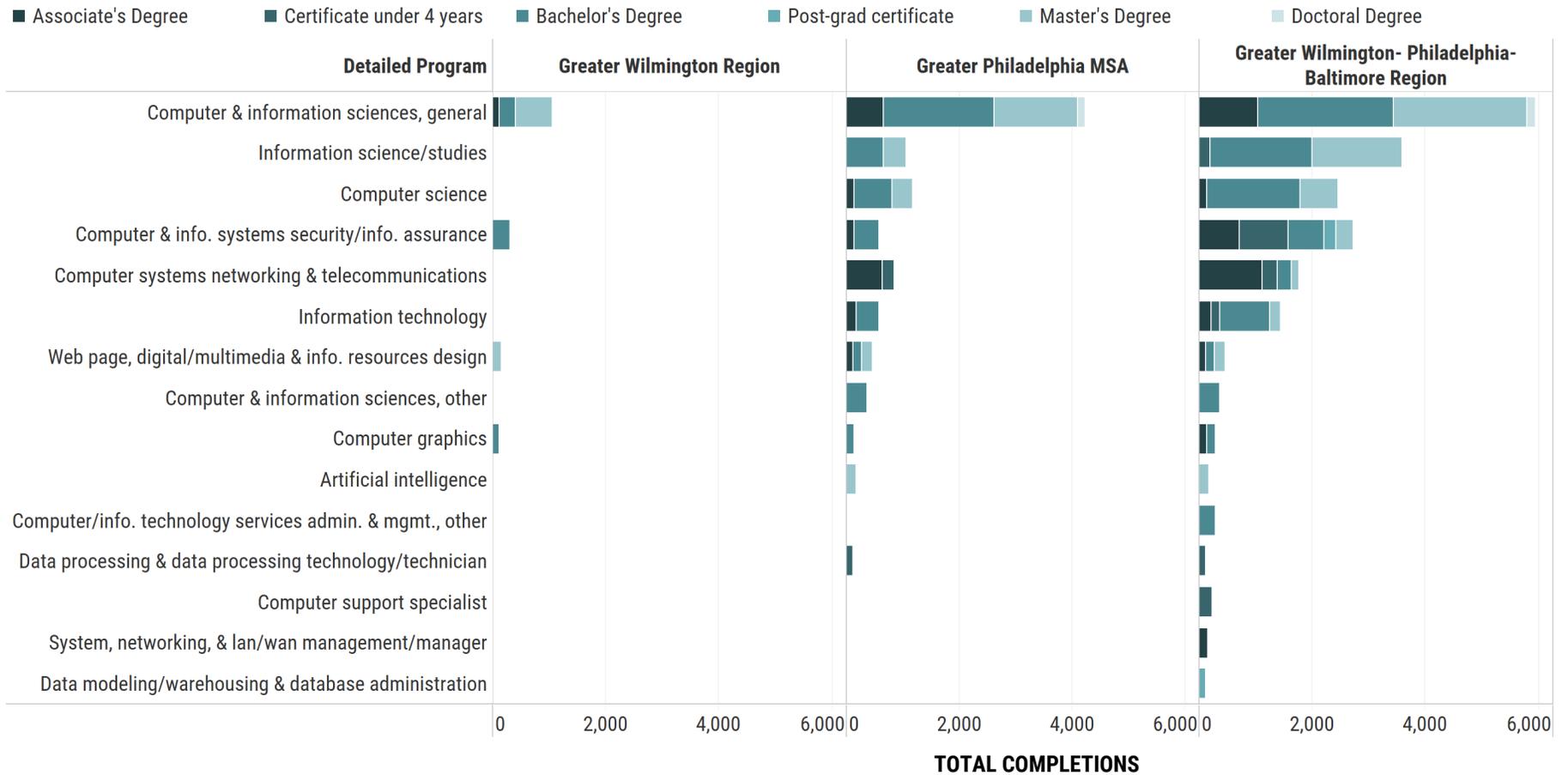
Source: TIP Strategies analysis of NCES IPEDS, Emsi 2020.2.

Notes: Only includes institutions that awarded at least one student annually, 2014–2017. Institutions with IT refers to those that awarded at least one student in an IT program annually, 2014–2017. The Greater Wilmington region comprises five counties and includes the Wilmington Metropolitan Division and the remaining Delaware counties (Kent, New Castle, Sussex, Cecil Maryland, Salem New Jersey). The Greater Philadelphia Metropolitan statistical area (MSA) comprises 13 counties, including the Greater Wilmington region and adding Burlington, Camden, and Gloucester counties (in New Jersey) and Bucks, Chester, Delaware, Montgomery, and Philadelphia counties (in Pennsylvania). The Greater Wilmington-Philadelphia-Baltimore region comprises 22 counties, including the Greater Philadelphia MSA region and adding Anne Arundel, Baltimore, Baltimore City, Caroline, Carroll, Harford, Howard, Kent, and Queen Anne's counties in Maryland.

Figure 13, on the following page, shows that Delaware's IT program offerings are much less varied than the surrounding regions, though this can be partially attributed to a relatively few institutions in the state. Many of these out-of-state institutions, though they lie in close commuting proximity, might have less incentive to cater to the specific needs of Delaware's existing in-state employers, especially for advanced degrees and continuing education.

⁸ IPEDS data shown here reflect the 4-year period of 2014–2017 despite the availability of 2018 data. While tabulating 2018 data, TIP discovered data inconsistencies for an IT program at Wilmington University. Despite attempts to clarify this, TIP was unable to resolve whether this was due to a reporting error or a spike in online enrollments for a specific degree program associated with the Disney Aspire initiative, of which Wilmington University is a participant. To preserve the integrity of the analysis, TIP focused on the years 2014–2017, a 4-year period in which TIP found reasonable year-to-year consistency across all geographies, institutions, programs, and awards.

FIGURE 13. DETAILED PROGRAM AWARDS FOR COMPUTER AND INFORMATION SCIENCES, 2014–2017



Source: TIP Strategies analysis of NCES IPEDS, Emsi 2020.2.

Notes: The Greater Wilmington region comprises five counties and includes the Wilmington Metropolitan Division and the remaining Delaware counties (Kent, New Castle, Sussex, Cecil Maryland, Salem New Jersey). The Greater Philadelphia MSA comprises 13 counties, including the Greater Wilmington region and adding Burlington, Camden, and Gloucester counties (in New Jersey) and Bucks, Chester, Delaware, Montgomery, and Philadelphia counties (in Pennsylvania). The Greater Wilmington-Philadelphia-Baltimore region comprises 22 counties, including the Greater Philadelphia MSA region and adding Anne Arundel, Baltimore, Baltimore City, Caroline, Carroll, Harford, Howard, Kent, and Queen Anne's counties in Maryland. Only detailed programs with at least 100 completions in the period are included.

SWOT SUMMARY

Assessing Delaware's strengths and challenges in addressing IT talent needs

Part of assessing the IT landscape is identifying strengths, weaknesses, opportunities, and threats (SWOT) in the current system. TIP engaged over 60 employers, educators, and government workers in a series of roundtables and interviews to understand the current environment for systematically addressing IT talent needs. *How well is Delaware prepared for the scale of education and training that will be required? What's working and where has Delaware made progress? What threatens the ability to be responsive to employer needs?* Figure 14 summarizes these findings.

FIGURE 14. SWOT SUMMARY OF DELAWARE IT TALENT PIPELINE

STRENGTHS: WHAT'S WORKING	
SYSTEMIC MATTERS	PROGRAMMATIC MATTERS
<ul style="list-style-type: none"> Delaware has a history of public, private, and nonprofit sectors successfully working together on big initiatives (fostered by the state's size). There is an array of stakeholders representing government, education, business, workforce training, and nonprofits committed to increasing diversity, equity, and inclusiveness in the state. Delaware Pathways has built out comprehensive models for young people to pursue careers. 	<ul style="list-style-type: none"> Recent expansion of the state's career pathways for youth and the increased attention on work-based learning experiences. Focused, condensed training programs, such as Zip Code Wilmington, Code Differently, and Goodwill Digital Career Accelerator. Education providers who actively seek engagement with employers to keep their programs relevant. Strong commitment to individual training accounts (ITAs) at the state level.
WEAKNESSES: WHAT'S MOST CHALLENGING?	
SYSTEMIC MATTERS	PROGRAMMATIC MATTERS
<ul style="list-style-type: none"> Recent expansion of the state's career pathways for youth and the increased attention on work-based learning experiences. Focused, condensed training programs, such as Zip Code Wilmington, Code Differently, and Goodwill Digital Career Accelerator. Education providers who actively seek engagement with employers to keep their programs relevant. Strong commitment to individual training accounts (ITAs) at the state level. 	<ul style="list-style-type: none"> A lack of coordination among education and training programs, little cross-referral of applicants. Wraparound services not closely tied to training, inhibiting access for low-income individuals. The lack of stackable education curriculum with industry-recognized credentials so students can demonstrate employable competencies at different stages of their educational progress. Pathways work funded with special grant money and has no sustainable funding base. Recruiting and retaining qualified technology instructors at the secondary and postsecondary education levels.

Continued, next page.

FIGURE 14. SWOT SUMMARY OF DELAWARE IT TALENT PIPELINE (CONTINUED)

OPPORTUNITIES: WHERE CAN DELAWARE MAKE PROGRESS?	
SYSTEMIC MATTERS	PROGRAMMATIC MATTERS
<ul style="list-style-type: none"> • Raise awareness about the array of IT opportunities for people with different skill levels, and adults seeking careers with greater advancement opportunities. • Increase resources, public and private, for upskilling those already in the workforce (including those recently unemployed). • Establish an IT Sector Council that acts as a central voice for employers. • Enhance the alignment of government policies and programs to promote expanded employer engagement in training. • Position Delaware as a premier destination for IT investment and talent. 	<ul style="list-style-type: none"> • Support the creation of employer collaboratives to collectively address training needs. • Improve training and education options for those who can't attend school full-time, both new entrants to the IT workforce and existing IT workers. • Promote more work-based learning opportunities for IT, such as apprenticeships. • Expand IT career exploration programs to include adults with a more intentional outreach to diverse populations. • Focus ITA resources on high-demand occupations that help build Delaware's economy, including IT occupations.
THREATS: WHAT ROADBLOCKS ARE LIKELY?	
SYSTEMIC MATTERS	PROGRAMMATIC MATTERS
<ul style="list-style-type: none"> • Economic disruption caused by the COVID-19 crisis, especially on disadvantaged populations and communities. • Many IT jobs can be portable and happen anywhere; the effects of increased remote working can be both an opportunity and a threat to Delaware. • Structural inability for educators to keep pace with the fast-moving and ever-changing needs for IT training. 	<ul style="list-style-type: none"> • Providing sustained or hard money for career exploration and work-based learning programs that have shown to have measurable impact. • Funding and leadership priorities to develop adult-focused education and training modalities at the pace needed for retooling those in the workforce. • Sustaining employer involvement in training issues when hiring is limited during the pandemic, but when they need to hire, it might be too late to implement training programs.



2

**DYNAMIC AND INCLUSIVE
OPPORTUNITIES TO FILL IT
TALENT NEEDS**

BEST PRACTICE CHARACTERISTICS OF A DEMAND-DRIVEN TALENT STRATEGY

How talent needs are addressed is fundamentally changing, especially in a post-pandemic environment.⁹ Part 2 combines research on factors influencing the future of workforce systems with best practices that are demonstrating success in building a more responsive and inclusive talent pipeline.

Over the past several years, a perfect storm of factors has challenged the efficiency and effectiveness of the current workforce system. These are driving new thought processes on how to address the need for continuous learning. They include the following.

- **The pace of change:** Knowledge is expanding at unprecedented rates and is continually redefining skills and technologies used in workplaces and homes.
- **The degree of change:** Disruptive technologies, like artificial intelligence and machine learning, will require restructuring, not merely modifying, millions of jobs.
- **The scale of change:** The result of rapid restructuring indicates most workers will need to significantly retool skills, if not completely change occupations, to find work over the next decade.

These factors also influence and change how education and training is provided. No longer is knowledge just the domain of the traditional education system. Disbursed models of learning are also disrupting how training is delivered and by whom. Taking advantage of more distributed models and understanding how various models address talent needs will add capacity to traditional education systems. It can also increase access to more people by providing multiple paths. Across the country, there are promising practices that are creating more agile and responsive solutions to meet talent needs of employers. These include the following.

At the end of the day, talent is defined by competencies, not pedigrees.

It is enabled by the continuous adaption of skills, knowledge, and experience.

- **Employer-led training consortiums** working together to cost-effectively upskill workers in industry-specific skills or in competencies, such as supervision, that cut across all businesses.
- **Apprenticeships** in nontraditional occupations, such as healthcare and IT.
- **Structured on-the-job training tools** that provide employers a way to efficiently transfer knowledge from one worker to another, increasing productivity and employee retention.
- Employers and job placement agencies working directly with training providers to ensure candidates entering training are good fits for jobs and **increasing the direct connection between training and job placement.**
- **Sector-based industry councils** that aggregate needs across employers and then work with multiple providers to help clarify talent needs, increase standardization of training outcomes across institutions, and align program expansions with regional industry needs.
- **Community organizations more closely connected to training** and job placement organizations, providing much needed wraparound services, mentoring, and support structures to help those with barriers.

⁹ Andrea Alexander, Aaron De Smet, and Mihir Mysore, "[Reimagining the Postpandemic Workforce](#)," McKinsey & Company, July 7, 2020.

DESIRED VISION AND ELEMENTS OF A TALENT SYSTEM

This IT strategy is based on a shared vision articulated by the employers and the providers engaged in this project.

VISION:

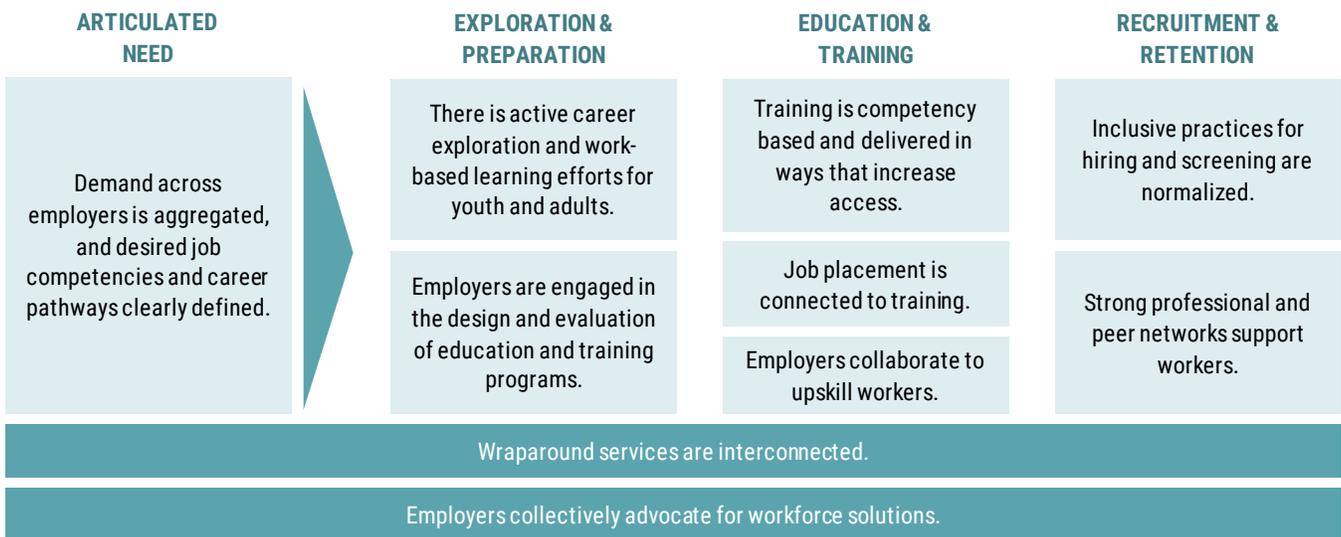
Delaware has a widely recognized and inclusive IT talent pipeline, creating a competitive advantage for the state.

OUTCOMES

- Delaware employers can quickly find and hire qualified talent, because training and education programs are flexible and demand driven.
- There are efficient ways to continuously upskill IT workers to provide Delaware companies a competitive edge.
- Youth and adults are aware of IT careers and the pathways to enter them creating a well-defined pipeline of new entrants.
- The IT talent pool is diverse and inclusive, where people with economic and social barriers are actively recruited and can access training and are supported by mentors and support services.
- Public and private resources are effectively leveraged with state policies that promote a demand-driven workforce system.

Stakeholders in this project repeatedly noted that achieving this vision at the necessary pace and scale will require a systems approach that weaves together different elements of the workforce system. This has been described as a supply chain or an end-to-end customer journey where each step in a student’s or a worker’s journey (discovering a career, gaining necessary training and education, finding a job, and advancing in that job) is interconnected. As with other supply chain models, connecting operations between elements, as well as within a specific element, enhances quality and outcomes and leverages limited resources. Equally important, a supply chain approach enhances diversity and inclusions by intentionally reaching out to and including a wide array of partners. Figure 15 illustrates the desired elements of an IT talent supply chain as described by those interviewed for this strategy. These elements are the basis for recommendations described in Part 3.

FIGURE 15. DESIRED ELEMENTS OF A TALENT STRATEGY



Within this system or supply chain approach, employers and educational providers in Delaware consistently underscored the importance of multiple on-ramps: ways for people to enter, exit and re-enter education and training without losing momentum or having to start their education pathways over. This was underscored by the fact that IT jobs require continuous learning, as new platforms, applications, and business models change rapidly. Participants in this strategy also acknowledged multiple onramps will likely need new or more delivery models for education and training, led by both employers and the public sector.

From these conversations, four characteristics were identified as critical characteristics for creating more on-ramps. These became cornerstones for the recommended strategies in Part 3.

Competency-based training and hiring: Employers are increasingly focusing on skill competencies rather than educational credentials, with many large employers, such as Google, announcing they will no longer require bachelor's degrees for some jobs. This is especially true in IT where job postings tend to emphasize specific industry certifications rather than degrees. As employers increase their focus on competency-based hiring, education and training systems need to reflect this through more curriculum based on stackable credentials.

"We stress that [a] **supply side response is by itself insufficient**: hoping that 'if we skill them, jobs will come,' is an inadequate foundation for constructing a more productive and economically secure labor market."

—David Autor, David A. Mindell, and Elisabeth B. Reynolds, *The Work of the Future: Shaping Technology and Institutions*, MIT Work of the Future, Fall 2019 Report

Adult-focused training modalities: Upskilling and retooling existing workers will require more training modalities that enable working adults and adults with family responsibilities to access and complete training in ways that fit their schedules and situations. This is especially important for low-income individuals seeking to improve their skills, yet unable to take extended time off for traditional education programs. With this in mind, training strategies need to consider *how* the training is delivered as well as its content.

Credit for education: Upskilling programs for workers offered by colleges address specific skill gaps defined by employers or industries. Unfortunately, those completing such training often do not receive college credit for their increased knowledge, requiring them to repeat or undertake extra work to earn a degree. As education and training programs move toward competency-based curriculum and stackable credentials, workers should be able to receive credit for the time spent in training. Akin to dual enrollment in high school and college for youth education, this approach can encourage more people to pursue further education and increase inclusion by shortening the time and reducing the cost of education.

Employer-led training collaboratives: Focusing primarily on increasing the number of graduates from high schools, colleges, and coding schools, while important and essential, will not be adequate to meet demand in the coming decade. Expanding training in the workplace itself is essential, both for new workers as well as retooling and upskilling of existing IT workers. This will require active engagement and collaboration among employers who share needs for specific skills. Across the country, groups of employers, facilitated by neutral intermediaries, are working together to fill the gaps in the rapidly changing skill sets that traditional education systems are not set up to address. By supporting the formation of training collaboratives, employers can deploy training at the scale needed while sharing costs.

BUILDING IN DIVERSITY AND INCLUSIVENESS FROM THE START

Delaware's IT talent strategy has an explicit focus on diversity and inclusion, enhancing opportunities for women, people of color, and low-income individuals to access the training, support, and jobs in information technology that can increase their earning potential. This plan also includes some strategies to address challenges unique to rural residents. Addressing inclusion and diversity is a systemic issue that is critical to the health of the US economy and communities as underscored by the Black Lives Matter movement. There is a real opportunity with the IT talent strategy to integrate diversity and inclusion in every aspect of the workforce continuum, rather than a separate program.

A diverse workforce is an economic advantage for companies, a recruitment factor for workers, and a wealth-building strategy for communities. Companies with a diverse workforce experience significantly higher revenues and profit margins.¹⁰ Research also shows that diversity of the workforce is a key decision-making factor in a worker's job decision. McKinsey surveyed employees on 26 workplace factors related to diversity and inclusiveness and found that diverse, inclusive leadership; merit-based performance; and sponsorships (mentors) were among the most important factors for enabling an inclusive workplace.¹¹

Much has been written about the lack of diversity in technical occupations and the tech industry sector. According to the US Equal Employment Opportunity Commission there are half as many Black and Hispanic workers in the tech sector as in the rest of the private sector, and over 83 percent of leadership in tech-based companies are white. Women are equally underrepresented in IT, especially in leadership positions. (As of 2019, the data and tech industry workforce consisted of only 30 percent women.) Yet, companies with more women in leadership were positively correlated with higher profitability.¹² With women overrepresented in lower-paid occupations¹³ (especially women of color), there is an opportunity to retrain women whose jobs have been dislocated due to the COVID-19 crisis to fill high-demand, entry-level IT jobs and increase their personal wages. This also calls for a concerted effort to increase access to science, technology, engineering, and mathematics (STEM) subjects for black and Latino girls, as well as government programs that provide resources and training opportunities to a wider audience. **This data holds true in Delaware where females make up only one in four IT jobs, and black and Latinx workers are underrepresented in most IT occupations.**

IT jobs offer an array of opportunities for people with varied education and skill levels. Yet current metrics indicate that doing more of the same in the way to reach, train, and place people in jobs is inadequate. People need to be more intentional about diversity and inclusion in every element of planning, implementation, and evaluation of workforce programs, building on promising practices across the country. In this plan, TIP suggests a variety of actions that can be implemented through all aspects and phases of deployment. Some are integrated within specific actions, while other actions are called out to underscore their importance. Undoubtedly, many more ideas and innovations will surface from local communities and employers as the plan evolves, adding to its effectiveness.

¹⁰ Vivian Hunt, Lareina Yee, Sara Prince, and Sundiatu Dixon-Fyle, ["Delivering through Diversity."](#) McKinsey & Company, January 18, 2018.

¹¹ Peter Bailinson, William Decherd, Diana Ellsworth, and Mital Guttman, ["Understanding Organizational Barriers to a More Inclusive Workplace,"](#) McKinsey & Company, June 23, 2020.

¹² "Delivering through Diversity."

¹³ Anu Madgavkar, James Manyika, Mekala Krishnan, Kweilin Ellingrud, Lareina Yee, Jonathan Woetzel, Michael Chui, Vivian Hunt, and Sruti Balakrishnan, ["The Future of Women at Work: Transitions in the Age of Automation,"](#) McKinsey & Company, June 4, 2019.

DIVERSITY AND INCLUSION GOALS OF THE IT TALENT STRATEGY

This strategy is based on building in diversity and inclusion goals at each step of the talent development cycle. They are based on achieving the objectives shown in Figure 16.

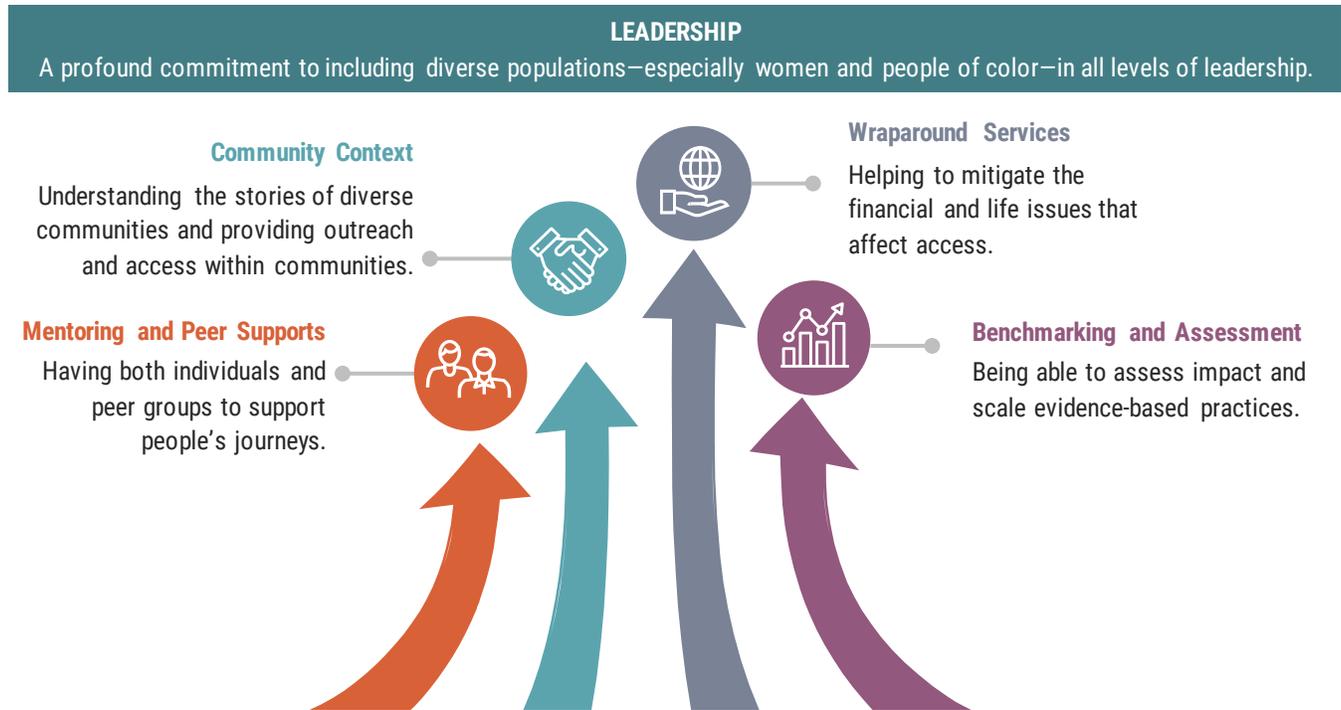
FIGURE 16. IT TALENT STRATEGY DIVERSITY AND INCLUSION GOALS

ENABLEMENT		PREPARATION	EMPOWERMENT	
Career Awareness	Interest & Exploration	Training & Education	Career Entry	Career Advancement
Career info, pathways, structures, and routes to career advancement are widely known and available to all.	Diverse populations can easily access ways to explore IT careers and interests and connect to other diverse workers in IT.	The education and training pipeline for IT reflects the needs of the diverse population it supports—for both youth and adults.	Workers from underrepresented populations are successful at finding IT jobs and feeling valued.	There are clear pathways for career advancements and peer supports to build community within IT occupations.

KEY ELEMENTS

The IT talent strategy seeks to foster five key elements of diversity and inclusion that include leadership, mentoring and peer supports, community context, wraparound services, and benchmarking and assessment.

FIGURE 17. KEY ELEMENTS OF DIVERSITY AND INCLUSION



LEADERSHIP

The diversity and inclusive culture of leadership is often viewed as the umbrella that spans diversity, equity, and inclusion (DEI) elements. Critical to the IT talent strategy is the diversity of current IT leadership in the public and private sectors, the presence of transparent plans and actions to increase the diversity of IT leadership, and the meritocracy that supports on-ramps to these leadership positions. Public and private IT leadership in Delaware (and elsewhere) does not currently reflect the demographics of the state, making it difficult to find high-level women and people of color in IT. Engaging diverse IT workers—including mid-level positions, students, teachers, and others—will be essential for the success of this initiative.

MENTORING AND PEER SUPPORTS

Role models and peers undeniably play a large role in the success of diversity and inclusion efforts. Providing mentors to students is a time-honored strategy. Thoughtfully creating diverse mentors and peer cohort groups in the workplace and for adult learners is equally important. Mentors are key to helping people develop a clear mental picture of success, closely tied to having role models throughout the career journey. This requires diversity in the workforce and leadership of organizations alongside the ranks of teachers and counselors in IT education and training. Peer networks (professional and affinity groups of people with shared interests) create an additional support structure for diversity and inclusion outside the workplace and should be fostered and supported.¹⁴

COMMUNITY CONTEXT

Reaching women and people of color, especially adults seeking better jobs, requires workforce efforts to proactively go into communities rather than relying on people to find specific programs on their own. Establishing relationships in diverse communities also requires strong working partnerships, often built over time, with local organizations and community nonprofits that have established the trust and respect of residents. As inclusive outreach and training strategies are developed, it will be important to include these partnerships and support/fund local organizations for their contributions in providing these critical connections and support services.

In addition, every community, both urban and rural, has unique constellations of assets and challenges. Because there is no single blueprint for successful diversity and inclusion efforts, best practices will need to be customized to specific circumstances. For instance, IT apprenticeships might be a better fit than a traditional classroom-based program in rural areas where the number of IT jobs in certain occupations are limited, or in low-income communities where earn-and-learn options are desirable. It will be important that IT talent strategies have the flexibility to adjust to the community context in which they are deployed.

WRAPAROUND SERVICES

The lives of low-income people tend to be exponentially more complex than the lives of people with access to resources. Any unplanned expenses—health emergencies, auto repairs, traffic tickets, housing instability—can quickly derail training or a job. For returning incarcerated citizens, this can be compounded by probation or parole requirements. Because of this, diversity efforts are frequently stymied by complex factors outside the direct control of employers. For example, a large tech company once worked hard with a local community college to plan a 2-year apprenticeship program that would provide trainees with paid work during training and an industry-recognized certificate. The company worked hard to recruit women from an urban community and were completely mystified when only a few people signed up. Further investigation helped them understand that there was no reliable public transportation between that community and the suburban plant and that childcare covering the 12-hour shift schedule was also not available. Had the company worked directly with human service

¹⁴ [The Inclusion Clearinghouse](#) is a good place to start exploring which organizations might establish or expand operations in Delaware. Its motto is, “Spend less time searching for diversity and inclusion resources and more time using them.”

organizations and public agencies inside that urban community, it would have been aware of these challenges (and potential strategies for solutions) at the outset. Developing these key partnerships in context with communities is imperative.

BENCHMARKING AND ASSESSMENT

While efforts at diversity and inclusion are always ongoing, it is important to understand what is working, why it is working, and how it can work better. While metrics and evaluation processes for diversity and inclusion are evolving, it will be important to identify assessment tools at the onset of this strategy, collect and analyze the data, and then make adjustments over time. This often includes both qualitative data (metrics) and quantitative insights (interviews, focus groups, strategy sessions). Absent credible metrics, programs, and initiatives might provide positive optics and warm feelings but lack substantive and sustainable results.

IMPLEMENTING AN IT STRATEGY IN COVID-19 AND POST-COVID-19 ENVIRONMENTS

The COVID-19 pandemic has hastened digital transformation. It has also challenged many workforce assumptions and provided an opportunity to rethink and reposition how a state can train, attract, and retain talent.¹⁵ Regions that can quickly retool workers to a changing “new normal” will help rebuild existing companies, which will also be more attractive to new companies and startups.

The state’s ability to put people back to work will depend largely on the agility and responsiveness of the workforce system—how public and private organizations are structured and connected, what policies are in place to encourage (or discourage) system innovations and adaption, and how well the talent supply chain is coordinated. Just doing more of the same will be inadequate and costly.

Delaware has an opportunity to use federal recovery funds to help spur needed innovations and target training on high-demand occupations that provide family wages and upward mobility. In the last recession, it became apparent that many states did not have a clear set of priorities for utilizing stimulus funds and missed the opportunity to provide substantial skills training in jobs that would support the rebounding economy.

Further, the pandemic has hit certain populations and communities harder than others, increasing poverty levels and creating instability for millions of Americans. A critical issue facing states will be helping those most affected by unemployment to quickly regain their foundation and creating new opportunities to diversify the longer-term talent pipeline for companies.

Down time is training time. In essence, Delaware needs to use this economic downturn as an opportunity to prepare for the future: to upskill existing IT workers, to retool those unemployed and underemployed, and to make the necessary innovations in training and education practices to increase access to diverse populations.

Delaware’s size and interconnectedness of organizations creates a more resilient environment for understanding and responding to the changing needs of employers in the state. And IT occupations offer the ability to showcase practices that can be useful in other occupations and industry sectors.

¹⁵ “Reimagining the Postpandemic Workforce.”



3

IT TALENT STRATEGY FRAMEWORK

RECOMMENDATIONS FOR DEVELOPING A ROBUST IT TALENT PIPELINE

The following strategy recommendations focus on creating a more inclusive and responsive IT talent pool in Delaware, a strategy that is demand driven and aligned with the state's key industries. With talent as one of the most critical drivers to economic growth and stability, this strategy positions talent development at the nexus of education and economic development. It recognizes that talent is more than just the responsibility of the education system and seeks to promote high-impact, cost-effective actions that leverage the contributions of industry, education, and government.



OVERALL GOAL

Delaware has a widely recognized and inclusive it talent pipeline, creating a competitive advantage for the state.

GUIDING PRINCIPLES

Guiding the recommendations that follow are a set of best practice or guiding principles derived from the input of employers and educators and the findings highlighted in the SWOT Summary. These principles serve as a checklist of sorts to ensure various recommendations are directly connected to the desired outcomes sought by Delaware stakeholders. These guiding principles include the following.

- A robust IT talent pipeline requires a visible and predictable system (or supply chain) for ongoing IT training, not simply a collection of programs.
- A talent system is led by an employer consortium¹⁶ representing IT workforce needs across sectors, guiding training and investment priorities, and recommending ongoing system improvements.
- Diversity and inclusion strategies are woven into the fabric of *all* strategy components, not created as a standalone activity or responsibility.
 - Diversity in this project includes people of color, women, low-income individuals, and returning citizens.
 - Both urban and rural populations will be addressed in this strategy.
- The various skill requirements for IT jobs are effectively met through training and education programs that foster stackable, competencies-based curriculum, allowing for different entry and exit points.
- A significant emphasis is placed on creating pathways for adults and those out of school to upgrade and retool skills for IT careers.
- Because most areas of Delaware are connected to laborsheds in other states, strategies should be expanded to include initiatives in adjoining states when it serves to broaden impact and spread costs.

¹⁶ In Delaware two-thirds of IT jobs are outside of the “tech” sector. In this strategy, employers represent the range of public and private industry sectors with IT occupations, noting that in some regions, local government, education, and healthcare might be the largest IT employers.

SUMMARY OF RECOMMENDATIONS

Expanding Delaware’s IT talent pipeline is essential to the state’s long-term economic prosperity. From the assessment of Delaware’s IT landscape and research on national best practices, TIP identified key opportunities and gaps in three strategic areas.

1. System-level operations and policies that are foundational to the support of all recommendations.
2. Enhanced efforts to address the skill and training needs of working and unemployed adults, with explicit focus on enhancing the representation of women and people of color in IT occupations.
3. Efforts that further encourage diverse youth to enter and complete IT educational pathways.

Under each of these strategic pillars are recommendations for creating a robust IT talent pipeline by expanding what is currently working, filling high-priority gaps, and creating a systems-level approach that effectively leverages resources and scales results.

FIGURE 18. SUMMARY OF DELAWARE’S IT TALENT STRATEGY RECOMMENDATIONS

 <p>STRATEGY A Develop a coordinated and demand-driven approach to IT talent development</p>	 <p>STRATEGY B Retrain Residents and Upskill IT Workers</p>	 <p>STRATEGY C Expand IT Career Opportunities for Youth</p>
<p>GOAL: <i>Delaware’s systematic approach to addressing IT talent needs leads to responsive and high-impact solutions.</i></p> <p>OBJECTIVES:</p> <p>A.1. Establish an IT Sector Council to aggregate employers’ needs and create a demand-driven approach to IT talent development.</p> <p>A.2. Significantly enhance awareness of IT careers among both youth and adults.</p> <p>A.3. Develop an IT resource hub that promotes the sharing of information and collaboration among workforce programs and employers.</p>	<p>GOAL: <i>Delaware residents have the IT skills needed by Delaware employers.</i></p> <p>OBJECTIVES:</p> <p>B.1. Increase the speed and scale to upskill workers.</p> <p>B.2. Provide greater opportunities for career changers and unemployed residents to enter IT careers.</p> <p>B.3. Transform training structures and supports to help adult learners successfully complete training and find jobs.</p> <p>B.4. Promote the formation and support of mentoring programs and peer networks, especially those that promote diversity in IT.</p> <p>B.5. Expand the scope and scale of foundational skills training required for entry into IT training programs.</p>	<p>GOAL: <i>To strengthen student’s access to and successful completion of IT education and training.</i></p> <p>OBJECTIVES:</p> <p>C.1. Ensure IT career options are widely understood by underserved youth and underscored with work-based learning opportunities.</p> <p>C.2. Expand IT career pathways and boost student enrollment and employer participation.</p> <p>C.3. Increase the number of qualified technology instructors.</p>
<p><i>Align state policies and resources to accelerate the impact of the IT talent strategy.</i></p>		

POLICY RECOMMENDATIONS

State funds and policies are often used to accelerate the impact of a talent strategy and leverage private sector resources. Agencies, such as Delaware Department of Labor and Delaware Department of Education, play important roles by targeting program and investment priorities toward high demand needs, and by using their leadership positions to encourage innovations in the workforce and the education system. The textbox below summarizes the policy recommendations included within the strategies that the state should consider as a foundation for developing talent pipelines.

SIX STATE GOVERNMENT POLICIES THAT SUPPORT AND ACCELERATE AN IT TALENT STRATEGY

1. **Establish an employer training tax credit**, based on best practices in other states, to encourage the hiring and continual training of Delaware residents in key occupations. Ensure the tax credit applies to incumbent worker training, apprenticeships, and internships. Provide additional credit if the workers meet qualifications of the federal Work Opportunity Tax Credit (WOTC), which is available to employers for hiring individuals from certain targeted groups who have consistently faced significant barriers to employment.
 - New York State Employer Training Incentive Program (for training, apprenticeships, and internships)
 - Virginia Worker Training Tax Credit for Manufacturing
 - Kentucky Skills Training Investment Credit program
 - States offering apprenticeship tax credits
2. **Target workforce training funds to high-demand occupations** and work with the Delaware Workforce Development Board to utilize the IT Sector Council as a model for sector strategy work. Ensure that funding for training programs includes educational resources and is systematically linked to support and mentoring resources.
3. **Enhance access to training for low-income and unemployed adults.** Create policies that allow uncomplicated access to IT training for individuals receiving unemployment compensation, Temporary Assistance for Needy Families (TANF), and similar supports. (Note: These recommendations can be applied to any high-demand occupation.)
 - Eliminate the unemployment insurance job search requirement and the TANF 30-hour work requirement for residents enrolled in IT training related to the state's high-demand occupations.
 - Establish a work-share program in Delaware that uses unemployment insurance for part-time layoffs so employers can hold on to key employees and utilize reduced workloads to provide needed training.
4. **Strengthen the importance of career exploration programs.** Adequately support career exploration and work-based experiences for both youth and adults.
 - Provide sustainable funding (moving away from soft money) for youth-based career exploration programs with proven impact and performance metrics. Provide funding for wraparound services to ensure low-income students can fully participate.
 - Develop an IT career exploration program for adults that includes job shadows, skills assessments, and skills labs.
5. **Promote access to quality IT infrastructure**, including full state coverage of broadband infrastructure alongside free or reduced cost internet access for low-income households.
6. **Incentivize and accelerate training delivery models** that are responsive to the needs of both youth and working adults. Specific recommendations include the following.
 - Reward programs that create stackable curriculum, increasing the ability for people to enter, exit, and re-enter education programs as they advance in their careers.
 - Provide credit for continued and customized education programs, so working adults can receive credit for skills training provided by the state's public institutions.

STRATEGY A. DEVELOP A COORDINATED AND DEMAND-DRIVEN APPROACH TO IT TALENT DEVELOPMENT

GOAL: Delaware’s systematic approach to addressing IT talent needs leads to responsive and high-impact solutions.

Successful talent strategies are more than a collection of training programs. They involve systems-level initiatives that guide and connect various activities. Throughout this project, employers and educators identified key infrastructure elements that foster a system that becomes the backbone to an IT talent pipeline. These elements are especially important to ensure inclusion and diversity are integral aspects of all programs. The recommendations in Strategy A represent the foundational elements of an IT talent strategy.

RECOMMENDATIONS

A.1. Establish an IT Sector Council to aggregate employers’ needs and create a demand-driven approach to IT talent development.

Why this is needed.

Input from industry and educators strongly underscored the need for an employer-led workforce system where there is a close connection between supply and demand. It was noted that the current retail model of individual education programs working with individual employers creates fragmentation and a lack of consistent skill standards, is time consuming, and just frustrating. By comparison, national best practices use employer or industry councils that act as a centralized voice to aggregate demand-side needs and act as convenor and facilitator to help education and training providers operate with more focus and clarity.

A.1.1. Establish and fund an IT Sector Council consisting of large and small employers who provide a unified voice for identifying IT talent needs and advocating for responsive workforce solutions.¹⁷ The council will play a lead role in the following areas.

- Aggregating IT demand and identifying core occupational competencies associated with targeted occupations, and then communicating this information to education and workforce agencies/organizations to drive resource allocation and program priorities.
- Promoting diversity and inclusion within the workplace, including inclusive recruitment and hiring practices and greater diversity in IT leadership.



INCLUSION PRINCIPLES AND PRACTICES

- Ensure that membership of the IT Sector Council and its working groups are diverse (this might mean reaching beyond corporate-level leadership). Develop a transparent plan to increase diversity.
- Develop a discipline of listening to diverse voices; hold regular conversations on the challenges faced by diverse populations. Include discussions in annual IT summit.
- Promote the sharing of best practices for inclusive screening and recruitment processes.

¹⁷ An earlier project funded by the Rodel Foundation suggested forming such a council. Work began in 2019 to establish the Delaware IT Council, which was postponed during the early months of the COVID-19 crisis. On July 16, 2020, Tech Hire and Delaware Technical Community College convened additional employers to expand participation in an IT Council. While best practices indicate that the council be housed at a chamber or economic development organization, as of this writing, the group has not made any decisions on an administrative home.

- Acting as a collective advisory council to education; training providers to clearly articulate IT skill competencies; and helping to enhance effective delivery of education and workforce programs.
- Identifying and promoting collaborative employer-based training models to help upskill existing workers.
- Advocating for state policies and investments that enhance the ability to continually train and retool workers for high-demand jobs and leverage private sector investments.

- A.1.2.** Identify an organizational home and a paid experienced professional staff person to manage the council, connect the council's priorities to appropriate partners, and maintain employer engagement in various talent initiatives. The recommendation is to house the council at the Delaware State Chamber of Commerce or the Delaware Prosperity Partnership.
- A.1.3.** The IT Council, in collaboration with the Delaware Workforce Development Board and Delaware Technical Community College (Del Tech), should host an annual IT summit that convenes industry, education, workforce training, and nonprofits to discuss talent needs and identify (1) technology trends that will affect education and training programs; (2) how those programs can be enhanced or scaled to meet critical needs; and (3) approaches to improve access and success of diverse populations to education, training, and jobs in IT.
- A.1.4.** The IT Council should convene regular employer best practices workshops and seminars around targeted topics common among IT employers, such as screening and hiring practices that promote inclusion and practices on enhancing mentoring and internship programs.
- A.1.5.** Develop employer-led training programs where groups of employers can upskill workers on common skill gaps, such as project management or team communication or new technical skills.
- A.1.6.** Use the IT Council to identify priorities for IT training programs funded by the Coronavirus Aid, Relief, and Economic Security (CARES) Act and use the IT Council to connect graduates of training programs to open jobs.

Who and How

In most other states and regions, industry councils typically reside within an organization aligned with business and industry—an industry association, chamber of commerce, or economic development organization—to easily convene employers and to avoid the appearance of conflicts of interests associated with any single education organization. Delaware's size makes it unique in that it has only one community college system, one workforce board, and a limited number of industry associations. Therefore, the partners involved in operating and supporting the IT Council might look different than other regions (see Appendix C for details on how industry councils are structured in other regions).

Currently Del Tech, though the Office of Work-Based Learning,¹⁸ has been supporting the development of industry councils for several industries including IT, primarily through expanding career pathways. In addition, a recent grant from the Delaware Department of Education has provided 3 years of funding for expanding employer engagement in pathways, including the support of industry councils. These funds will be important in helping to solidify the operation of an IT Council and provide needed support for operations.

Regardless of where Delaware's IT Council is housed, it will be important that its charter goes beyond the support of career pathways and addresses industry competitiveness issues related to talent that are not training related (diversity, retention, compensation, etc.), and strategic/system level issues related to talent policies and resources.

¹⁸ The Del Tech Office of Work-Based Learning is an outward-facing organization, not directly connected to Del Tech's training programs.

Being able to address a broader set of talent issues might require structured partnerships with key organizations, including the Delaware State Chamber of Commerce, Delaware Prosperity Partnership, and others. In addition to those considerations, the IT Council will want to carefully examine the neutrality—both perceived and real—of any host organization. Lack of perceived neutrality or any compromising of accountability could become impediments to broad private sector participation.

Funding to start sector councils often includes public (workforce or economic development funds) or philanthropic sources, or a combination of these, with the private sector providing specific in-kind or matching funds. Ongoing funding typically includes contributions or sponsorships from employers as well as grant funds to carry specific roles.

Examples

- Sector industry councils that worked in a structured and collaborative manner with education and workforce include the following.
 - UpSkill Houston. <https://www.houston.org/upskillhouston>
 - Tampa Bay Works. <http://tampabayworks.org/>
 - Mass Technology Leadership Council (MassTLC) 2030 challenge to increase diversity. <https://www.masstlc.org/WeCommit/>
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A.2. Significantly increase the awareness of IT careers among youth and adults.

Why this is needed.

Employers and providers alike identified a need for greater public understanding about IT careers. Many participants noted a lack of awareness about the breadth of IT occupations, which can lead to common misperceptions (such as a need for a 4-year college degree, or that IT jobs are not for creative types). These perceptions and biases are not just found among youth and adult workers, but guidance counselors, workforce staff, and other people who influence education and career decisions. The lack of accurate information on IT occupations limits the number and diversity of people interested in these careers.

A.2.1. Utilize input from the IT Sector Council and others to create a public awareness campaign that increases statewide understanding of IT careers.

- Illustrate the broad nature of IT jobs with their range of educational requirements and opportunities for career changers.
- Pay special attention to highlighting diversity in Delaware's IT community and targeting outreach to underserved communities.
- Host awareness workshops for workforce system staff, educators, and community nonprofits to increase the level of knowledge about IT careers among those providing formal and informal career guidance.



INCLUSION PRINCIPLES AND PRACTICES

- Develop videos of diverse populations who work in IT, especially those who have succeeded through nontraditional pathways (people without 4-year degrees, immigrants, returning citizens, people with disabilities, etc.) Ask what worked for them when they were exploring jobs and careers and their advice for others.
- Provide adequate resources to market career exploration to diverse populations and communities. Organizations with career awareness and exploration programs should come to the communities, not expect communities to come to them.

A.2.2. Connect the statewide campaign to Delaware Prosperity Partnership's efforts to broadly market and promote Delaware as a premier destination for high-technology jobs, investment, and talent.

A.2.3. Utilize the leadership position of the IT Sector Council to promote greater ongoing relationships among employers and workforce and education providers.

Who and How

The vision of the awareness campaign expressed by IT leaders in Delaware is one akin to campaigns that market a state or region as a great place to live or work. Content is dynamic and highly visual, with an array of videos showing how different people of diverse backgrounds and ages found their way to IT careers. Many of these sites have industry sponsors with direct links to job postings. In a sector such as IT, students in IT education and training programs can be used to help produce aspects of the campaign, such as developing a website, creating video, assisting with digital marketing. This provides hands-on experience for students (including adult workers changing careers) while also maximizing the use of resources.

The media materials are backed by a well-articulated public relations strategy that provides information and establishes key working relationships between the IT Council and its employers and key agencies and institutions that direct workforce and education resources. Examples include the hosting of an annual summit as described in A.1.3.

Delaware Department of Labor Workforce Development Board, Delaware Department of Education, Delaware Prosperity Partnership, and large IT employers all have a stake in developing this type of career awareness campaign and should share in the cost of its development and implementation.

Examples

- CompTIA. <https://www.comptia.org/content/it-careers-path-roadmap>
 - Make It. MSP. Tech. <https://makeitmsp.org/tech-in-msp/>
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A.3. Develop an IT resource hub that promotes the sharing of information and collaboration among workforce programs and employers.

Why this is needed.

Throughout this project, employers and providers noted a lack of centralized information about IT education and training programs. Providers also noted fragmentation among training programs that resulted in lost opportunities for applicants when they failed to qualify for one program and could not be rerouted toward another program. These challenges also hinder the ability to connect training completers with jobs.

A.3.1. Develop and maintain an inventory of IT education and training programs. Create an inventory of programs describing key elements, such as industry credentials received, time and intensity of training modality, requirements for entry, completion and job placement rates, and connections to and engagement with employers.

A.3.2. Create shared resources for enhancing cross-promotion of programs. Establish collaborative tools that are utilized across training providers to create a network of cross-referrals and coordination. These can include the following.

- A shared assessment tool with information about each provider's minimum and preferred qualifications, helping providers steer applicants to other appropriate programs if they do not qualify.
- A single web portal for applicants to express their interest and complete initial assessment information, followed by referral to specific programs or opportunities.

A.3.3. Strengthen connections between training and jobs. Utilize the membership of the IT Sector Council and IT job placement agencies to help training programs more effectively identify applicants entering programs and connect completers to jobs. Specifically, this includes the following.

- Engage employers in helping to refine application and screening criteria to better align with job expectations and to enhance the diversity of the applicant pool.
- Work with groups of employers and placement agencies to establish placement agreements and other means of directly connecting graduates to jobs.



INCLUSION PRINCIPLES AND PRACTICES

- Include wraparound support services and peer networks in the inventory of programs.
- Use assessment tools and application processes that have been adjusted to eliminate bias.
- Promote the use of a resource hub to workforce offices and organizations that work with diverse populations to increase the number of women and people of color expressing interest in IT careers.

Who and How

Most resource hubs have a strong connection to a sector council yet are managed by an intermediary organization with appropriate capacity and capabilities. Funding for a resource hub typically comes in two phases, a development phase and an ongoing operation phase. Typically, state and philanthropic resources are used to develop the initial backbone of a resource hub, and ongoing funding relies on a combination of private and public funds. Intermediary organizations that manage these programs are typically selected through a competitive bid process.

STRATEGY B. RETRAIN RESIDENTS AND UPSKILL IT WORKERS

Goal: Delaware residents have the IT skills needed by Delaware employers.

Approximately 80 percent of workers who will be in the workforce 10 years from now are already in it. Additionally, the skills needed in technology are changing constantly, requiring constant training and retraining to keep up. This strategy element focuses on adults—those whose skills can be upgraded within the workforce as well as those who are either unemployed or underemployed. The centerpiece of this strategy is substantially expanding the scope and scale of these training efforts, along with services to help people succeed in their training and placement.

RECOMMENDATIONS

B.1. Increase the speed and scale of upskilling existing workers.

Why this is needed.

Companies large and small need to be retooling their technology workers at a dizzying pace and having multiple options for providing that training—both inside and outside the workplace—is critical to success. In addition, upgrading existing workers within an organization is a cost-effective approach to filling vacancies and expanding the workforce, allowing companies to capitalize on existing talent while also opening more entry-level jobs to others entering the IT field.

B.1.1. Establish employer-led consortiums where groups of employers work collaboratively to cost effectively and more rapidly train existing workers in key skills needed across IT occupations (e.g., project/team management).

B.1.2. Develop and share tools across employers that help small- and medium-sized employers create and refine structured on-the-job training (OJT) programs to onboard or advance workers.

B.1.3. Maximize use of Workforce Innovation and Opportunity Act (WIOA) funds for incumbent workers to upgrade skills of existing workers, providing incentives to leverage employer training funds. Up to 20 percent of adult and dislocated worker funds might be spent on this. States have used it efficiently to upgrade existing workers, then backfilling those positions with new, entry-level workers through the workforce system.

B.1.4. Enhance the ability for workers to attain educational credentials by extending access to and affordability of next-level education.

- Establish deferred tuition agreements between employers and educational institutions for entry-level employees seeking an associate’s degree or a bachelor’s degree.
- Extend college credit for badges or competencies earned through continuing education/workplace learning divisions of Delaware institutions. Educational institutions should work with the IT Sector Council to identify key skill competencies that can be used to pilot this approach.



INCLUSION PRINCIPLES AND PRACTICES

- Connect employers with best practices in DEI, so they are not reinventing work.
- Recognize particularly successful employers and their specific DEI practices with joint awards from community organizations and the governor.

- B.1.5.** Establish a training investment tax credit for employers based on best practices in other states, encouraging the hiring and continual training of Delaware residents in key occupations. Such a tax credit should apply to incumbent worker training, apprenticeships, and internships and provide additional credit for workers who meet qualifications of the federal Work Opportunity Tax Credit (WOTC).

Who and How

Most employer-led training consortiums are connected to workforce sector strategies. Since 1990, many states have funded sector strategies through state and local funds, WIOA, and support from employers to develop collaborative approaches to training. Competitive federal grants and economic stimulus money have also been used for the establishment of employer consortiums, then maintained through employer contributions. This work has been documented by organizations such as the Aspen Institute, the US Department of Labor, the National Governors Association, the Urban Institute, and others.

Accrediting customized training or other training provided in the workplace is a challenging issue in higher education because the courses do not go through rigorous (and time-consuming) approval protocols prior to implementation. Providing credit for experience is certainly not new, however. Credit for training is a hybrid of traditional classroom training and hands-on experience and might be approached on the same basis. The IT Council might want to explore partnerships and investments with accredited institutions that are more experienced in this model and are motivated to keep up with the needs for quick implementation of training for ever-changing technologies.

Finally, as noted, state tax credits to encourage employer investments in worker training have been implemented successfully in several states, generally led by the governor's office because multiple state agencies need to be involved.

Examples

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- Oregon BioPro is an example of an employer training consortium, operated under the state's bioscience industry association, where companies work together to design and deliver skills training. <https://www.oregonbio.org/biopro/>
 - Texas Skills Development Fund for Employers is an example of using state funds to help employers developing training programs. <https://www.twc.texas.gov/businesses/skills-development-fund-employers#overview>
 - Oregon Smart Talent is an example of an OJT model that can be supported by these types of state funds. <https://www.nist.gov/blogs/manufacturing-innovation-blog/holistic-approach-developing-modern-manufacturing-workforce>
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B.2. Provide greater opportunities for career changers and unemployed residents to access training and enter IT careers.

Why this is needed.

Many onramps and modes of training are needed for adults if Delaware is to scale up its training to produce the necessary number of IT workers. IT jobs are considered springboard occupations because of their upward mobility. They pay 119 percent more than the average wage and provide a pathway to economic self-sufficiency for Delaware residents.¹⁹ Therefore, workforce investments in this type of training produce significant impact. Yet a “build it and they will come” approach will not help training programs achieve success. Few adults, especially those without friends and family in tech jobs, understand the breath of opportunities in IT or the onramps to training. Without more intentional efforts in reaching adult learners, Delaware will have a difficult time filling high-demand jobs, and training programs cannot operate at the scale needed.

B.2.1. Create broad awareness about the array of IT opportunities, especially entry-level and mid-level jobs requiring less than a 4-year degree.

- Utilize awareness campaign materials created in Strategy A.2 to train counselors in one-stop centers, high schools, colleges, universities, and community organizations to understand the opportunities in IT across industries, especially opportunities that do not require a bachelor’s degree.
- Establish an adult career exploration and assessment program for IT that exposes residents to IT career options and determines qualifications (prequalifies them) for various training and education programs.

B.2.2. Expand the scale of IT training by focusing workforce resources on key occupations as defined by employers.

- Target WIOA and state workforce resources (e.g., at least 25 percent) for training in IT skills approved by the IT Council. Economic stimulus and other training funds should be similarly targeted when available.
- Increase the number of IT certificate completions substantially over the next 5 years. The IT Council should set types of certifications and numerical goals in concert with the state Workforce Development Board. This will also require tracking training results by occupation.
- Maximize utilization of student financial aid in tandem with WIOA and other resources to expand enrollments.



INCLUSION PRINCIPLES AND PRACTICES

- Focus recruitment activities (informational workshops, assessments, and coaching sessions, etc.) on organizations and communities that are home to people of color and rural residents. Hold activities in physical locations, not just online (post-COVID-19 crisis).
- Track recruitment, training, and placement data for each target group, evaluating what is working, then do more of what is working. This will require holding back some training resources for course corrections during the year.
- Convene regular focus groups of trainees, teachers, employers, and others (in separate groups) to learn more about what is working and what should be changed.
- Target a portion of all WIOA investments to be focused on returning citizens.
- Train case managers and employers in use of bonding programs for those with felony records. Coordinate with use of WOTC program.

¹⁹ In Delaware, the 2018 median hourly wage was \$19.34. The median among IT occupations (SOC 15-0000) was \$42.42. Therefore, the median IT worker earns 119 percent more than the median worker in the state.

Who and How

Resources for career information and exploration work are generally available using federal and state workforce funds, often supplemented by resources from companies. Exploration programs should include workplace activities, such as job shadows, as well as assessments that provide a realistic picture of how to make a desired career change. The work could be planned centrally, then implemented across the state. This could be led or directed by the IT Council or intermediary described in Strategy A.1. The career exploration components should be made available at no cost to community organizations, school systems, colleges, youth offender facilities, returning citizen programs, etc. After several months of operating, the partners should review which strategies appear to be most successful, what conditions made the success possible, and refine strategies accordingly.

Expanding the scale of IT training in Delaware will require considerable investment. Delaware's workforce board has a strong history of investing in high-demand occupational training, unlike some states. These efforts could be even stronger if the state's Workforce Development Board required that a significant percentage (e.g., 80 percent) of existing training investments, both individual training accounts and cohort training, be spent on key industries and occupations that will strengthen Delaware's economic base, including IT. While developing this targeting strategy might take some time, investments in high-demand IT training could be prioritized immediately with the spending goals adjusted when the full system is rolled out.

Also, Del Tech was recently granted participation in the federal Second Chance Pell Experiment, which allows former offenders to participate in federal student financial aid programs. These resources should be optimized to expand enrollments in IT training.

Examples

- Minnesota has developed CAREERwise, a program for adult learners to explore careers and education pathways. <https://www.minnstate.edu/careerexploration/guide/adult-learners/index.html>
 - Rhode Island's community college system previously ran a hands-on career exploration program for adults that provided career assessments, job shadows, and basic skills labs. It has been eliminated due to the COVID-19 pandemic.
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B.3. Transform training structures and supports to help adult learners successfully complete training and find jobs.

Why this is needed.

With demand outpacing supply of IT workers, developing multiple onramps to retool adults for IT careers will be essential. Few adults, however, can afford to become full-time students for 2 to 4 years. The inability to complete training is exacerbated by the need for many participants to attain foundational skills (often requiring 20 to 40 weeks of basic education) before starting a training program, and by silos in education programs that make it difficult for rural residents to participate. This reality requires greater awareness about opportunities, and it requires that training be accomplished as quickly as possible and be combined with paying work whenever feasible (learn-and-earn efforts such as apprenticeships).

B.3.1. Condense training time for both foundational and technical skills, combining foundational skills with occupational training whenever feasible. This should be a key feature of most training programs for adults. Employers and placement agencies should be connected to these condensed training programs to help with the following activities.

- Develop application criteria to ensure candidates will be qualified for jobs.
- Review curriculum.
- Provide mentors, if possible, and agree to participate in placement services offered by the training organization.

Recovery funds could be used to pilot these connections in two or three IT training programs.

B.3.2. Use best practices in distance learning to link participants from rural areas and reduce overall costs of IT training. For instance, for a specialized course, an educational institution in Wilmington might stream a class to other locations (at other institutions) where there are local preceptors to help distance-learning students. This might require policies from the Delaware Department of Education or agreements among educational institutions to address issues such as shared curriculum and instructors and dual enrollment credit for the participant.

B.3.3. Significantly increase efforts to utilize registered apprenticeships in IT with Delaware employers and residents.

- Establish apprenticeship avenues (such as Apprenti and IBM New Collar) in Delaware, recruiting employers and setting up requisite classroom training.
- Assist employers in learning how to best use apprenticeships and on-the-job training through technical assistance and establishing shared



INCLUSION PRINCIPLES AND PRACTICES

- Locate training in areas most effective for diverse populations. Locations might include employer premises, if available.
- Enhance state funding to expand and support internships for associate's degree programs.
- Develop partnerships between employers and specific training programs, including opportunities for financial support, use of company instructors, mentoring, use of facilities and equipment, etc.
- Create articulation agreements between correctional training providers and postsecondary institutions.
- Decouple fine payment from driver's license suspensions.
- Streamline work verification for those on probation or parole by using paystubs rather than calls or visits to employers.

training programs to prepare supervisors to become successful training coaches.

- Promote utilization of apprenticeships in rural areas and industry sectors that have difficulty recruiting IT workers to enhance employers' ability to attract and develop new workers.

B.3.4. Enhance internships and work-based opportunities for people pursuing associate's degrees or other postsecondary training.

B.3.5. Provide wraparound case management and support services to sustain participants through training, including training stipends or part-time work, childcare and transportation support, and connections to necessary human services, including healthcare. This will require intensive collaboration between human service organizations to unify case management and focus community resources on helping participants make it through training.

B.3.6. Disconnect driving license suspensions from unpaid fines and fees, enabling more Delawareans to commute to work, removing roadblocks to many low-income people. See programs in other states: <https://www.freetodrive.org>.

B.3.7. Consider clean slate legislation to expunge or restrict access to records of past convictions of job applicants. Approximately 80,000 Delawareans have felony records but are not incarcerated. Their job prospects are considerably dimmed by long-ago convictions, even when they have been model citizens for many years. A clean slate program automatically expunges or restricts records for eligible individuals, without having to go through a time-consuming and costly application process. See <https://www.safeandjustmi.org/our-work/clean-slate-for-michigan/>

Who and How

The Delaware Workforce Development Board and the Delaware Department of Education should require or incentivize cohort-based training programs to have a focus on compressed training times and training modalities, such as apprenticeship and integrated foundational skills.

State workforce efforts should provide ongoing support for IT apprenticeships. This includes Tech Impact, which has already become an Apprenti affiliate (a national effort to match employer needs for IT workers with apprenticeship-style training), and nontraditional apprenticeships efforts within the Delaware Department of Education. Delaware might also want to explore the Consumer Technology Association (CTA) and IBM Apprenticeship Coalition, a similar but potentially complementary effort.

A state interagency team (the state of Delaware's labor, education, corrections, youth, rehabilitative, housing authority, and social services agencies) could assess the adequacy of comprehensive support services for trainees in workforce programs, involving community-based partners for both input and solutions.

Wraparound case management will require intensive collaboration among human service organizations in each community. Organizations that specialize in supporting populations, such as returning citizens, collaborate directly with job training programs as well as organizations providing peer support, housing, transportation, and similar services.

Examples

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- Apprenti national. <https://apprenticareers.org/>
 - Apprenti Delaware. <https://apprenticareers.org/locations/delaware/>
 - CTA Apprenticeship Coalition. <https://www.cta.tech/Membership/Member-Groups/CTA-Apprenticeship-Coalition>
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B.4. Promote the formation and support of mentoring programs and peer networks, especially those that promote diversity in IT.

Why this is needed.

Mentoring and peer support (informal and formal groups where people gather around a shared affinity) have been shown to be highly effective elements in helping people complete training and successfully start their careers. They help aspiring IT workers cut through many of the complexities of education and new jobs in ways that programs or classes can't begin to approach. This intervention can make the difference between success and dropping out, even after months of training. Mentors and peer support help develop a mental picture of success, especially success in a job outside one's own family experience. Seeing similar people coping with similar challenges or talking with someone who has already addressed them can be powerful. Others find that being mentored by someone with contrasting life experiences can be helpful in career advancement. Funding and training for mentors and peer supports is an essential strategy for diversity and inclusion.

B.4.1. Develop a mentoring template within the IT Sector Council to train mentors and help companies form structured mentoring programs that pair existing IT workers with new workers seeking to enter the IT field. Establish a rural mentoring effort within the program that uses a combination of in-person and online channels to mentor students and adult learners in rural communities and connect them to broader peer networks.

B.4.2. Improve employers' onboarding processes by developing shared training resources on mentoring and development of successful career advancement programs.

B.4.3. Require mentoring as a component for publicly funded IT training, especially those targeted to rural areas and communities of color. This is especially important for retooling dislocated workers from another occupation into IT.

B.4.4. Support the expansion of peer support or professional groups/chapters that self-identify by occupation or interest, such as Dev Color, Blacks In Technology, and #YesWeCode, which build frameworks of support within underrepresented communities. Publicize the availability of diverse peer/professional groups to learners seeking to enter the IT field and tap these groups for mentors.



INCLUSION PRINCIPLES AND PRACTICES

- **Embed the practice of mentoring in every step of the process.** People who have successfully completed a training program can start mentoring other people as they begin the program. Helping people establish the regular practice of mentoring reinforces their own career trajectory as well as expands the pool of people being mentored.
- Be intentional about developing national chapters of tech organizations serving women and people of color. Connect to chapters in adjoining states.
- Consider implementing a "reverse (or reciprocal) mentorship" program in which newer workers mentor managers regarding the challenges and dilemmas experienced by diverse populations.

Who and How

"For mentoring to boost diversity, it must be a formal, structured program as opposed to an informal one . . . While white males tend to find mentors through their own social networks and can benefit from an informal structure, minorities and women are less likely to get a mentor through an informal program"²⁰ (bold emphasis added).

Mentoring activities could be spearheaded by a working group of the IT Sector Council that taps member companies and IT-related peer/professional groups for mentors. This group would establish a mentoring program

²⁰ Kevin Howell, "[Can Mentoring Programs Improve the Diversity Pipeline?](#)" Dice, June 22, 2017.

(typically one or more companies will have existing programs on which to build) that includes implementation tools and training for companies and mentors. The state workforce system or foundations should help seed the development of the program because it significantly increases the impact of training programs and the retention rate of Delaware jobs. Some peer/professional groups are already present in Delaware. But there might also be times when a national or regional group should be invited by the IT Council (or some subset of employers) to set up a chapter in Delaware.

Examples

- PayPal has multiple mentorship programs; its Unity mentorship program is an employee-led community whose mission is to help women thrive at PayPal. <https://mgte.thefemalequotient.com/case-studies/paypal/>
 - Reverse-mentoring programs are described in a Harvard Business Review article. <https://hbr.org/2019/10/why-reverse-mentoring-works-and-how-to-do-it-right>
 - Medtronic supports its employees through employee resource groups and diversity networks, which are geared toward supporting members both personally and professionally. <https://www.medtronic.com/xq-en/about/citizenship/supporting-a-global-workforce/inclusion-diversity/annual-report.html>
 - Strong examples of peer support networks are Dev Color, a membership group for black engineers, and the Latinx tech-worker organization Techqueria. <https://www.protocol.com/colorstack-stanford-coronavirus-tech-diversity>
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B.5. Expand the scope and scale of foundational skills training required for entry into IT training programs.

Why this is needed.

According to National Center for Education Statistics,²¹ 78 percent of black students, 75 percent of Hispanic students, and 64 percent of white students undertake remedial classes during community college enrollment. It is likely that this need is even greater among potential adult students who have been out of school for a period and have not considered further education because they need to work. Further, most IT training programs require a high school diploma or equivalent for entry. Foundational strategies include digital literacy—defined as an individual’s ability to find, evaluate, and compose clear information through writing and other media on various digital platforms—and it is absolutely required to succeed in any form of IT training (and many other types of training, including the trades) as it now forms the basis for much work-related communication. Many definitions of digital literacy also incorporate the concept of critical thinking, which is perhaps the element that elevates skill to talent.

B.5.1. Increase availability and enrollment in foundational skill training related to IT occupations to meet the need. This will require additional resources and coordination between training providers and the IT Council to assess the scope of the need.

B.5.2. Expand basic digital literacy skills as a part of adult basic education (ABE) and offer standardized digital literacy certificates as a regular part of skill development initiatives throughout the workforce system. This could be extended first in rural areas and other underserved areas where digital skills were reported to be lower than other parts of the state.

B.5.3. Combine foundational skills with occupational skills training whenever possible. The Washington State Integrated Basic Education and Skills Training (I-BEST) program is one innovative example, providing basic skills and language coaches who help students simultaneously complete basic skills or English language competencies with occupational training. Texas has also seen significant success with its contextualized teaching and learning curriculum.



INCLUSION PRINCIPLES AND PRACTICES

- Target resources to people of color, women, rural residents, and returning citizens by funding adult basic education (ABE) and high school equivalency programs in organizations that specialize in helping those communities, working closely with schools and colleges who can help with curriculum and pedagogy.
- Pay participants a stipend for program participation and rewards for achievement.
- Funders can work with community change agents to develop effective approaches and pilots, then shift to ongoing funding so providers aren’t chasing grant dollars only for new ideas.

Who and How

The state of Delaware is already working with community leaders and organizations to address the gaps in academic and related skills among Delaware’s unemployed and underemployed residents. The IT Council should work with the Delaware Workforce Development Board and community partners to help ascertain and develop the necessary scale for foundational training as it feeds into IT occupational skills training.

Additionally, the state of Delaware’s labor, education, corrections, youth, rehabilitative, housing authority, and social services agencies could form an interagency team to incentivize the further incorporation of digital literacy skills into all the foundational skills development programs. (It is likely that these agencies fund or oversee such

²¹ Xianglei Chen and Sean Simone, [Remedial Coursetaking at US Public 2- and 4-Year Institutions: Scope, Experiences, and Outcomes](#), US Department of Education National Center for Education Statistics, September 2016.

programs at some level.) They should work with the IT Council and IT training providers and use national digital literacy standards to specify the competencies needed. Helping low-income and unemployed residents to access complete training will also require these agencies to assess the adequacy of and coordinate comprehensive support services for trainees in workforce programs. Progress should be formally and regularly reported to the IT Council and the Workforce Development Board.

Examples

- Washington State Integrated Basic Education and Skills Training (I-BEST) provides foundational skills (including limited English speakers) simultaneously with occupational skills. This model speeds the training time for participants and is effective in limiting attrition. <https://www.sbctc.edu/colleges-staff/programs-services/i-best/>
 - In Texas, contextualized teaching and learning links the learning of basic skills with academic or occupational content by focusing learning on concrete applications in a specific career context. <https://tcall.tamu.edu/docs/ContextualizingAdultEdInstructionCareerPathways.pdf>
 - The state of Massachusetts has published a helpful guide on incorporating digital literacy into adult basic education. <http://www.doe.mass.edu/acls/frameworks/DigitalLiteracy.html>
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STRATEGY C. EXPAND IT CAREER OPPORTUNITIES FOR YOUTH

Goal: To strengthen student's access to and successful completion of IT education and training.

Across the country, and in Delaware, science, technology, engineering, and mathematics (STEM) and career and technical education (CTE) programs seek to prepare students for careers in technical and professional fields. Yet, most students enter education and career pathways when they can visualize what it looks like, understand how it matches their skills and interest, and are supported by teachers and guidance counselors who can articulate these careers. For students in rural and low-income communities, IT jobs are much less visible and, therefore, appear out of reach. This is compounded by misperceptions that these jobs all require 4-year degrees, which further discourages students with barriers. These recommendations build on the state's STEM and CTE educational foundation and represent ways to increase interest for and access to IT career pathways, targeting students in rural and underserved communities.

RECOMMENDATIONS

C.1. Ensure IT career options are widely understood by underserved youth and underscored with work-based learning opportunities.

Why this is needed.

To expand inclusiveness and diversity with the state's IT talent pool, it is critical for youth, especially those of color and/or living in underserved communities in the state, to develop a firm understanding of what IT is and what the field encompasses. Stakeholders remarked that children of color do not often see IT as a possible career field; being on a computer is more often associated with entertainment rather than a career. Educators and employers must be able to make this career more tangible and relatable in an everyday sense. Moreover, this must start at an early age, including the primary school level through teaching basic digital literacy. It also will require making students more aware of the education and certification pathways to an IT career.

Expanded work-based learning and internship opportunities are an effective way to increase awareness and understanding among youth of IT career options and requirements. Real-life work opportunities also offer students (and adults) the knowledge, skills, and experience needed for entry or advancement in the IT field.

- C.1.1.** Increase educators' understanding and working knowledge of IT careers through digital media, workshops, and other activities (see Strategy A.2).
- C.1.2.** Expand IT work-based experiences and social-enterprise projects for youth by intensifying connections between education and industry in underserved areas and developing more structured approaches for engaging employers. Potential industry partners should include IT firms, employers from other industries who have IT jobs available, and industry associations.
 - Provide resources to support coordination of efforts between the Delaware Office of Work-Based Learning and employers' consortiums, such as the IT Sector Council.
 - Including mentoring as part of work-based learning, so youth develop role models and encouragement beyond any single experience.
 - Develop and disseminate tools to help employers learn to utilize and support youth in IT work experience/summer jobs settings.

- Engage in a marketing and outreach effort to low-income students, including regular surveys to determine their level of understanding of IT career options, digital literacy, and the most effective channels for communicating information to them.

C.1.3. Work with community organizations and training nonprofits to develop multiple onramps and entry points into IT training that allow individuals from underrepresented and rural backgrounds to find the model that best fits their needs based on experience, education, and career goals.

- Develop pre-apprenticeship and education bridge programs to help prepare disadvantaged young people for longer-term training programs by helping to close existing academic and skill gaps. Jobs for the Future (JFF) provides a framework for pre-apprenticeship programs designed to improve outcomes.²²
- Develop a robust data collection program to ensure that youth work-based learning programs in Delaware are having a positive and measurable impact on student outcomes. According to a 2019 report from Advance CTE, a national nonprofit representing state career and technical education leaders, many states and communities lack the ability to collect and use data to improve youth apprenticeship programs.²³ The report also recommends that data should be tracked on a disaggregated basis with respect to such factors as race, ethnicity, gender, career cluster, socioeconomic status, language, and housing. Additionally, establish mechanisms for validating the accuracy of the data.

C.1.4. Utilize technology tools to expand work-based learning opportunities for low-income youth. JFF has catalogued many initiatives, organizations, and tools around the US that are working to expand career exploration and work-based learning opportunities for youth.²⁴

C.1.5. Provide greater financial support and wraparound services to enable low-income students to participate in hands-on experiences and internships. For many low-income and disadvantaged youth, the ability to complete IT training program depends on overcoming financial and life barriers. Greater access to services, such as mentoring, academic tutoring, or housing and transportation assistance, is vital to overcoming existing barriers to students being able to participate in work-based learning programs.

COMMON MODELS OF IT TRAINING PROGRAMS

Apprenticeship: A training model that combines paid on-the-job learning and formal classroom or online instruction to help a worker master the knowledge, skills, and competencies needed for career success.

Boot camp: An accelerated, often private, training program focused heavily on software positions. These programs are usually full time and are tuition-based.

Bridge program: A short-term training program that helps participants close academic skill gaps so that they can enter a longer training program, such as a pre-apprenticeship.

Ecosystem model: An approach that leverages a variety of on-ramps designed to meet participants where they are and provide multiple entry points into a training program.

Certificate program: Programs that are often offered at the community college level, involving classroom training and, in some cases, an internship component.

Internship: A form of experiential learning, often tied to a secondary or postsecondary program of study, in which participants work for an employer under the guidance of a supervisor for a limited period, typically three to six months.

Pre-apprenticeship: A program designed to prepare individuals to enter and succeed in Registered Apprenticeships or other high-quality apprenticeship programs and, ultimately, careers.

Source: Vanessa Bennett and Sara Lamback, [Transforming IT Training Programs into Successful Career On-Ramps](#), JFF, July 2020, p. 7.

²² "JFF's Framework for a High-Quality Pre-Apprenticeship Program," JFF.

²³ [The Role of Data and Accountability in Growing Youth Apprenticeship Programs](#), Advance CTE, 2019.

²⁴ [Promising Trends and Challenges in Work-Based Learning: A Market Scan of Organizations and Tools](#), JFF..

- Adequately fund and connect wraparound services to career exploration and work-based experiences, so low-income students and opportunity youth can more readily participate in and successfully complete out-of-classroom learning experiences.
- Create a scholarship fund for high-achieving, low-income students seeking work-based learning opportunities. Such a scholarship fund could be set up using a mix of public, private, and nonprofit resources and administered by the IT Sector Council or the Delaware Office of Work-Based Learning.

- C.1.6.** Support and expand chapters of national organizations that provide mentoring programs and help students of color, girls, and rural students see themselves in tech careers. Many examples and resources can be found at <https://inclusionclearinghouse.org/>.
- Coordinate mentoring programs with other career exploration and work-based efforts to provide well-rounded experiences for students.



INCLUSION PRINCIPLES AND PRACTICES

- **Raise awareness:** Use videos of diverse IT workers referenced in Strategy A.2 to help diverse high school students see themselves in IT careers and to assist teachers and counselors to more actively promote these careers to students of color.
- **Foster interest:** Promote activities that help diverse young people understand what IT people do and why they might be interested. Job shadows (especially those that persist for a period of time, not just one day) can be effective, as well as internships, class speakers, or demonstration projects.
- **Maintain interest:** Work with employers to adopt a local school: helping schools establish tech clubs, mentoring programs, and other activities to provide multiple touch points for students to explore and pursue IT interests.

Who and How

Expanding awareness of IT career opportunities through work-based learning requires the participation of both schools and employers. The Delaware Office of Work-Based Learning and the IT Sector Council both play a central role in bringing educators and employers together in this effort. In addition, community organizations and nonprofits that are actively engaged with underserved communities and low-income students will be needed to help provide outreach and engagement with these populations.

Examples

- *Delivered in partnership with The Door (New York City), the TechBridge program effectively integrates career exploration and wraparound services into an IT training. <https://www.yasepnetwork.org/tech-bridge>*
- *Seattle-based Code Fellows offers multiple entry points for participants based on their experience and readiness to make IT training accessible to all types of potential and existing workers. <https://www.codefellows.org/>*
- *The Philadelphia Jewish Employment and Vocational Service (JEVS) Human Services provides an IT pre-apprenticeship program that provides foundational IT training and professional development to help young adults transition to a registered apprenticeship, college, or the workforce. <https://www.jevshumanservices.org/program/it-pre-apprenticeship/>*
- *Black Girls Code (<https://www.blackgirlscode.com/>), Code2040 (<http://www.code2040.org/>), and All Star Code (<https://www.allstarcode.org/>) are examples of organizations seeking to increase the number of young people of color working in the IT field by raising awareness of IT career opportunities, dismantling barriers, and offering IT tools and skills.*

C.2. Expand IT career pathways and boost student enrollment and employer participation.

Why this is needed.

Through the Delaware Pathways initiative, the state has been on the national forefront of preparing students for high-demand careers and extending their education beyond high school. Launched in 2014 through the combined efforts of the Delaware Department of Education, the Delaware Department of Labor, Delaware Technical Community College (Del Tech), the Rodel Foundation, and the United Way, the initiative seeks to expand opportunities for Delaware students to access work-based learning experiences, college credit and industry-recognized credentials, and 21st-century skills training to enhance employability. The Delaware Pathways initiative was bolstered in 2018 by a \$3.25 million grant from Bloomberg Philanthropies to expand employer engagement and work-based learning opportunities through the establishment of the Delaware Office of Work-Based Learning.²⁵

Expanding student and employer participation in Delaware's IT career pathways is a critical component to growing the state's future tech talent. Because of the growing importance of information technology to nearly every industry, digital skills curriculum should be incorporated into each of the state's other 15 career pathways programs, in addition to expanding pathways specifically aligned with high-demand IT occupations.

C.2.1. Continually assess and expand IT/digital media career pathways and dual credit programs to provide an array of educational opportunities.

- Align education pathways with industry certifications so students receive credentials as they pursue degrees, providing them with employable skills if they need to pause educational pursuits.
- Continuously assess IT career pathways and require digital literacy skill standards across all career pathways. Promote digital media and online options alongside computer science-based career pathways to underscore both creative and technical aspects of the field.
- Work with the IT Sector Council to define foundational skills that include soft skills required in all IT disciplines. Implement these standards into curriculum across providers.



INCLUSION PRINCIPLES AND PRACTICES

- Create “comeback” routes for students who have dropped out of established pathways.
- Provide financial and/or hiring incentives for diverse students to successfully pursue IT training or apprenticeship, including stipends, scholarships, conditional job offers, etc.

C.2.2. Allow the Delaware Student Excellence Equals Degree (SEED) Scholarship Program to be used for certifications in high-demand occupations and not just 4-year degree programs. Established in 2007, the SEED Scholarship Program offers free tuition at either Delaware Technical Community College or the University of Delaware Associate in Arts Program. SEED scholarships are granted to Delaware residents who graduate from state high schools and meet merit requirements.

- Perform an assessment of how SEED is structured and delivered to ensure that lower-income students can overcome fundamental barriers to succeed in the program.

²⁵ In 2019, RTI International (RTI) was engaged by the founding partners to collect and analyze data on Delaware Pathways to inform program improvement and track outcomes. RTI's analysis found that 91 percent of Delaware high schools offered at least one Delaware Pathways initiative and 25 percent of students participated in a pathway in 2018–2019. In addition, 240 employers representing 20 industries were engaged by the Delaware Office of Work-Based Learning in the Delaware Pathways initiative during the same period.

- Look at expanding the Inspire Scholarship program at Delaware State University to include certifications for high-demand IT occupations.

Who and How

Working closely with the IT Sector Council, the lead partners of the Delaware Pathways initiative will have an ongoing central role in expanding IT/digital media career pathways in the state. Delaware Pathways already assesses program performance twice a year and publishes an annual report of outcomes. This data, along with input from the members of the IT Sector Council, should guide the expansion of IT/digital career pathways in Delaware. Additionally, the state of Delaware should take the lead in assessing the effectiveness of the SEED program and if it can be expanded to include certifications for high-demand occupations. This could include engaging an outside party to perform the assessment and make recommendations for expanding the program.

Examples

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- The Pathways for Advancing Careers and Education (PACE) project has undertaken an evaluation of next-generation strategies for increasing the economic self-sufficiency of low-income individuals and families. PACE includes nine partner programs in 18 locations across the United States. <https://career-pathways.org/acf-sponsored-studies/pace/>
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C.3. Increase the number of qualified technology instructors.

Why this is needed.

A fundamental challenge to expanding IT education programs is the lack of qualified instructors, especially at the secondary education level. Education programs often struggle to attract and retain the most qualified IT instructors due to wage competition with the private sector. Another need is recruiting more people of color into IT instruction and mentoring. Students of color are more likely to consider a career field if they are taught/mentored by someone who looks like them. This requires encouraging established IT professionals from diverse backgrounds to serve as adjunct instructors and mentors for students of color.

- C.3.1.** Implement an industry fellowship program based on national best practice models, where teachers receive industry experience and augmented wages.
- C.3.2.** Enhance the use of industry professionals as adjunct instructors and pair them with full-time teachers. Actively recruit women and people of color.
- C.3.3.** Utilize distance-learning modalities so qualified instructors and industry professionals can reach classrooms that are geographically dispersed.



INCLUSION PRINCIPLES AND PRACTICES

- Make it a priority for training organizations to recruit instructors from diverse populations, creating policies and incentives to recruit people from industry or other government agencies.
- Provide additional training in didactic and other skills, as necessary.

Who and How

Increasing the pool and diversity of IT instructors—both part-time and full-time—is a daunting challenge faced by states and communities throughout the United States. Success will require a unified effort involving public education institutions, nonprofits, and employers. The Delaware Department of Education and the state’s postsecondary institutions should evaluate existing industry fellowship models to see if any could be replicated in Delaware. They should also raise awareness among instructors of various nonprofit and foundation fellowship programs designed to provide instructors with additional training and skills. It will also require employers to be willing to allow and encourage their IT professionals to volunteer their time to teach information technology and digital literacy to secondary students, particularly in disadvantaged/rural areas of the state. The IT Sector Council could play an important role in urging Delaware employers to participate in such efforts.

Examples

- The HP Teaching Fellows program is supporting innovative elementary and secondary school teachers throughout the United States and Canada. Digital Promise Global is offering the program through a partnership with HP, Microsoft, and Intel. <https://global.digitalpromise.org/hp-teaching-fellows/>
- The Woodrow Wilson (WW) Teaching Fellowship is working to attract individuals with backgrounds in the STEM fields into teaching in high-need secondary schools in Pennsylvania. <https://woodrow.org/fellowships/ww-teaching-fellowships/>
- The South Carolina Teaching Fellows Program offers tuition assistance for those who wish to serve in South Carolina’s public schools following graduation. https://www.sc.edu/study/colleges_schools/education/my_coe/gamecock_edquarters/scholarships_and_aid/fellows.php
- Through its Teaching Fellows, Upperline Code is working to transform education by making computer science accessible to all students regardless of race, gender, or income. <https://www.upperlinecode.com/teacher-fellowship>

PERFORMANCE METRICS

To measure the outcomes of IT talent strategies, a set of performance metrics should be established and regularly reported to the IT Council and its partners. These metrics will serve as a report card on progress and provide insights into areas that might require a shift in priority or capacity. Some can be collected through national databases and metrics currently reported by state agencies, while others will require a new annual survey to employers and providers specifically focused on IT talent outcomes. This type of work is typically contracted to a third party (e.g., regional consulting organizations or university research centers) that has experience and capacity to complete this type of effort.

WHAT TO MEASURE	PERFORMANCE METRIC (COLLECTED ANNUALLY)	SOURCE
Quality of Talent: Job applicants have the right skills and qualifications.	<ul style="list-style-type: none"> The average time an IT job is posting or vacant. The satisfaction rate of employers with the state's IT talent pipeline. 	Emsi Job Posting Data Employer Survey
Awareness of IT Careers: People guiding career choices for youth and adults are well informed about IT opportunities.	<ul style="list-style-type: none"> The number of workforce and education career counselors and faculty receiving training and information on IT career options and pathways. The number of and enrollment in IT career exploration programs for adults. The number of youths enrolled in IT Pathways. 	Provider Survey Department of Education data
Quality of Programs: Education programs are producing qualified hires.	<ul style="list-style-type: none"> The completion rate of IT education and training programs. The percentage of graduates hired within 3 months. The percentage of middle and high school technology teachers with industry experience or technical education background. 	IPEDS State Department of Education
Ongoing Skills Development: Continuously upskilling IT talent to be competitive.	<ul style="list-style-type: none"> The number of workers trained through employer-led efforts. The number of IT certifications awarded by Delaware training providers. 	Employer Survey Provider Survey and IPEDS
Diversity of IT Talent: Diversity in IT talent is reaching all levels.	<ul style="list-style-type: none"> The overall diversity of IT occupations. The race and gender diversity of the IT Council and senior IT leadership among employers. 	Emsi Employer Survey
Pervasiveness of Best Practices: Deploying practices that increase impact and results.	<ul style="list-style-type: none"> The number of IT internships and apprenticeships. The number of IT mentors engaged in training programs. The percentage of IT education and training programs with stackable, competency-based curriculum. The diversity of technology teachers. 	Provider Survey

IMMEDIATE IMPLEMENTATION STEPS

Implementing a talent strategy depends on developing a set of priorities and harnessing initial resources to begin implementation. While this report outlines an array of recommendations necessary to build a diverse IT talent pipeline for both adults and youth, the priorities will need to be set by the key partners in Delaware. Although the COVID-19 pandemic has impacted the supply and demand for IT workers, it has also created an opportunity to rethink talent development. With over \$25 million in new workforce and training dollars coming into the state (a level of funding not seen in over a decade), there is a unique opportunity to tap into these funds to fill key IT gaps and expand programs that work.

TIP recommends the formation of a small implementation working group (five to seven people) to help define and oversee the next steps. This group would be active for approximately six months or until an IT Council or some other entity is more fully operational and would help ensure that the funding opportunities created by the recent surge of federal funds are rapidly deployed and aligned with IT sector priorities as outlined in this report. This group could be composed of the following entities.

- Delaware Prosperity Partnership (continue its role of convenor for this group).
- Two employers on the executive committee of the currently developing IT Council.
- A member from Del Tech working with industry councils.
- A liaison from the education and workforce system working on Delaware Executive Order 43 and the US Department of Education 2020 Education Stabilization Fund–Reimagine Workforce Preparation Grants program.
- Someone from an organization working with underrepresented populations.
- A limited number of other representatives once more refined priorities are identified (optional).

This group should also have regular communication with philanthropic organizations engaged in this effort, as well as organizations receiving funding from the Delaware Rapid Workforce Training and Redeployment Initiative and the Reimagine Workforce Preparation grant. To avoid conflicts of interests, it is not recommended that individual program representatives be part of this group.

TIP recommends that this working group focus on three key activities as described below.

1. Solidify the establishment of an IT Sector Council or similar entity.

The nascent IT Council or a similar entity will serve as a centralized voice for employers with IT needs and therefore will play a pivotal role in many of the strategy's recommendations. Consequently, it is imperative that the entity's operations be solidified as soon as possible. Immediate action steps would include the following.

- Convening the executive committee of the existing IT Council to confirm the organization that will house and support council operations.
- Hiring a full-time professional to lead the council using funding received through a recent grant by the US Department of Education to expand employer engagement and work-based learning experience. Because this should be a seasoned professional with industry experience, it is recommended that this be a contract position. A contract position also minimizes the appearance of any conflict of interest with the organization housing the council.
- Developing a council charter or bylaws that outlines the primary roles of the council, decision-making processes, conflict-of-interest policies, and conflict-resolution agreements.

- Establishing a 3-year strategy and work plan that includes the selection of top priorities to work toward as well as the development of working groups and operational relationships with partner organizations.

1. Convene partners receiving economic recovery funds targeted to jump start key IT talent activities.

In August 2020, Delaware Governor John Carney signed Executive Order 43, Rapid Workforce Training and Redeployment Initiative, to deploy \$10 million in CARES Act funding toward training and related workforce efforts focused on five industries, including IT. These funds will be used to help unemployed and underemployed access condensed training that would lead to an industry certification. Approximately \$2 million of those funds would be allocated toward IT initiatives. The working group should convene recipients and managers of these funds to encourage activities that build on recommendations described in Strategy B, including the following.

- Expand the capacity of existing short-term, industry-aligned training programs, especially programs that have well-developed placement services to Delaware employers, and which provide mentoring and/or wraparound services to promote diversity. Use lessons from CARES Act funding to make longer-term modification to the priorities and allocation of workforce development funds as described in Strategy B.2.2.
- Use this opportunity to develop a collective outreach and marketing effort among programs receiving funding, which can be used as the basis for an ongoing public awareness campaign around IT careers (as described in Strategy A.2). Ensure this outreach collaborative includes industry (Delaware State Chamber of Commerce, DPP, Delaware Business Roundtable, etc.) as well as workforce and training providers, so awareness of training opportunities is directly connected to employers with hiring needs.

2. Help ensure recent federal and philanthropic grants to expand adult and youth career pathways and work-based learning initiatives connect to IT employers and diverse participants.

The state of Delaware recently received a Reimagine Workforce Preparation Grant from the federal government. The multimillion-dollar grant targets activities that lead to certificates, badges, microcredentials, licenses, or other workplace-relevant credentials that respond to the needs of employers or facilitate entrepreneurship. These funds have the potential to align with and support several key recommendations, including the following.

- Developing an adult career exploration for IT effort (described in Strategy B.2.1) that enables adults to gain a firsthand understanding of IT jobs through skill assessments, job shadows, digital literacy skill development, and other related steps. These efforts should target underrepresented populations—including females, black, and Latinx workers—and can build on the experiences of programs such as Code Differently and Goodwill Industries.
- Including mentoring and peer support networks as part of work-based learning efforts as described in Strategy B.4. This can include funding for training existing IT employees on how to be a mentor and to help establish peer support programs in industry and training programs. The IT Sector Council can play a critical role in convening employers around this effort.
- Enhancing career exploration and work-based learning for underrepresented youth (girls, youth of color, and low-income communities). This would include focused resources and community partnerships to reach targeted populations, as well as wraparound services and resources to remove economic barriers to participation (see Strategy C.1 for details).
- Expanding IT apprenticeship and pre-apprenticeship programs as described in Strategy B.3.3.



APPENDICES

APPENDIX A. IT OCCUPATION OVERVIEW

This overview of information/computer technology jobs represents occupational clusters described by Delaware area employers. It is meant to be an illustrative, rather than an inclusive, list to be further refined as specific recommendations are implemented.

SOFTWARE AND WEB-DEVELOPMENT FUNCTIONS

These occupations are highest in demand and are most prevalent in professional and technical services, finance, manufacturing, and information industry sectors.

KEY FUNCTIONS	EXAMPLE JOB TITLES OF DELAWARE IT POSTINGS
Software Development and Programming	<ul style="list-style-type: none"> • Application Developer/Engineer • Coder* • Java Developer* • .NET Developer* • Scrum Master / Agile Developer • Systems Engineer • Software Developer/Engineer
Web Development	<ul style="list-style-type: none"> • Front End Developer • SharePoint Developer* • User Experience Designer* • Web Administrator • Web Developer / Designer*
Testing, Monitoring, and Quality Assurance	<ul style="list-style-type: none"> • Software Tester* • Software Quality Assurance Analyst • Test Engineer • Test Case and Script Development • IT Documentation Specialist*

**Positions with job posting requiring less than a bachelor's degree.*

IT AND CUSTOMER-SUPPORT FUNCTIONS

The second most in-demand type of IT occupation, these jobs tend to require an associate's degree (or less) and are found in a variety of industry sectors.

KEY FUNCTIONS	EXAMPLE JOB TITLES
Network Support (support of internal IT infrastructure)	<ul style="list-style-type: none"> • IT Service Tech* • IT Technical Support Specialist* • Computer Support Technician*
Customer/User Support (interface with customers)	<ul style="list-style-type: none"> • Customer Support Technician* • Technical Support Representative* • Help Desk Specialist/Technician*

**Positions with job posting requiring less than a bachelor's degree.*

CYBERSECURITY FUNCTIONS

This occupational group is expected to surpass projections for job growth due to the rapid digitization of industries during the COVID-19 pandemic. The need is expected across all industry sectors, including public sector employers.

KEY FUNCTIONS	EXAMPLE JOB TITLES
Information Security	<ul style="list-style-type: none"> • Cybersecurity Analysts • Information Security Specialist • Cyber Forensics Specialist • Penetration Tester* • Incident Monitoring and Tracking*

NETWORK AND DATA-MANAGEMENT FUNCTIONS

These occupational groups have had less growth in the recent past, however the issues—like remote working, online education, and telehealth—are projected to increase the need for new IT infrastructure related to these positions.

KEY FUNCTIONS	EXAMPLE JOB TITLES
Network and Cloud Administration	<ul style="list-style-type: none"> • Computer Network Architect • Network Administrator* • Network Engineer • Systems Administrator • SysOps Specialist*
Data Storage and Management	<ul style="list-style-type: none"> • Data Center Support Specialist* • Data Quality Manager • Database Administrator • DB Product Specialist

**Positions with job posting requiring less than a bachelor's degree.*

SPECIALIST POSITIONS

The IT occupations, while lower in number, can be mission critical to an organization. Almost all of these positions require at least 4-year degree and experience.

KEY FUNCTIONS	EXAMPLE JOB TITLES
IT Planning and Management	<ul style="list-style-type: none"> • Data Scientist • Enterprise/Systems Architects • Supply Chain Analyst • Business Continuity Specialist • BPM Architect

APPENDIX B. JOB POSTING METHODOLOGY OVERVIEW

HOW JOB POSTINGS WERE ANALYZED

Job postings database

Gartner TalentNeuron

Occupational groups

All computer and mathematical professions occupations in the Standard Occupational Classification (SOC) system—15 were included. A few selected occupations in SOC 43 (office and administrative support) were also permitted in the search if strong aptitude for computer skills was reflected in the occupation.

Education and experience

All levels of educations were included. Separate searches were conducted to isolate entry-level experience (less than 2 years) from postings requiring more experience.

Place of employment

Delaware

Timeframe

January through June 2019 and January through June 2020 in two-month increments. This approach was intended to isolate patterns of hiring that might have been impacted by COVID-19-related decisions.

Search term refinements (inclusions)

Blockchain, Cisco, cloud, coder, computer, cybersecurity, data, database, desktop, developer, firewall, Java, Microsoft, network, programmer, software, SQL, web

Search term refinements (exclusions)

cashier, sales

APPENDIX C. SECTOR COUNCIL ROLES AND CHARACTERISTICS OF ORGANIZATIONS ASSUMING THOSE ROLES

The development of talent is influenced by how employers engage and invest their workforce, how well demand from employers is connected to education, and to what extent the workforce and education system is connected to the economic needs of sectors. From examining various employer-led sector programs, TIP developed a matrix of roles and characteristics of organizations housing these councils.

	LEADERSHIP FOR TALENT DEVELOPMENT (PRIMARY ROLE)	ENGAGEMENT IN EDUCATION AND TRAINING	PROMOTION OF INDUSTRY COMPETITIVENESS
	<i>Actions that work to foster talent and economic development at a system level</i>	<i>Actions that connect the needs of employers to education and training providers</i>	<i>Actions that help employers within the sector stay competitive</i>
Lead Roles	<ul style="list-style-type: none"> Identifies talent needs and aggregating demand across employers. Identifies how talent development can lead to an economic advantage for businesses in Delaware. Advocates for state policies and resources to support talent development. 	<ul style="list-style-type: none"> Acts as a centralized advisory/planning committee for providers with IT education and training programs. Hosts/cohosts an annual IT summit to gather partners. Promotes/pilots innovations in education and training. <p><i>(Councils typically do not run programs, although they might coordinate some shared training initiatives.)</i></p>	<ul style="list-style-type: none"> Promotes inclusiveness and diversity. Shares best practices around recruitment and retention issues. Establishes or promotes employer-led training programs for upskilling workers (typically through grants).
Characteristics of Organization Assuming These Roles	<ul style="list-style-type: none"> Commands respect from employers and has credibility to gain their participation, especially from the private sector. Has ability and commitment to advocate, directly or indirectly, for policies and resources. 	<ul style="list-style-type: none"> Maintains working relationships with diverse education and training partners. Has few real or perceived conflicts of interests. 	<ul style="list-style-type: none"> Has the ability to develop and staff working groups of employers. Is engaged in efforts to grow key industries.
	<ul style="list-style-type: none"> Can act as a neutral facilitator/convener of business and industry. Has the ability to conduct or contract research/data analysis and track metrics and results. Has administrative capacity to help distribute and track funds, including public funds. 		
Types of Organizations Typically Filling These Roles in Other States	<ul style="list-style-type: none"> Industry associations Chambers of commerce Economic development organizations 	<ul style="list-style-type: none"> Industry associations Chambers of commerce Workforce development boards Centralized offices within the education system 	<ul style="list-style-type: none"> Industry associations Chambers of commerce Economic development organizations

OPERATIONAL NOTES

In most regions, there is rarely an existing organization that has the capability or capacity to complete all the roles of the council. Therefore, many sector councils might be housed at one organization to carry out its primary leadership roles yet operate through structured partnerships with other key organizations (memorandum of understanding or similar arrangement) to carry out other roles. Typically, councils form working groups around a specific set of roles or outcomes and then have appropriate partners lead efforts within those roles. The most common of these is a workforce or education organization partnering with the home organization around aligning education and training programs with industry needs. Other partnerships include contracting with intermediary organizations to help market or increase awareness about the sector and its careers or helping to establish employer-led training efforts (those not associated with an educational institution).

A council can also be incubated in one organization and then be spun-off as its own nonprofit as it builds capacity and a sustained funding structure. This tends to happen when there is no existing industry association in a sector.



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