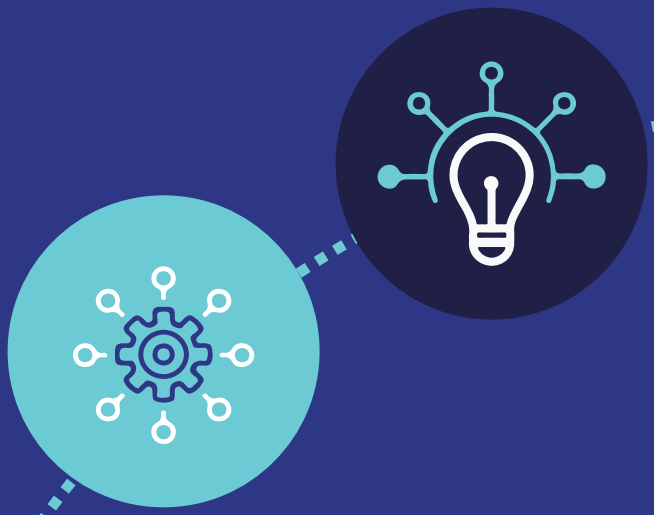
Strategies for Building Buffalo Niagara's **Tech Workforce**



October 26, 2022

TECHBUFFALO

University at Buffalo
Regional Institute
School of Architecture and Planning

About TechBuffalo

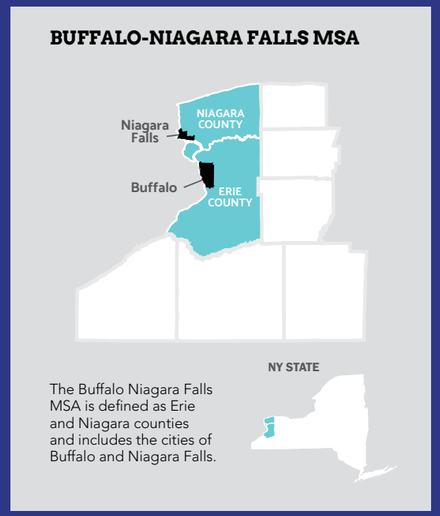
This report was commissioned by TechBuffalo in 2021. TechBuffalo is a nonprofit organization that strives to create a sustainable, inclusive, and accessible technology community for Western New York (WNY) by improving the region's ability to retain, attract and foster technology talent. Established as a 501(c)(3) in 2020, TechBuffalo is working to connect programs, avoid duplicative efforts, and increase collaboration across WNY talent attraction initiatives.

About This Report

This study represents a partnership between TechBuffalo and the University at Buffalo Regional Institute ("UBRI") with the goal of building a set of research-grounded, data-driven recommendations, strategies and action steps to strengthen the tech workforce ecosystem in the Buffalo Niagara region. UBRI is a research center of the University at Buffalo School of Architecture and Planning that focuses on regional economic development strategies around four interconnected pillars: **workforce development, innovation, placemaking and sustainability.**

This report is focused on aligning supply and demand for tech workers; fostering inclusive growth through quality training, career on-ramps, and wraparound services; and developing research-grounded strategies that leverage regional strengths and opportunities and address pressing needs in the ecosystem.

The research builds on a talent initiative report UBRI completed in 2019 that lays out a three-pronged strategy focused on tech. The study was completed prior to the onset of COVID-19, which accelerated the adoption of technology across the economy in unprecedented ways. As Buffalo Niagara's economy continues to recover, tech is part of a new normal for how we learn, work, produce, shop, travel and communicate - transformations that exacerbated pre-pandemic tech talent gaps that continue today, which this study addresses with recommendations and strategies.



Unless otherwise noted, the two-county Buffalo Niagara region is the geographic scope for the analysis presented in this report. The region has 1.1 million people, 536,500 jobs and 29,400 firms and is New York State's largest metro outside of New York City. Situated in the western most part of the state, Buffalo Niagara borders Canada and is located about 100 miles from Toronto, the most populous city in Canada.

RECOMMENDED CITATION: University at Buffalo Regional Institute, State University of New York at Buffalo, School of Architecture and Planning. 2022. "Strategies for Building Buffalo Niagara's Tech Workforce."

TABLE OF CONTENT

What went into this report?

Input from the Experts

TechBuffalo and UBRI acknowledge the insights, input and research support provided by the 17 advisory group members who dedicated their time to this initiative over the nine-month project. This group offered valuable feedback on preliminary findings, provided edits and suggestions on report drafts, and offered critical outreach support for the two surveys and multiple focus groups.

Tech Workforce Project Advisory Group Members

Gina Burkhardt, Buffalo Center for Arts and Technology

Matt Egyhazy, M&T Bank

Kristin Fields, Buffalo State College

Arlene Kaukus, University at Buffalo

Nick Kosinski, Odoo

Ken Lesniak, ACV Auctions

Rob Leteste, Invest Buffalo Niagara

Grant Loomis, Buffalo Niagara Partnership

Emily Mahaffy, Imagine Staffing

Bukola Mallia, Erie County Workforce Investment Board

Kirk McLean, City of Buffalo

Randi Murphy, Goodwill of Western New York

Stephanie Peete, Say Yes Buffalo

Gary M. Smith, Trocaire College

Kayleigh Terranova, formerly Tesla

Lynne Thornton, Ingram Micro

Christine Whipkey, Trocaire College

Stakeholder Engagement

Research engaged a wide variety of tech workforce stakeholders, including tech and tech-aligned companies of all sizes, tech training organizations, tech students, and the project advisory group. Their contributions are evident throughout this report, and particularly in the sections that highlight insights. Input from these critical tech workforce ecosystem stakeholders grounded the data with perspective, experience and vision, helping the research team understand findings and trends and consider possible solutions for addressing challenges and tech talent gaps. Surveys were completed between March and May 2022 by representatives of both counties.

- **94 representatives of employers responded to an employer survey** and represented tech and tech-enabled employers of all types and sizes. The group shed light on current and future needs for tech skills, partnerships with trainers and approaches for growing a diverse workforce.

- **15 representatives of tech trainers responded to a trainer survey** and represented degree-bearing and non-degree-bearing postsecondary tech trainers. The survey gathered information on tech programs, future growth opportunities, target populations, partnerships with employers and capacities for wraparound services.

- **70 representatives of tech employers, trainers and young professionals participated in 8 focus groups and listening sessions.** Many of these sessions were made possible through a partnership with Invest Buffalo Niagara and Newmark, who are working on a regional labor market study for Western New York.


Employers


Trainers


Young Professionals

- **17 members of the Tech Workforce Project Advisory Group provided guidance in monthly meetings.** They represented employers, trainers, and other tech workforce developers.

Additional Data Sources

The research team compiled additional data and information from sources that included CompTIA, Data Axle Business Database, Lightcast (formerly Emsi/Burning Glass), National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) and NYS Education Department.

Glossary of Terms

This report uses the following terms and definitions, unless otherwise noted. Additional detail on the definition of "tech" can be found in this report's Data Sources and Notes.

Diversity: Includes people of color, women, urban and rural populations, LGBTQIA individuals, veterans, and others that comprise an inclusive tech workforce.

Tech: Includes 18 occupational codes from the Standardized Occupational Classification (SOC) system capturing 100+ computer and IT job titles. Examples include computer system analysts, database administrators, computer programmers, web developers, computer user support specialists, and data scientists.

Tech-aligned: Refers to non-tech skills and training that enable the delivery of tech products and services, such as sales and marketing.

Tech-enabled: Includes employers or industry sectors where tech jobs make up at least five percent of all jobs.

Tech Trainers: Includes the wide range of entities involved in training for tech at any level from entry-level to mid-career and senior-level roles. It includes public, private and not-for-profit colleges, universities, BOCES, schools, community-based organizations, and companies that do training. Programs may lead to a credential such as a degree or certificate.

Underemployed: Includes individuals who work but live in or near the poverty level.

Underrepresented: Includes individuals such as women and people of color (all races and ethnicities except white, non-Hispanic) whose population in the region's tech workforce falls short, compared to the workforce overall and/or the tech workforce across the nation.

Unemployed: Includes individuals who are in the labor force, but out of work and actively seeking a job.

Wraparound Services: Supportive services that mitigate barriers to training and work such as career coaches or flexible scheduling.

Why Focus on Growing Our Tech Workforce?

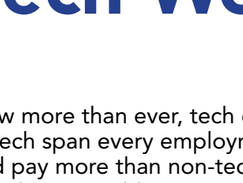
Now more than ever, tech drives our nation's economy. Jobs in tech span every employment sector, and are growing faster and pay more than non-tech jobs. In order for our region to remain competitive, we need to begin filling gaps in our tech employment ecosystem before they become insurmountable.

TECHBUFFALO

Tech jobs are growing but we lag nation/peers.

Tech Job Growth 2010-2019

Expected Tech Job Growth 2022-2032



Tech Jobs as % of all jobs

Employers have a hard time filling tech jobs.

Major "Job Postings vs. Hires" Gap Exists.

Our Tech Workforce Lags in Diversity and Yearly Compensation.

TECH WORKFORCE PEOPLE OF COLOR:

24% Buffalo Niagara
34% US

MEDIAN ANNUAL EARNINGS:

$80,986 Buffalo Niagara
$99,342 US

85% of employers **said hiring tech talent is at least somewhat challenging.**

We train but don't retain tech talent.

Even Though the Region Has Many Tech Graduates, Tech Hiring Shortages Persist.

The region had 5 tech-related grads for each tech job opening in 2021.

5:1 Ratio of Grads to Jobs

That's 3 times more graduates per opening than the US overall and 2 times more than peer metros.

75% of these grads are in tech-aligned programs.

International Students Account for Half of the Region's Tech Graduates. They Need a Visa Sponsor to Work Here.

INTERNATIONAL STUDENTS AS % OF TECH GRADUATES

49% Buffalo Niagara
19% US
27% Peer Metros

7 out of 10 of **tech alumni** from Buffalo Niagara colleges live and work outside the region.

3,000+ live in NYC Metro area and

1,400+ live in Rochester.

THOUSANDS of others live in larger, more developed tech markets with major tech employers and higher wages, like San Francisco, Washington, DC, and Seattle.

Tech training programs and employer needs are disconnected but opportunities exist.

Stronger partnerships between employers and trainers can address the disconnects in tech.

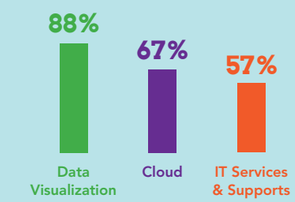
4 out of 5 tech trainers are interested in **expanding employer partnerships.**

Employer recruitment practices can adapt to new training options.

Only **23%** of employers **recruit through targeted outreach to nontraditional talent sources.**

Employer demand is increasing for tech skills but training options often don't evolve quickly enough. Less than half of trainers surveyed offer beginner level programs for these top growing tech skills.

% CHANGE IN AVG. MONTHLY JOB POSTINGS, 2020-2022



Workers need wraparound services, but employers and trainers lack capacity.

Expanded access to wraparound services could expand tech talent pipelines to include more underserved, underrepresented individuals.

Employers estimate that **52%** of tech workers **would benefit from wraparound services.**

Supportive services add to the cost of training and are commonly provided by referral only, if they are provided at all.

Programs like **Live Well Erie County,** can provide comprehensive and individualized wraparound supports to student graduates through their first years of employment.

Employers, trainers, and job seekers need better information to grow the region's tech workforce.

A stronger regional tech workforce will leverage existing data and information to support training and career choices, recruitment and outreach, program delivery, onboarding, upskilling, partnerships, and more.

Audiences Served

Information Needs

- Workforce
- Training
- Wraparound Services
- Best Practices

* See Data Sources and Notes on page 61.

Tech jobs are growing, but we lag our peers.

For individuals, employers, and entire regions, tech can lead the way to economic prosperity. Employers across nearly every industry are increasingly reliant on technology and workers with tech skills to stay competitive. Individuals with the skills to fill tech jobs earn more and have wide-ranging opportunities for career advancement.

Tech jobs, or roles in information technology and computer science, are growing across the country. In the decade prior to COVID-19 (2010 to 2019), tech jobs grew by 36% across the US—2.3 times more than the economy overall (15%). Tech job growth is concentrated in a handful of major metros that are growing, diverse, higher paying, and home to top tech companies. More than a third (36%) of all tech jobs in the US are located in ten top tech metros. These regions accounted for 40% of the tech job growth from 2010 to 2019. Tech jobs are projected to grow another 13% nationally over the next ten years. Regions without a robust, skilled and inclusive tech workforce will continue to fall behind, and limit their prospects for future growth and sustainability.

The tech sector is creating higher-paying job opportunities in Buffalo Niagara too, but tech job growth here lags the nation, major tech hubs, and most peer metros. Unlike major tech regions, Buffalo Niagara's workforce is relatively older, less diverse, and with lower incomes. Other regions across the country face similar workforce conditions, but even when compared to these selected peers, Buffalo Niagara's tech sector is smaller, lower paying, with less job growth overall.

This section takes a closer look at Buffalo Niagara's tech workforce and how it compares to peer regions, the top tech metros, and the US overall.

"I think Buffalo doesn't give itself credit...We see the seeds of opportunity here."

"I think the tide has changed in Buffalo."

Focus group with startups and small employers, July 15, 2022

"[Tech] is... a place with opportunities for everyone."

Focus group with young professionals, August 10, 2022

Our tech sector is not as developed as peer metros.

Tech represents a huge opportunity for Buffalo Niagara. There are currently 11,961 tech jobs in the region. Tech jobs offer higher pay, with median annual earnings nearly double the regional median ($80,986 vs. $43,976). Over the next ten years, the region is projected to have nearly 9,400 tech job openings, including new positions and replacement hires. Tech jobs are expected to grow about five times faster than the region as a whole by 2032.

While tech represents a growing opportunity for Buffalo Niagara, tech job opportunites are growing faster elsewhere. In the top ten tech hubs, tech jobs grew nearly twelve times faster than in Buffalo Niagara from 2010 to 2019 (47% vs 4%). These major tech hubs tend to be younger, more diverse, and higher-paying, while Buffalo Niagara's workforce is older, less diverse, and with lower incomes compared to the US overall. Some metros face similar workforce conditions that might challenge their tech sector too.

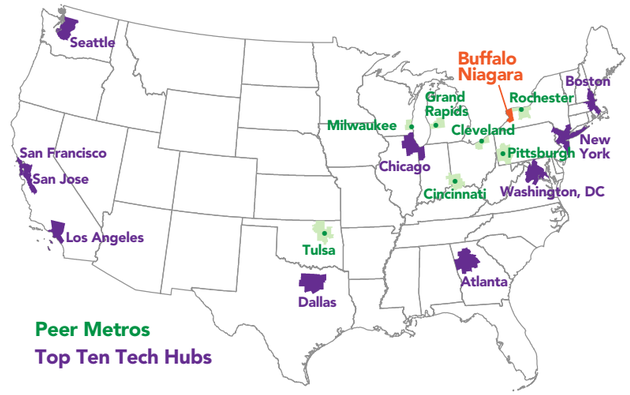
Seven metros that share these traits are selected as peer cities for this analysis.

When compared to these selected peer metros, Buffalo Niagara's tech sector is falling behind. Tech jobs account for 2.3% of all jobs in the region, a relatively small share which makes it more challenging to attract tech workers and employers. Compared to selected peer regions, only Tulsa and Grand Rapids have a lower share of their workforce employed in tech. Median annual earnings for tech workers in Buffalo Niagara are 10%-15% lower than metros like Tulsa, Cincinnati, and Cleveland, and $17,000 below the top ten tech metros, even when adjusting for the cost of living. Lower pay can make it more difficult to fill tech jobs and retain tech talent. Nearly half (41%) of local tech employers surveyed said regional wages not being competitive made tech hiring more challenging.

Peer metros share similar workforce characteristics with Buffalo Niagara that relate to key challenges for the region's tech sector: limited population growth and a regional workforce that is relatively older, less diverse, and with lower incomes. When comparing the 100 largest metros in the US, these rank in the bottom half for diversity (% people of color), share of the labor force in prime working age (25-54), and recent population change (2016-2021), and are also outside of the top 40 highest- paying metros (median household income).

Metros that meet these criteria and are relatively close to Buffalo Niagara's population size are selected as **peer metros for this analysis.** Those are: **Cincinnati, Cleveland, Grand Rapids, Milwaukee, Pittsburgh, Rochester, and Tulsa.**

Top Ten Tech Hubs are metros with the most tech jobs in 2022. These are: Atlanta, Boston, Chicago, Dallas, Los Angeles, New York, San Jose, San Francisco, Seattle, and Washington DC. Together, these metros account for 36% of all tech jobs in the US.

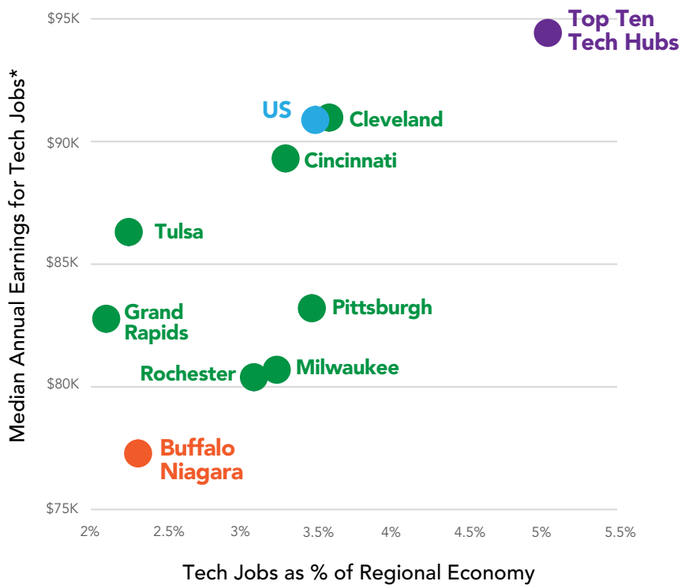


Sources: Rankings of metrics to determine peer cities and top tech metros based on a UBRI analysis of Lightcast data (2022) using data from the US Census. See Data Sources and Notes.

Tech job growth in the region is falling behind national trends, both before and after COVID-19. From 2010 to 2019, tech jobs in Buffalo Niagara grew by 4%. Meanwhile, tech jobs in selected peer regions grew six times more, on average (24%), and even faster across the US (36%) and in the top ten tech hubs (47%). In the wake of the pandemic in 2020, tech jobs dipped slightly across the nation, but declined by 10% in Buffalo Niagara—five times the average for selected peer regions (-2%). In the two years since COVID-19 hit, Buffalo Niagara has yet to see net tech job growth, experiencing a 2% decline while tech jobs grew by 6% across the US.

Looking out over the next ten years, Buffalo Niagara is projected to grow tech jobs by 5%, which would exceed recent regional trends and match the average tech job growth for selected peer metros. However, Buffalo Niagara and these peers would continue to fall behind major tech hubs and the US overall, which is projected to see a 13% increase in tech jobs by 2032—about two and a half times the projected growth for tech jobs in Buffalo Niagara.

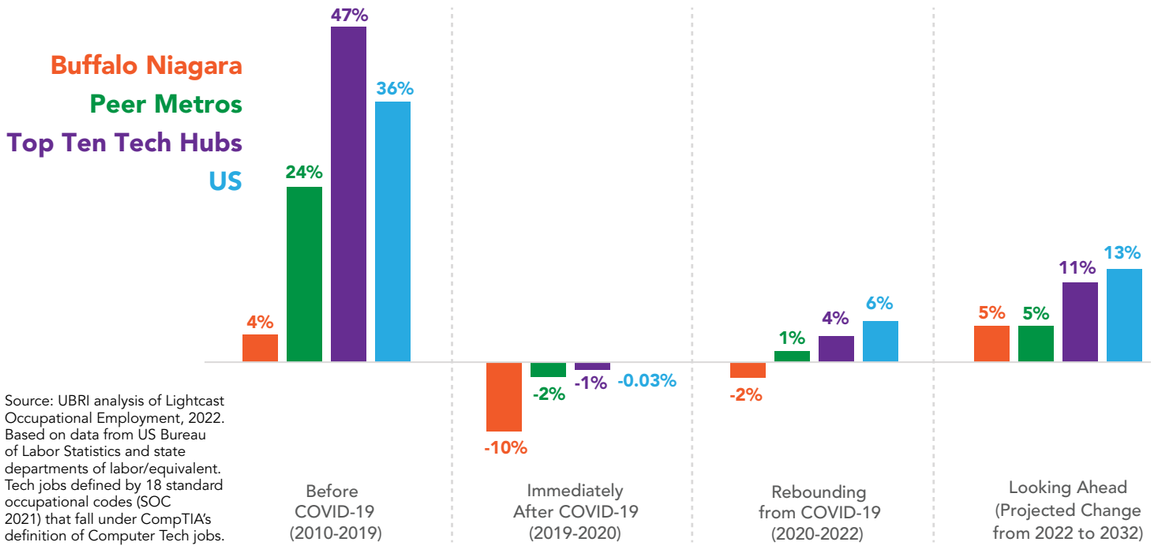
MEDIAN EARNINGS VS TECH JOBS AS A PERCENTAGE OF THE ECONOMY, BUFFALO NIAGARA, US AND SELECTED PEER METROS, 2022



*Adjusted for cost of living.

Source: UBRI analysis of Lightcast Lightcast Occupational Employment and Wage data, 2022. Based on data from the US Census, Bureau of Labor Statistics, state departments of labor or equivalent, and the Council for Community and Economic Research (C2ER's) Cost-of-living index. Tech jobs defined by 18 standard occupational codes. See Data Sources and Notes.

PERCENTAGE CHANGE IN TECH JOBS BY GEOGRAPHY, BEFORE AND AFTER COVID-19



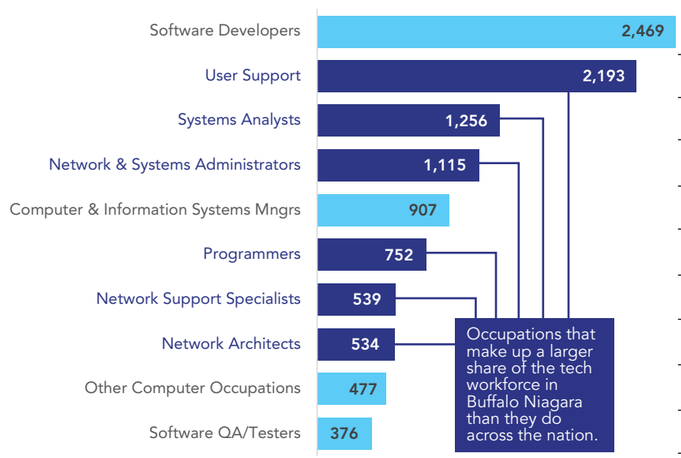
Source: UBRI analysis of Lightcast Occupational Employment, 2022. Based on data from US Bureau of Labor Statistics and state departments of labor/equivalent. Tech jobs defined by 18 standard occupational codes (SOC 2021) that fall under CompTIA's definition of Computer Tech jobs.

Our tech workforce is specialized in more entry-level, tech-aligned jobs and industry sectors.

Buffalo Niagara's tech workforce includes a wide variety of occupations, from programmers and network administrators to data analysts and help desk techs. The chart below shows the ten tech occupations with the most jobs in the region. This list is based on the general occupation codes used in government data, but this covers hundreds of unique tech job titles used by employers. Some common examples are shown below.

There are nearly 2,500 software developers in the region, making it the most common tech job. The region also employs about 2,200 computer support specialists, like IT/help desk workers. These positions account for a larger percentage of the region's tech workforce than the US overall, along with other more entry-to-intermediate-level tech jobs, such as systems analysts, and network support specialists. This contributes to the relatively low wages for tech workers in Buffalo Niagara—because lower-paying tech roles make up a relatively larger share of our region's tech workforce. These occupations may point to unique strengths and opportunities for strengthening Buffalo Niagara's tech workforce.

TOP TECH OCCUPATIONS BY EMPLOYMENT, BUFFALO NIAGARA, 2022



Common Job Titles
Software Engineers, Java Dev., Full Stack Developers
Tech. Support Spec., IT Spec., Help Desk Analysts/Tech.
Business Sys. Analysts, Infrastructure Analysts, Tech. Team Leads, IT Business Analysts
IT Administrators, Provider Network Managers, Service Delivery Managers
Directors of Information Technology, Chief Information Officer
Programmer Analysts, Systems Programmers, Scientific Programmers
Network Systems Specialists, Custom Engineers, Network Relations Consultants
Network Engineers, Automation Engineers, Visualization Engineers
Scrum Masters, Systems Engineers, Solutions Architects, IT Project Managers
QA Analysts, Quality Engineers, Test Engineers

Source: UBRI analysis of Lightcast Occupational Employment, 2022. Based on data from the US Bureau of Labor Statistics and NYS Department of Labor. Throughout this report, tech jobs are defined by 18 standard occupational codes (SOC 2021) that fall under CompTIA's definition of Computer Tech. See Data Sources and Notes.

Employers in every industry rely on tech workers, but tech workers are typically concentrated in tech-intensive sectors. The computer systems design sector, which includes companies who plan and create hardware, software and other IT systems, employs nearly 1,600 tech workers regionwide, more than any other sector. Many other tech workers are in closely related tech-intensive sectors like software publishing and computer programming services.

Nearly 1,000 tech workers work in manufacturing, involved in the production of electronic products and components, transportation equipment, chemicals, machinery, and more. The number of tech jobs in the electrical equipment manufacturing sector increased by 48% from 2012 to 2022—more than the nation overall. Tech employment in sectors such as software publishing, advertising, and finance also grew more over the past ten years in Buffalo Niagara than the US.

Thousands of tech workers work in tech-enabled sectors such as finance, insurance, and education. Nearly 1,200 tech employees work at corporate offices and headquarters located in the region. These employers are primarily involved in banking and administration and include tech jobs related to finance, systems analysis, and technical support. Tech workers in the region are more likely to work in these tech-enabled sectors than across the US overall.

SECTORS WITH LARGEST % INCREASE IN TECH JOBS, BUFFALO NIAGARA, 2012-2022

	% Chg 2012-22
Software Publishers	76%
Electrical Equipment Manufacturing*	48%
Advertising	36%
Social Assistance*	35%
Finance*	34%
Custom Computer Programming Services	26%

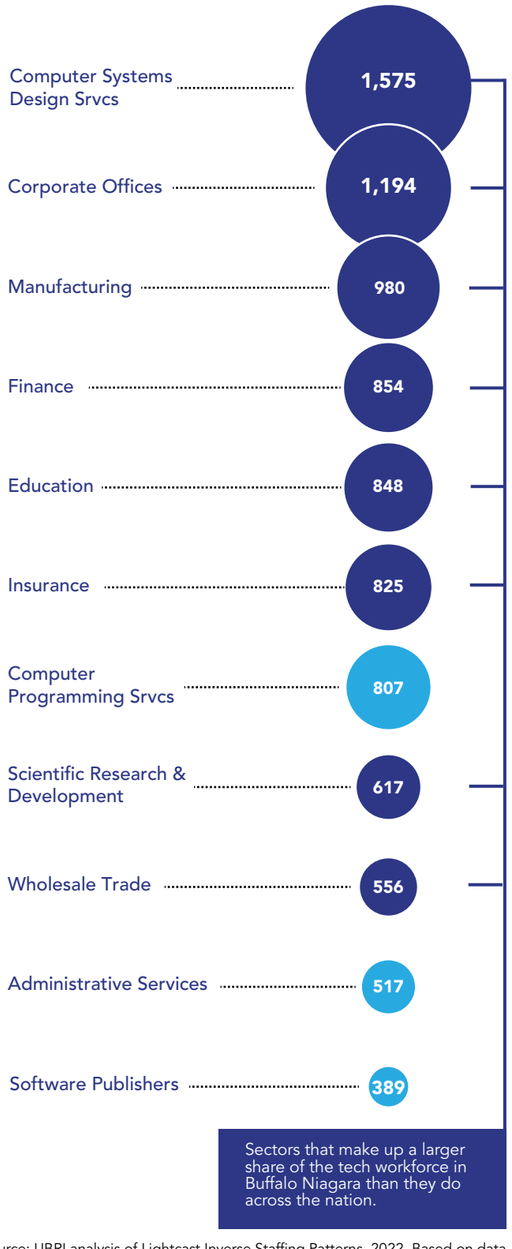
Includes sectors with 25% or more increase in tech jobs from 2012-2022 and with 50 or more tech jobs.

Exceeds US tech job growth from 2012-2022

* Makes up a larger share of Buffalo Niagara's tech workforce than the nation overall.

Source: UBRI analysis of Lightcast Inverse Staffing Patterns, 2022. Based on data from the NYS Department of Labor. Industries defined by NAICS codes: Software Publishers = 511210, Electrical Equipment, Appliance, and Component Manufacturing = 335, Advertising, Public Relations, and Related Services = 5418, Social Assistance = 624, Finance = 521, 522, 523, 525, Custom Computer Programming Services = 541511. See Data Sources and Notes.

INDUSTRY SECTORS WITH THE MOST TECH WORKERS, BUFFALO NIAGARA, 2022



Source: UBRI analysis of Lightcast Inverse Staffing Patterns, 2022. Based on data from the NYS Department of Labor. Industries defined using a combination of 2-6 digit NAICS industry codes. Computer systems design = 541512, Computer programming services = 541511, Corporate Offices = 551114, Manufacturing = 31-33, Finance = 521, 522, 523, 525, Insurance = 524, Education = 61, 90361, 90261, Scientific R&D = 5417, Wholesale = 42, Administrative Services = 56, Software Publishers: 511210. See Data Sources and Notes.

Many of the employers looking to hire tech workers are also in tech-enabled industries like finance and insurance. M&T Bank had over 900 unique job postings for tech workers in Buffalo Niagara from September 2021 through August 2022, over three times more than any other regional employer. Other tech-enabled companies also posted hundreds of tech jobs in the past twelve months, like global accounting firm PricewaterhouseCoopers, insurance provider Anthem Blue Cross, and hospitality giant Delaware North. Some of the largest tech employers in the region, like Moog and ACV Auctions, also posted hundreds of open tech jobs in the past year.

The variety of companies who hire tech workers underscores the wide-ranging employer need for tech skills, and the numerous job opportunities for tech workers across nearly every industry. These job opportunities are in close proximity to underrepresented populations. Most (72%) of the region's tech job postings over the past year were located in the City of Buffalo which is home to over half (55%) of the people of color in the region and nearly half (47%) of the population in poverty.

EMPLOYERS WITH MOST TECH JOB POSTINGS IN BUFFALO NIAGARA, SEPT. 2021 TO AUG. 2022

	Company	Tech Job Postings (Sept 2021 - Aug 2022)
1	M&T Bank	929
2	PricewaterhouseCoopers	295
3	Anthem Blue Cross	265
4	Citigroup	225
5	Delaware North	169
6	ACV Auctions	163
7	Deloitte	152
8	Moog	139
9	Paychex	121
10	Cognizant Tech Solutions	116

Source: UBRI analysis of Lightcast Job Posting Analytics, 2022. Includes unique, newly posted job postings in Buffalo Niagara.

Employers have a hard time filling tech jobs.

The tech job market is heating up across Buffalo Niagara, as the number of tech job postings increased in four of the past five years. From January to August of 2022, employers posted 20% more tech job postings per month than in 2021. Tech job postings in 2022 exceeded pre-pandemic levels, with 26 more jobs posted per month than in 2019.

While more tech jobs are being posted, hiring is not keeping up. Monthly tech hiring in early 2022 was relatively unchanged from the previous year. In the first eight months of 2022, there were 884 tech job postings per month compared to 389 tech hires, on average. This leaves 56% tech job postings unfilled.

Employers are shifting hiring practices to help fill tech jobs by increasing wages in job postings and offering more remote-hybrid positions, but most employers face challenges hiring tech workers. In a survey of regional employers, the majority of respondents (85%) said their company finds hiring workers with technical skills at least somewhat challenging—including 38% who said it's very challenging.

This section looks at the range of tech jobs and skills employers are looking to hire, and the challenges that employers face in trying to fill their tech hiring needs.

"Right now... it's very difficult when it comes to recruiting."

"My department... [operates with] 15-30% open roles because I lose people to headhunters upstream and downstream whether it be a vendor or a customer, but also to... other companies in general who are looking for technicians."

Focus group with large employers, July 13, 2022

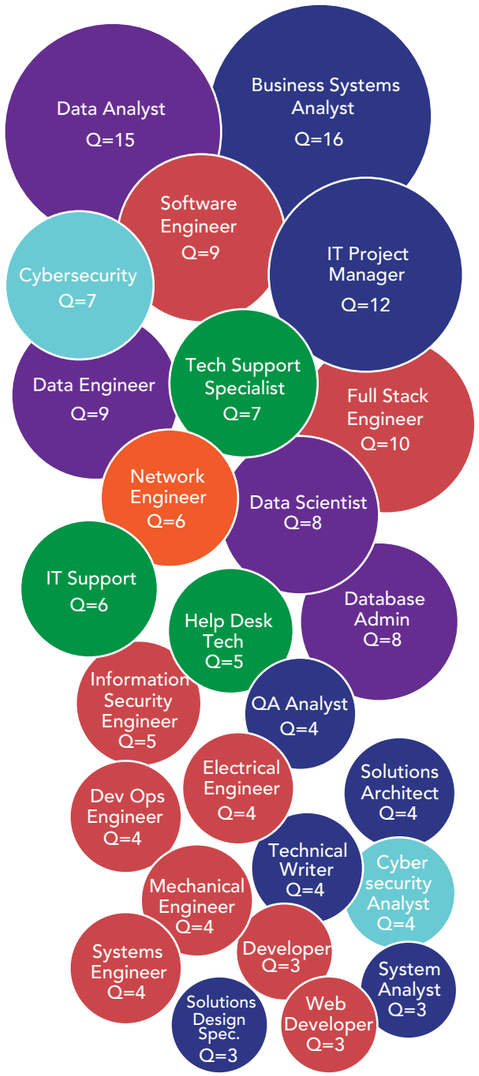
Employers are looking to fill a wide variety of tech jobs and tech skills.

When asked in a survey to list the top five tech jobs they expect to hire over the next two years, local employers named over 125 unique job titles. The most common were data analyst, software engineer, business systems analyst, and full stack engineer. Several entry-level tech roles were also mentioned multiple times, such as help desk, IT/ tech support, and technical writer. Even though a small share of employers were surveyed, these responses reveal the wide range of tech roles that employers need, and which are most in-demand.

Many of these same job titles are also among the most frequently posted tech jobs over the past 12 months. This includes software engineers with 274 job postings, nearly double any other tech job title, and many other postings for closely related roles like full stack developers. Business systems analysts, data analysts, systems administrators and engineers, and scrum masters are also among the most commonly posted tech job titles. Every employer has unique tech hiring needs, but these job titles are in high demand by employers of all sizes in nearly every industry.

Employers have a significant demand for tech jobs, but their need for tech skills is even greater. Most positions that require tech skills are not typically thought of as "tech" jobs. From September 2021 to August 2022, Buffalo Niagara employers posted over 22,000 jobs that required some technical skill, and only about a third (34%) of those postings were for jobs classified as tech.

VARIETY OF TECH JOB TITLES WITH PROJECTED OPENINGS FROM THE EMPLOYER SURVEY, 2022



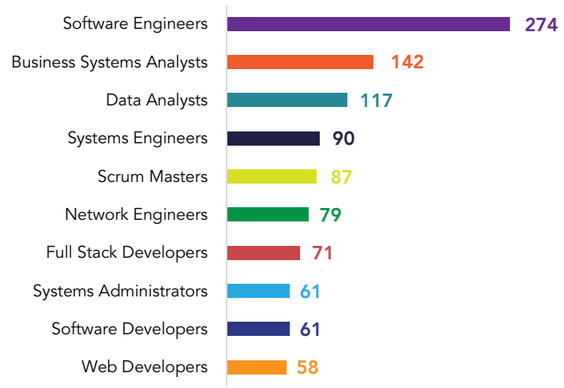
Q= Number of mentions

Source: UBRI, TechBuffalo Employer Survey, 2022. n=60
Note: Size indicates number of mentions.

To understand how employer demands and workforce trends vary across different types of tech skills, UBRI and TechBuffalo classified tech skills into nine categories. The categories range from tech-aligned skills like IT support and tech sales, to more advanced skills like cybersecurity, software development, and data science. Tech skills lead to above average incomes, and jobs that require cloud, data science, or software engineering skills have the highest pay of any tech skill, offering median starting salaries over $100,000—over 2.4 times the regional median.

Based on discussions with local employers, surveys, and recent job postings, tech jobs that require more advanced tech skills, like cloud and software engineering are harder to fill. The most common advanced types of tech skills in recent job postings were database management, data analysis/visualization, and software development.

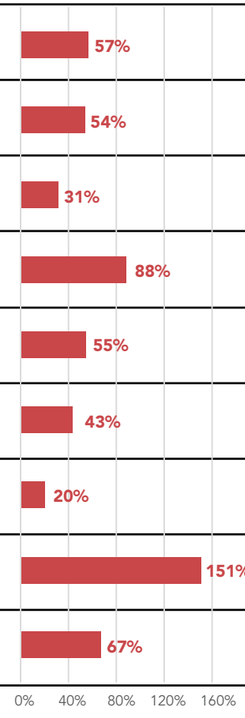
TECH JOB TITLES WITH MOST JOB POSTINGS IN BUFFALO NIAGARA, SEPT. 2021 - AUG 2022



Source: UBRI analysis of Lightcast, Sept. 2021 through Aug. 2022. Based on 18 occupational codes (SOC 2021) that fall under CompTIA's definition of Computer Tech jobs.

HIRING DEMANDS BY TECH SKILLS CATEGORY, BUFFALO NIAGARA, SEPTEMBER 2021 - AUGUST 2022

Tech Skills Category	Related Tech Skills	Job Postings	% Change In Jobs Postings, 2020-2022	Median Advertised Salary
IT Services & Support	Help Desk, Software Quality & Testing	2,930	57%	$54,912
Cybersecurity / Infrastructure	Proxy/Firewall/DLP/ CASB, RHEL, Windows Server, Network Mgmt	2,226	54%	$67,328
Database Management	MS Dynamics, SalesForce, SQL, Unix	4,849	31%	$85,248
Data Analysis / Visualization	Power BI, Tableau	4,862	88%	$85,800
Technical Sales & Marketing	Customer Relationship Mgmt, IT Project Mgmt, Tech Sales & Marketing	5,553	55%	$87,296
Web Development	Angular, API, CSS, HTML, Javascript	3,050	43%	$95,104
Software Development / Engineering	.NET, C/C#/C++, PHP, Python, Kotlin, Swift	4,099	20%	$100,100
Data Science	Predictive Modeling, R, SAS, SPSS	2,853	151%	$109,824
Cloud	AWS, DevOps, MS Azure, Infrastructure as a Service	2,419	67%	$111,400



Source: UBRI analysis of Lightcast, Job Postings, Sept. 2021 through Aug. 2022. Based on a keyword search of job postings that list any skill in each category. Median advertised salaries are based on a smaller sample size of job postings in each category and are limited to postings for tech jobs. See Data Sources and Notes.

Since 2020, demand grew by 50% or more for advanced skills such as data science, data analysis/ visualization, cloud, and cybersecurity. This heightened demand for emerging tech skills can create challenges for training and academic programs looking to keep pace with evolving employer needs.

Employers have a demand for every type of tech skill. Over half of all respondents to an employer survey expect to have at least one open job for every type of tech skill shown in the table, including cybersecurity, cloud, web development, and data science.

Employer demand for tech-aligned skills exceeds demand for some advanced tech skills. In the most recent 12-month period, tech sales and marketing skills were required in over 5,500 job openings and IT service/support skills were listed in more than 2,900. Job postings for these skills increased by over 50% from 2020 to 2022. When asked which tech-aligned skills are most in-demand, about half of employers surveyed said help desk, software testing, tech sales, and client relationship management (CRM). Tech-aligned skills can be an entry point to more advanced tech career pathways. Jobs like help desk techs and sales reps involve tech skills and offer salaries above the regional median of $40,600, but less than positions requiring more advanced tech skills.

In focus groups, employers stressed the challenge of finding workers with tech-aligned skills that can be useful in both entry-level and advanced tech roles, such as IT project management. In a recent survey, more than two out of three (69%) of employers said they would need to hire IT project management positions over the next two years. Tech-aligned roles like help desk or technical sales, often require more interpersonal skills, like teamwork and emotional intelligence, which can be useful to roles in project management. These skills are not as easily cultivated in more advanced tech roles like software development, leaving ample opportunities for tech-aligned workers to advance into IT management positions.

From Sept. 2021 through Aug. 2022, **20,282 job postings listed tech skills.**

66% were for non-tech jobs.

Source: Lightcast, Sept. 2021 through Aug. 2022. Based on a search of keywords that fall under each category of tech skills. See Data Sources and Notes.

More than **one out of every two tech job postings** are left ***unfilled*** in Buffalo Niagara.

Source: Lightcast analysis of Job Postings, US Census Quarterly Workforce Indicators, and US BLS Occupational Separations data, Buffalo Niagara, January through August 2022.

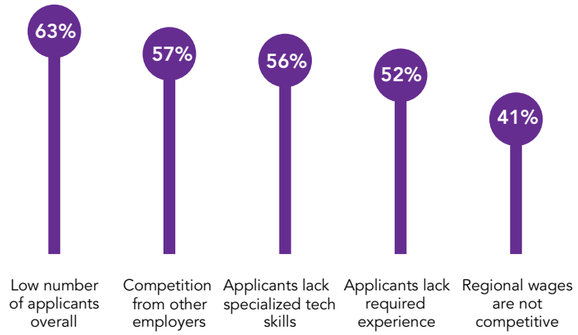
A low number of qualified applicants and competition make tech hiring a challenge.

Hiring in tech is not currently meeting market demands. The number of tech hires per month in early 2022 was down by about 13% from 2019, and relatively unchanged from the previous year. In the first eight months of 2022, there were 884 tech job postings per month compared to 389 tech hires, on average. This leaves more than one out of every two tech job postings unfilled.

Based on a recent survey, companies focused on tech are more likely to have an easy time hiring tech talent than tech-enabled employers (23% vs. 7%). The competition for tech workers is most acute for larger employers. Nearly all respondents from employers with over 500 employees (94%) said tech hiring was at least somewhat challenging, compared to 81% among smaller companies.

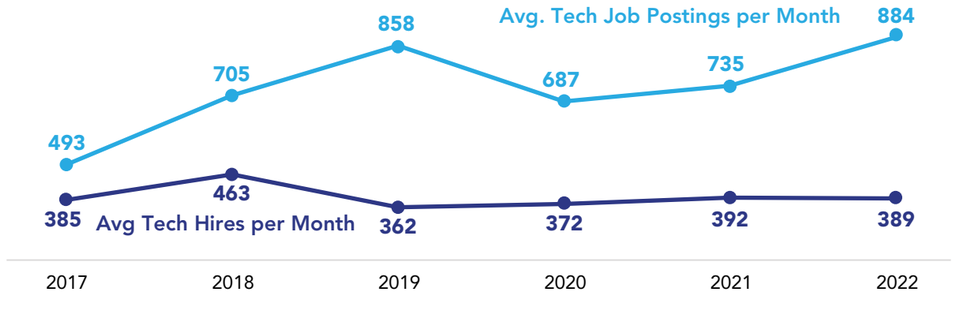
A variety of factors make tech hiring a challenge in Buffalo Niagara. More than half of employers in a survey said their top tech hiring challenges included: a low number of applicants overall, applicants with insufficient tech skills/ experience, and competition. Focus group participants agreed that hiring is strapped by a low number of applicants with suitable tech skills and experience. Other participants said that highly skilled tech workers often leave to take higher-paying jobs, which are often at larger companies or outside of the region.

TOP FACTORS THAT MAKE TECH HIRING A CHALLENGE, 2022



Source: UBRI, TechBuffalo Employer Survey, 2022. n=54.

AVG. MONTHLY TECH HIRES AND JOB POSTINGS, BUFFALO NIAGARA, 2017-2022



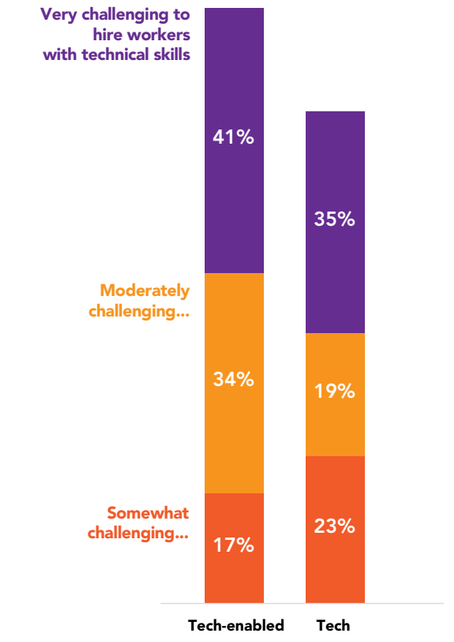
Source: UBRI analysis of Lightcast Job Posting Analytics, US Census Quarterly Workforce Indicators, and US BLS Occupational Separations data, Buffalo Niagara, January 2017 through August 2022. See Data Sources and Notes.

Employers are increasing wages to help fill hiring gaps. The median advertised salary in tech job postings increased by 25% since 2019, and is now 84% higher than the overall region's median advertised salary ($80,986 vs. $43,976). However, even when adjusted for cost of living, the regional average pay for tech jobs falls below peer cities and the top tech metros.

Focus group participants agreed that jobs requiring advanced skills such as cloud, cybersecurity, data analysis, and software development are some of the hardest to fill. Many also noted the heightened challenge of finding experienced workers with varied expertise, such as full stack engineers with the ability to work in a wide range of programming languages and applications. When asked which programming languages tech jobs will require over the next two years, more than half of employers surveyed said Java, HTML, Python, and C/C#/C++. Several respondents mentioned others, like SQL, Salesforce, Powershell, and Angular.

Employers stressed how difficult it can be to find workers with the right combination of skills to advance from technical work into management positions. There is an expectation of continuous learning and professional development for all types of tech workers. However, employer focus group participants said that career pathways are not always clear cut and there may be a lack of awareness of opportunities for advancement within companies. This may lead workers to search for higher paying or more advanced positions at another employer or outside the region, which is more common with the rise in remote work.

% OF RESPONDENTS WITH CHALLENGES HIRING TECH WORKERS, BY COMPANY TYPE, 2022



Source: UBRI, TechBuffalo Employer Survey, 2022. n=55. Includes responses from 26 tech employers and 29 tech-enabled employers.

"We put in a ton of time and... energy into recruiting... onboarding... then 2 years later they [tech workers] move on... because they're offered double the salary... we're like the farm team for the rest of the country."

Focus group with large employers, July 13, 2022.

Remote work became commonplace in the wake of COVID-19, especially for tech. From 2019 to 2020, the percentage of tech job postings in the region that specify remote-hybrid work more than doubled, increasing from 4% to 9%, on par with the US overall (4% to 10%). But since 2020, the regional shift to remote-hybrid work for tech jobs has been slower than the US overall. In 2022, remote-hybrid positions made up 14% of tech job postings in Buffalo Niagara, compared to 24% across the US.

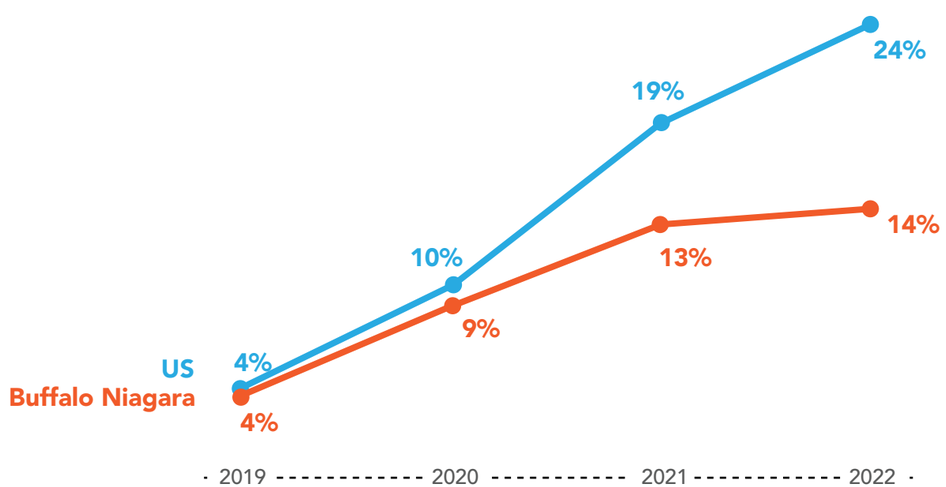
Tech job postings are over three times more likely to specify remote or hybrid work options than non-tech jobs in the region (14% vs 4%). Tech jobs that are more likely to offer remote work in Buffalo Niagara include web developers and designers, cybersecurity analysts, and software developers. The companies most likely to offer remote-hybrid work options include HSBC Bank, Rural Sourcing, and Anthem Blue Cross.

In focus group conversations, both employers and young professionals said that remote or hybrid work is not only a preference, but an expectation among tech workers. With the increased flexibility offered by remote work, these positions are more attractive to job seekers and easier to fill for employers. The median time to fill remote or hybrid tech positions is nearly two weeks shorter than jobs that specify in-person work (27 days, vs 40 days) and five days shorter than positions that do not specify if they are remote or in-person (32 days). Remote hybrid positions can also be filled by talent from outside the region, which expands the pool of qualified applicants and can help fill open jobs.

"I have a laptop and wi-fi, I can work anywhere."

Young professional focus group participant, August 10, 2022

% TECH JOB POSTINGS SPECIFYING REMOTE OR HYBRID WORK, BUFFALO NIAGARA VS US, 2017-2022



Source: UBRI analysis of Lightcast Job Posting Analytics, Buffalo Niagara, January 2019 through August 2022. Shows job postings that are specified as a remote-hybrid position as a share of all job postings, including those that do not specify whether they are remote-hybrid or in-person. Based on unique, newly posted job postings.

Employers require degrees for tech hires, leaving workers who could meet job needs behind.

In Buffalo Niagara, employers are more likely to look to hire entry-level tech workers. Over a quarter (27%) of tech job postings in 2021 required no more than three years of experience, which is higher than the US as a whole (25%). Another 29% of the region's tech job postings required either a high school or an Associate's degree, more than double the rate across the nation overall (12%).

Entry-level tech workers fill a variety of essential roles. Employer survey respondents named help desk workers, business systems analysts, data analysts, and IT/tech support as the most in-demand entry-level job titles at their companies. The high demand for service, support, sales, and marketing roles in tech was raised in the employer focus groups as well. Employers are also looking to hire entry-level workers with less experience to fill more advanced roles, like software engineers.

The most common credential required for entry-level tech jobs is a college degree. When asked which degree/certificates are required for entry-level tech jobs, nearly half (47%) said a bachelor's degree and 30% specified a computer science degree, while another 14% named a degree in engineering or a similar field.

"They throw in everything possible into a job description. Requirements are not just a bachelor's... but also CISP, for example, which takes 5 years experience..."

Young professional focus group participant, August 10, 2022

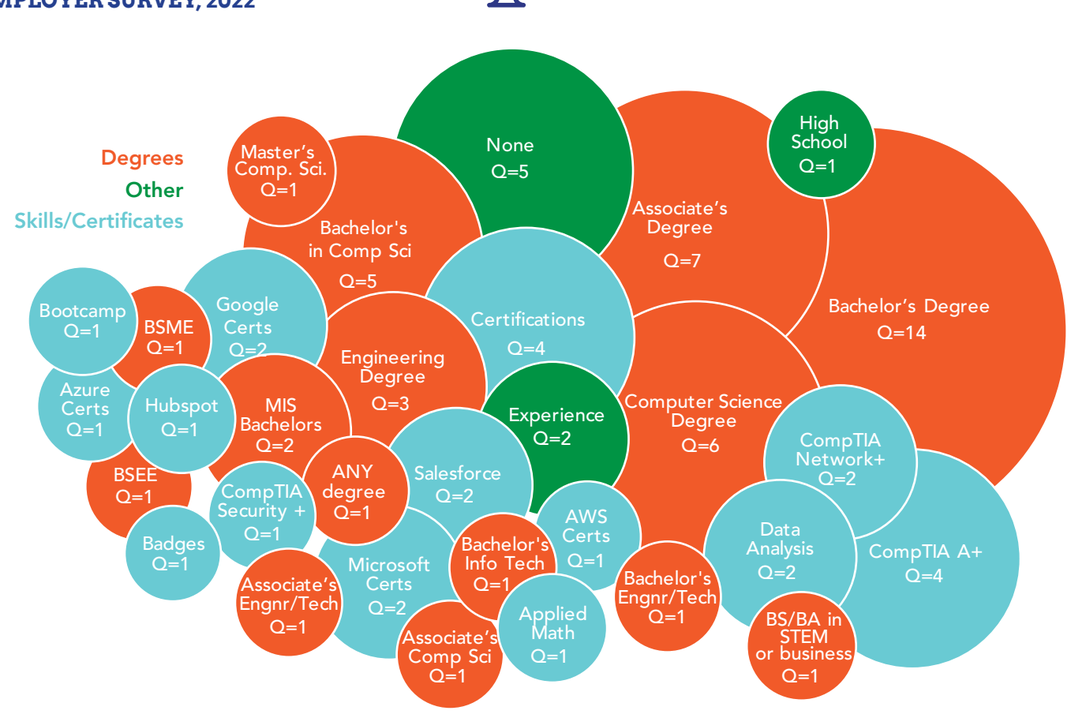
"Expectations have changed... some people in interviews are flat out saying if they can't work remote they don't want the job. That was unheard of 5 years ago."

Focus group with startups and small employers, July 15, 2022

Focus group participants stressed that using college degrees as a job requirement for entry-level tech can create unnecessary barriers. Some noted how many advanced tech workers are self-taught without a college degree, so some employers ask for a demonstration of skills or certifications in lieu of degrees.

The use of certifications is relatively common with the employers who took the survey. More survey respondents named some type of certification than an Associate's degree (28% vs. 19%, respectively) when asked about entry-level requirements for tech. The most common certifications mentioned were offered by CompTIA. Others included Google and Microsoft certificates, and certifications in specific software or platforms, such as Salesforce, Amazon Web Services, or MS Azure. Several survey respondents said that no degree or certificate would be required for an entry-level tech job.

TOP IN-DEMAND DEGREES/CERTIFICATES FOR ENTRY-LEVEL TECH JOBS FROM EMPLOYER SURVEY, 2022



Q= Number of mentions

Source: UBRI, TechBuffalo Employer Survey, 2022. n=43
Note: Size indicates number of mentions.

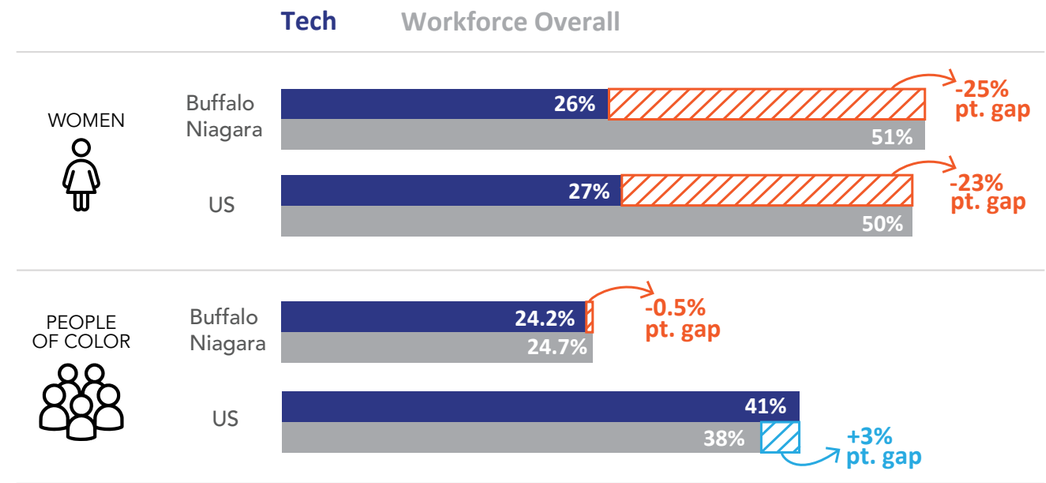
The region has large, untapped talent pools that could potentially fill tech job openings.

Women and people of color are underrepresented in Buffalo Niagara's tech workforce. Across the US, women make up 50% of the workforce overall but only 27% of tech workers—a gap of 23%. And the gap for women in tech is even wider in Buffalo Niagara (-25%). Nationally, people of color make up a larger share of the tech workforce than the workforce overall (+2.7%), but in Buffalo Niagara tech is slightly less diverse than the overall workforce (-0.5%).

Among people of color, Black and Hispanic/Latinx workers are most underrepresented in tech. Black workers make up 11% of the region overall, but only 7% of tech jobs. Meanwhile, Hispanic/Latinx workers make up 7% of the workforce, but just 4% of tech jobs.

In order to eliminate these gender and diversity gaps, thousands of women and people of color will need to be hired in tech. Of the nearly 9,400 tech job openings projected in the region over the next decade, over 4,700 would need to be filled by women, and 2,300 would be

TECH WORKFORCE COMPARED TO WORKFORCE OVERALL, % WOMEN AND PEOPLE OF COLOR, BUFFALO NIAGARA VS US, 2022



Source: UBRI analysis of Lightcast, 2022. Based on data from US Census Quarterly Workforce Indicators and American Community Survey. Tech jobs defined using 18 standard occupational codes (SOC 2021) that fall under CompTIA's definition of Computer Tech jobs. See Data Sources and Notes.

filled by people of color to achieve equal representation in tech by 2032. This includes 1,400 jobs filled by Black individuals and over 900 filled by Hispanic/Latinx workers.

As women and people of color make up a relatively small share of tech workers in Buffalo Niagara (26% and 23%, respectively), focus group participants agreed increasing diversity of the tech workforce could help fill hiring demands. Many said employers share diversity as a goal, but increasing diversity is a long process. Non-college trainers who provide tech education to underrepresented segments noted that their program graduates are not retained by local employers due to a variety of factors, including gaps in wraparound services and hiring practices. Some employers agreed that traditional recruitment practices may disadvantage underrepresented populations and intensify hiring gaps. Both employers and trainers noted that limited awareness of tech careers among underrepresented populations contributes to the lack of diversity in tech.

"Tech brings everybody together...it can really be the core for promoting diversity, equity and inclusion."

Young professional focus group participant, August 10, 2022

"...we need to open the door for people to see themselves in a [tech] role that they might not think of... How could we show them that yes, you belong here?"

Focus group with workforce trainers, June 24, 2022

We train but don't retain tech talent.

Buffalo Niagara faces tech hiring gaps despite training a relatively large supply of tech talent. The region produces thousands of tech and tech-aligned graduates who could potentially fill tech jobs, more grads per tech job opening than the US overall and peer metros. However, seven out of ten local college alumni with a tech job today currently live and work outside the region.

This points to a mismatch between the local supply and demand of tech workers. One factor is international talent, which made up nearly half of our region's tech graduates in 2021, but the added costs, time, and legal barriers makes this population especially difficult for local employers to retain. Also, about three-quarters of the region's tech-related grads have tech-aligned degrees that are still useful for many tech roles but are not designed purely for tech jobs.

In a recent survey, many employers (41%) said competition from outside the region was a challenge for hiring tech workers. In focus groups, employers noted that tech workers, especially top talent, are often attracted to other regions due to higher pay, larger tech companies, and more career opportunities.

This section introduces the range of training providers and higher education institutions in the region that generate tech talent, and the factors underlying the mismatch between locally produced tech talent and tech hiring needs.

"Companies are antiquated in their talent attraction and hiring practices, that's where we struggle."

"Companies and organizations outside our region are reaching into our region, taking talent, and those people don't have to move."

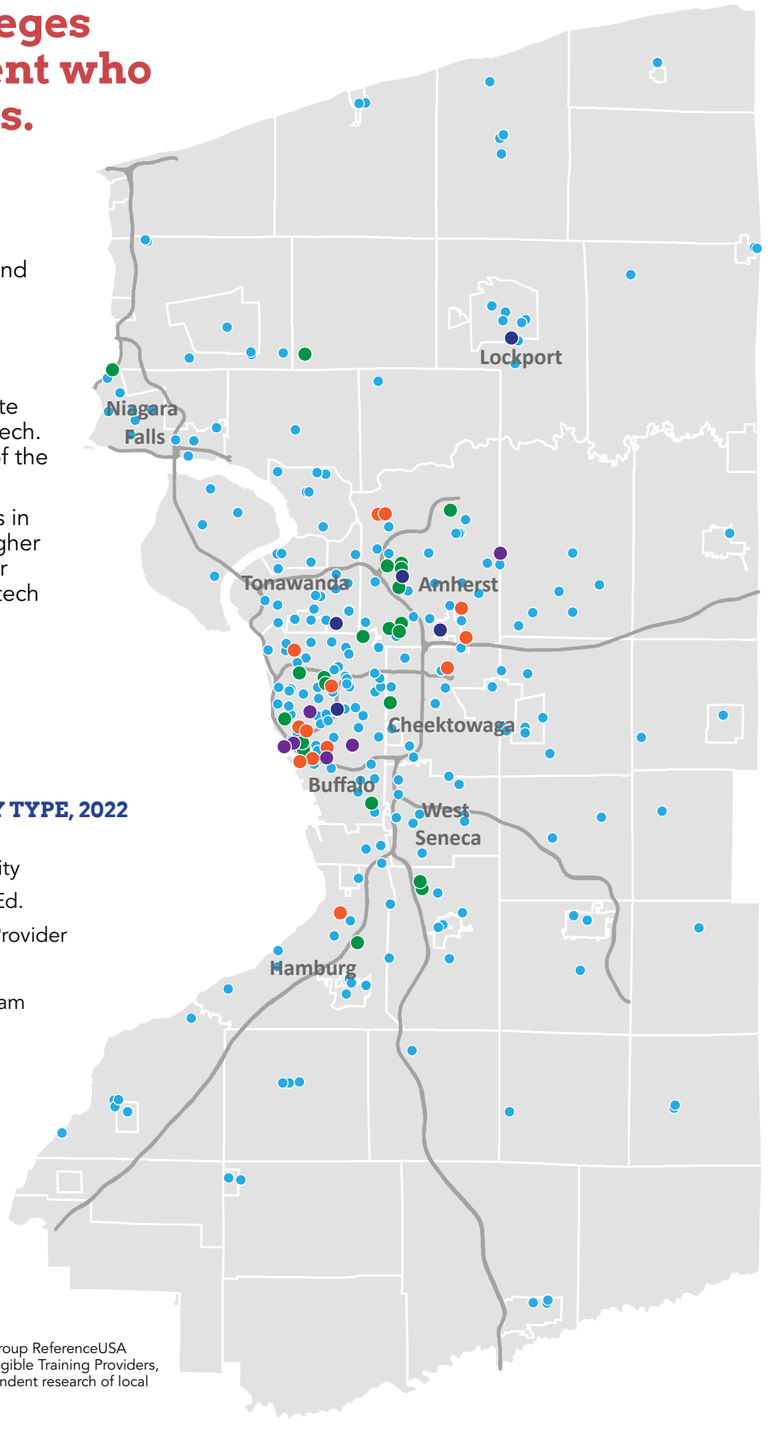
Focus group with small and mid-sized employers, July 13, 2022

A variety of local trainers and colleges produce tech talent who could fill tech jobs.

A variety of organizations provide tech training programs across Erie and Niagara Counties. Most are concentrated in the City of Buffalo and neighboring towns.

Trainers include community service providers, adult and continuing education services, and after-school programs or competitions to promote career awareness and education in tech. K-12 schools are the starting point of the region's tech education pipeline.

Colleges and universities are leaders in tech education. Buffalo Niagara's higher education institutions produced over 4,600 graduates in fields related to tech in 2021.



TECH TRAINERS BY TYPE, 2022

- College or University
- Adult/Continuing Ed.
- Community Srvc. Provider
- K-12 School
- After School Program

Source: UBRI analysis of various sources, including InfoGroup ReferenceUSA Business Database, NYS Department of Labor's List of Eligible Training Providers, NYS Department of Education K-12 Schools, and independent research of local training provider and tech-related programs, 2020-2022.

There were 1,129 graduates from tech degree/certificate programs in Buffalo Niagara in 2021. Tech degrees are computer/information science degrees defined using 12 Classification of Instructional Programs (CIP) codes. The most common degrees earned by tech graduates are general computer and information science degrees, computer/IT administration, and computer engineering.

The University at Buffalo produced 75% of the region's tech graduates, with many others graduating from Buffalo State College, Niagara University, and local community colleges. Tech degree programs graduate higher level talent. Nearly half (45%) of tech degree grads in 2021 earned a Master's, while 35% received a Bachelor's.

About half (49%) of all tech degrees in Buffalo Niagara were earned by international students in 2021. This includes the wide majority (92%) of those who received a tech Master's degree. International students make up nearly twice the share of tech graduates in Buffalo Niagara than they do in peer metros, on average. This presents a pressing challenge and an opportunity for Buffalo Niagara's tech workforce.

Participants in employer focus groups spoke about facilitating the process to hire international tech talent from local colleges. Some estimated the cost of sponsoring and hiring just one international student to be $25,000 making it prohibitive for most employers. This may overestimate the actual initial cost, which is closer to $11,000 including an H-1B visa, filing fees, and attorney fees. In subsequent years, employers may incur additional costs associated with the green card process that allows an individual to continue working after their H-1B visa expires.

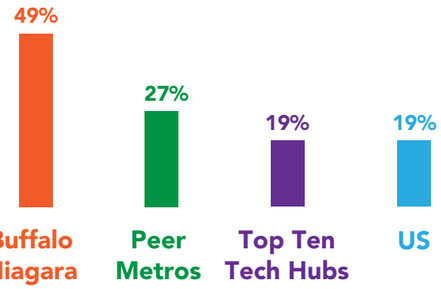
In 2021, Buffalo Niagara colleges generated...

1,129 Tech Graduates

Computer and information science (CIS) degree/certificate programs designed specifically for tech jobs.

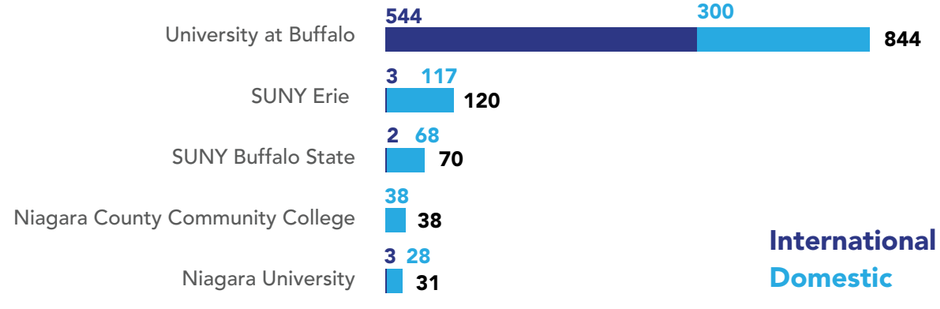
Source: UBRI analysis of National Center for Education Statistics, Integrated Postsecondary Education Data System, 2021. Preliminary data subject to revision.

INTERNATIONAL STUDENTS AS A % OF TECH GRADS, BUFFALO NIAGARA, 2021



Source: UBRI analysis of National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS), 2021. Preliminary data subject to revision. Tech grads are defined using 12 Classification of Instructional Programs (CIP) codes of computer/information science programs.

BUFFALO NIAGARA INSTITUTIONS WITH MOST TECH GRADUATES, 2021



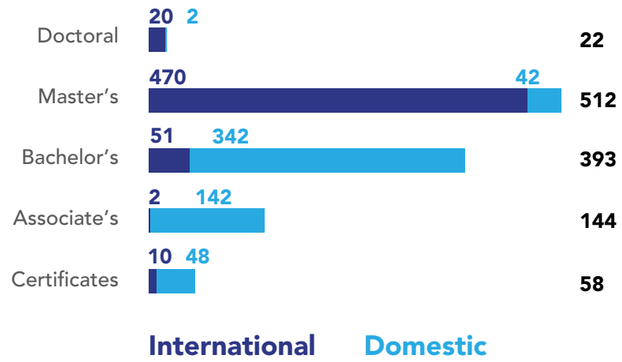
Source: UBRI analysis of National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS), 2021. Preliminary data subject to revision. Tech grads are defined using 12 Classification of Instructional Programs (CIP) codes of computer/information science programs. See Data Sources and Notes.

While the region's tech degree programs are diverse in terms of international representation, they still face a wide gender gap. Women make up 23% of 2021 tech graduates in Buffalo Niagara—a smaller percentage than the current tech workforce overall (26%). Initiatives to raise awareness of tech job opportunities to females at colleges and K-12 schools and promote inclusive workplace cultures at local tech employers can help close tech workforce gender gaps.

Women can also be recruited into tech from tech-aligned sectors and degree programs. In addition to the region's 1,129 graduates in computer/information sciences, there are another 3,480 with tech-aligned degrees that are also common among today's tech workers. Hundreds of local college alumni with a tech-aligned degree currently work in a tech job. This includes business and finance degrees which can be used for tech jobs like business systems analyst which are among the region's most in-demand tech jobs. Several students in the young tech professional focus group had a background in business. In 2021, over 2,100 people in Buffalo Niagara earned degrees in Business. The region also produced nearly 800 graduates in electrical, mechanical and other types of engineering that can be used to earn tech jobs, along with over hundreds in math, science, and other tech-aligned degrees like communications technology and bioinformatics.

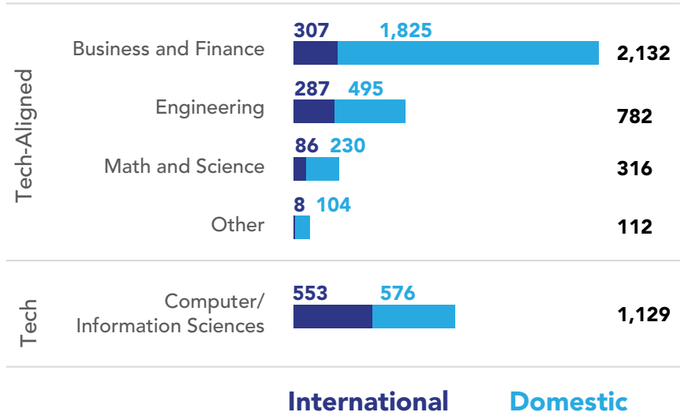
When considering the entire pool of tech and tech-aligned college graduates, the region produced over five tech-related graduates for each tech job opening in 2021. However, when considering only graduates of purely tech (or computer science) programs, there is a more even ratio of tech graduates per tech job opening (1.2 to 1), and half of these graduates are international students who are harder to retain. But even when considering only domestic tech degree grads, Buffalo Niagara's supply of tech college talent per job opening (0.6) exceeds the US (0.3) and peers (0.5).

TECH GRADUATES BY DEGREE LEVEL, BUFFALO NIAGARA, 2021



Source: UBRI analysis of National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS), 2021. Preliminary data subject to revision. Tech grads are defined using 12 Classification of Instructional Programs (CIP) codes of computer/information science programs. See Data Sources and Notes.

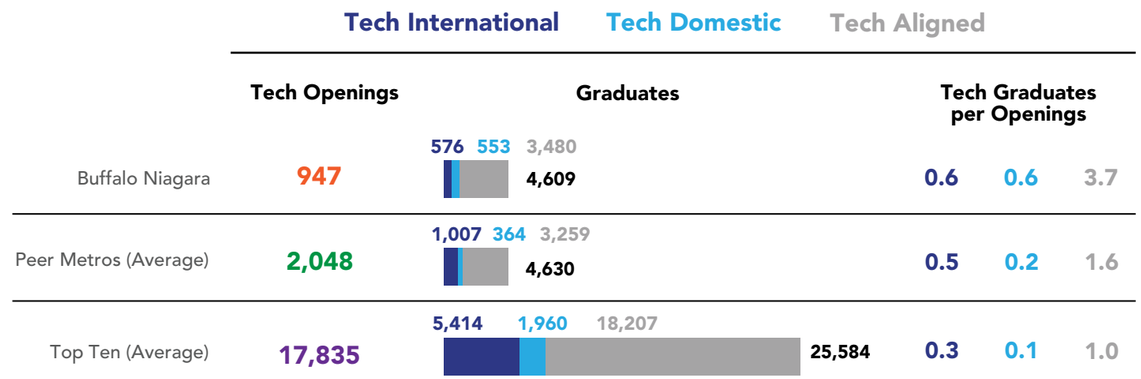
TECH AND TECH-ALIGNED GRADUATES BY DEGREE TYPE, 2021



Source: UBRI analysis of National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS), 2021. Preliminary data subject to revision. Tech grads are defined using 12 Classification of Instructional Programs (CIP) codes of computer/information science programs. Tech-aligned programs are other programs that are also commonly used to earn tech jobs. See Data Sources and Notes.

While the region produces a large supply of local tech graduates per job opening compared to peers, hiring shortages persist. This may point to a misalignment between tech degree programs and local employer needs, and an opportunity to better connect local tech trainers, colleges, and universities with employers. Employers who participated in the survey and focus groups said they already partnered with a variety of local training providers and higher education institutions in a variety of ways, from career fairs to internship programs. Some suggested that higher education institutions could improve employer engagement, help retain international students to fill local jobs, and facilitate the hiring of students and graduates at local employers.

TECH AND TECH-ALIGNED GRADUATES PER TECH JOB OPENINGS, 2021



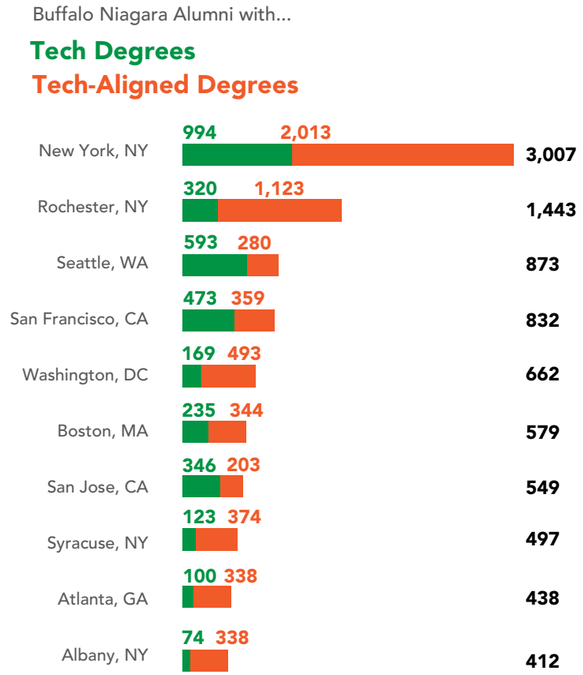
Source: UBRI analysis of National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS), 2021. Preliminary data subject to revision; and Lightcast, Occupational Job Openings, 2021. Based on job openings data from NYS Department of Labor. See Data Sources and Notes.

Many graduates leave the region, making it more challenging for local employers to hire tech workers.

Employer focus group participants said that highly skilled tech workers often leave to take jobs at major companies who pay higher wages, offer remote work, and are located outside of the region. Some elaborated that Buffalo has the training to grow tech talent and may be a good place to start a career, but they have seen workers, especially higher-level tech talent, leave Buffalo Niagara for the career opportunities and higher pay offered by bigger metros with more established tech markets. This contributes to a gap for mid-level tech workers who typically have several years of experience, highly developed skills, and the potential to advance into senior level or management positions.

An analysis of online worker profiles of local Buffalo Niagara alumni shows that seven out of ten who now work in a tech job live outside the region. There are nearly as many local tech alumni (7,882) in the top ten tech metros as there are living in Buffalo Niagara today (8,026). Over three thousand live in the NYC Metro area, and nearly 1,600 live in Rochester. Hundreds of other local tech alumni live in bigger more developed tech markets with more major tech employers and higher wages, like San Francisco, Seattle, and Washington, DC. In the age of remote work, competition with other metros for tech talent presents unique challenges and opportunities for Buffalo Niagara.

METRO AREAS WITH MOST BUFFALO NIAGARA ALUMNI WORKING IN TECH, 2022



Source: UBRI analysis of Lightcast Profile Analytics, 2022. Based on online worker profiles of alumni from Buffalo Niagara colleges and universities. Includes any alumni of a Buffalo Niagara college currently working in a tech job. Only includes profiles updated since 2020 (n=8,026). Tech degrees are defined using 12 Classification of Instructional Programs (CIP) codes of computer/information science programs. Tech-aligned programs are other programs that are also commonly used to earn tech jobs. See Data Sources and Notes.

"...everyone wants to move to New York City...then as I got older, adulting starts... do I want to pay $3,000 for a small apartment?"

Young professional focus group participant, August 10, 2022

While opportunities exist, tech training programs and employer needs are disconnected.

The disconnect between supply and demand for tech talent in Buffalo Niagara has many implications. It's seen in the number of tech jobs that go unfilled every month—even those that are entry-level. And potential diverse talent pools remain untapped.

Employers speak about the challenge of filling mid-level tech jobs, management roles, and finding the right talent to grow their tech startups. We also see the disconnect in how nearly half of tech-related graduates have bachelor's degrees, but employer focus group participants say they seek skills and experience.

We also hear it in the eagerness of trainers to understand business needs and hear first-hand from employers what they seek in terms of skills, experiences and credentials. More closely aligning tech training programs and employer needs is important to addressing the skills gaps in tech, growing a diverse workforce, and supporting a more competitive tech sector. It's also a great opportunity as most trainers surveyed report plans to grow their tech programs. This section sheds light on areas where deeper partnerships could address real workforce challenges and solve problems facing job seekers, employers, and trainers.

Across the region **there are 75,000 adults ages 25-64 who have some college or a degree but are out of work.**

2020 American Community Survey (5-yr estimates).

Stronger partnerships between employers and trainers can address disconnects.

Employers partner with many local colleges and trainers to grow their tech workforce. The most common tech training partners were the University at Buffalo (UB), SUNY Buffalo State, SUNY Erie, and the Rochester Institute of Technology (RIT). Twenty-seven respondents to the employer survey said UB was a tech training partner, more than twice as many as any other. RIT was named ten times, more than any Buffalo Niagara college besides UB and Buffalo State (11). Focus group participants said they partnered with these same institutions, and had interest in expanding partnerships.

Internships are the most common way employers partner with local colleges, offered by 75% of respondents. Many (67%) share job postings and attend career events. Less than a quarter (23%) of employers surveyed said trainer partnerships are very important to grow their tech workforce. Large and mid-sized employers were more likely to say tech training partnerships are very important than small employers (24% vs 15%, respectively).

Four out of five tech trainers are interested in expanding employer partnerships for tech training programs. Trainer survey respondents see the greatest potential for partnerships focused on connecting with underserved populations, upskilling/professional development and internships for students. To facilitate these deeper connections, focus group participants expressed strong interest in closer, more frequent and embedded connections with employers, a role that an intermediary convening organization like TechBuffalo could potentially play. Other trainers want a conversation with employers about cultural competency, to ease the transition for their graduates from un/underemployment and poverty to training and work.

The majority of trainers surveyed report **partnering with employers to connect students with a job, provide internships and/or develop curriculum.**

Broader connections with additional employers and trainers could benefit learners and job seekers in tightening the connection between job training and local demand.

Source: UBRI, TechBuffalo Employer Survey, 2022. n=55.

"It's really about relationship...."

Focus group with startups and small employers, July 15, 2022

Employers can adapt recruitment practices, training options and career pathways to attract nontraditional students.

Nearly all surveyed employers (93%) use online job postings to fill tech jobs. Most also recruit by word of mouth, social media, and by engaging colleges. Focus group participants said filling jobs by referrals or word of mouth is typically more effective than using online postings, and can help find workers who are more likely to succeed and advance in the company. Some employers described how COVID-19 and the shortage of candidates has changed hiring practices, with increasing pressure to hire fast. Others mentioned how hiring practices that rely on referrals from existing employees, social media, and college degree requirements reveal potential biases that could limit opportunities for underrepresented populations in tech and may exacerbate hiring shortages.

Employers said that sustained efforts to increase proactive outreach to underrepresented groups and promote welcoming workplace cultures are needed to create a more inclusive and sustainable tech workforce. They described how the pipleline into tech is uneven for young students across school districts. Promoting awareness and early career exposure could include expanded tech programming and outreach to K-12 schools, especially in urban districts where there is an opportunity to partner with nearby tech employers on industry-aligned training programs that improve outcomes for students, districts, and employers. Employers also said that sustained efforts to create welcoming workplace cultures are needed to retain an inclusive tech workforce.

The prevalence of remote work presents an opportunity to recruit tech talent to grow and diversify the region's tech workforce. Participants said broader regional partnerships with Rochester, and across the border with Toronto, would also help to grow the local tech workforce.

In preparing existing workers for advanced roles, large and mid-sized employers are more likely to offer training services for their employees. Nearly all (94%) of employers with 100 employees or more offered on-the-job training, compared to 69% of small employers.

In considering how employers can leverage existing workers as source of talent for higher-level, hard-to-fill roles, young professional focus group participants said that they see opportunities to advance and high demand for more advanced and senior level positions. However, they said these positions require experience in business and soft skills that are not typical of many tech roles. They said that while there are opportunities for advancement, it is hard to move up because many tech workers lack experience and requisite skills to advance into management.

23% of employers recruit through targeted sourcing of nontraditional talent such as Veterans and immigrants

Source: UBRI, TechBuffalo Employer Survey, 2022. n=55.

TOP HIRING/RECRUITMENT METHODS

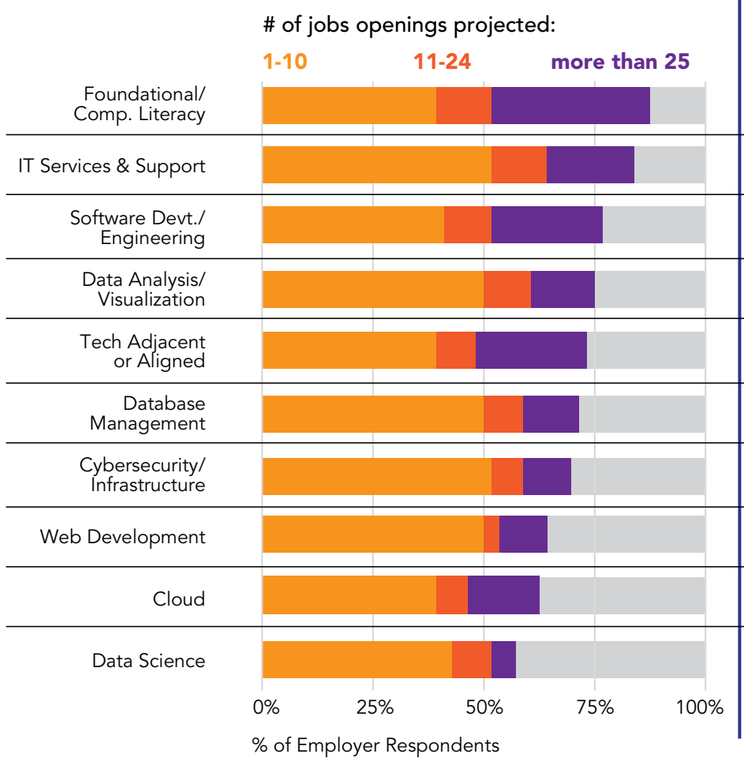
93% Job posting websites
85% Word of mouth
76% Social media posts
58% College/university based recruiting

Source: UBRI, TechBuffalo Employer Survey, 2022. n=55.

Training programs can't keep up with evolving industry needs and employers' increasing demand for tech skills.

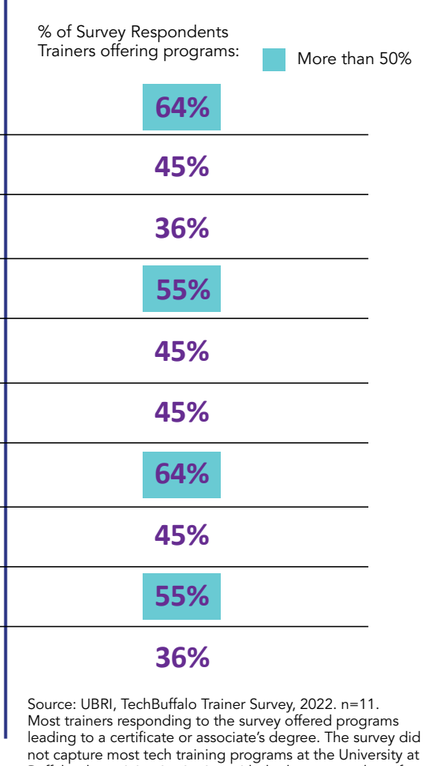
Looking ahead over the next couple years, employers in Buffalo Niagara across a broad variety of industries expect that more job openings will require entry-level tech skills, like computer literacy and IT support, than advanced technical skills. Over 75% of respondents expect their company will need at least some workers with data analysis, software development, IT support, and foundational computer skills. Many respondents expect their employer will need to fill more than twenty-five open jobs with certain tech skills over the next two years. More than a third (36%) said their company would need more than twenty-five workers with foundational computer skills over the next two years, and 25% said the same for tech-adjacent or tech-aligned skills.

EXPECTED JOB OPENINGS OVER NEXT 2 YEARS, 2022



Source: UBRI, TechBuffalo Employer Survey, 2022. n=56.

TECH TRAINING PROGRAMS BY TECH SKILL AND LEVEL, 2022



Source: UBRI, TechBuffalo Trainer Survey, 2022. n=11. Most trainers responding to the survey offered programs leading to a certificate or associate's degree. The survey did not capture most tech training programs at the University at Buffalo, the training institution with the largest number of tech graduates in Buffalo Niagara.

Less than half of trainer survey respondents offer training at any level for many of these growing, in-demand tech skills. The gap is greatest for software development. Only 36% of tech trainers surveyed said they teach this skill, even though the large majority of employer respondents project they will be seeking this skill in new hires at their company over the next two years. While higher percentages of trainers report teaching skills such as foundational computer literacy, data analysis, cybersecurity, and cloud, many of these training programs are small, enrolling less than 100 students a year.

Many focus group participants, especially those from large employers, stressed the high demand for entry-level tech skills, and tech-aligned skills like IT support. In hiring entry-level workers, employers look for individuals with the skills needed to grow into mid-level and advanced positions. This typically includes strong interpersonal and non-technical skills and a desire for lifelong learning to advance technical skills. Many rely on referrals from existing workers to identify applicants with these qualities to succeed in entry-level tech positions, and some source talent from retail stores.

In considering career pathways in tech, computer literacy and basic digital skills are an important starting foundation for students. These skills also benefit workers in tech-aligned occupations that require a higher level of digital literacy. More than 50% of tech trainer respondents reported providing computer literacy at the beginner level. Nearly half also offer intermediate and advanced-level programming. Beginner-level programs in cybersecurity are another common entryway into tech, and beginner-level programs are offered by more than half of trainer respondents. Many of these trainers also reported having programs that cultivate more advanced skills in cybersecurity. Cybersecurity, IT services & supports and foundational/computer literacy were the only three program areas where more than a quarter of trainer respondents reported having programs along the learning continuum from beginner to advance level.

The survey identified common entry points in tech for those just starting out in training, as well as focus areas for up-skilling and professional development. Conversations with trainers shed light on challenges across the spectrum of learning that can add to skill gaps despite the existence of training programs. At the entry level, trainers said they would benefit from more centralized marketing of programs to reach priority student audiences. They also identified the need to fund wraparound services and expressed an eagerness to tap into new pilot programs like Live Well Erie County. Trainers expressed a need for on-boarding assistance to support program graduates' transition into a work setting. Finally, while some individual trainers described learning pathways in tech at their institutions, stronger connections across the ecosystem could broaden access to training and stackable credentials for job seekers at all levels.

Small business representatives and entrepreneurs emphasized the importance of training that meets the evolving needs of Buffalo Niagara's maturing ecosystem for tech startups, as well as the increasing demand for tech skills across employers. The challenge of finding experienced tech talent may be one factor that holds back entrepreneurs and startups in the region. Some participants said that Buffalo Niagara has a deep pool of young talent to supply early-stage startups, but they lack the expertise needed to grow these businesses into sustainable enterprises, especially leadership skills.

Workers need wraparound services, but employers and trainers lack capacity.

Wraparound services help to reduce and eliminate barriers to ensure individuals are successful in training and on the job. Many potential tech workers who are just out of high school, unemployed, or working in a lower-paying job face barriers to tech training, succeeding in school, and jumpstarting a tech career. Common obstacles include limited financial resources and professional networks, transportation, balancing training with work, benefit cliffs, and job postings that assume a traditional learning pathway. At a regional level, these barriers contribute to reduced workforce participation, economic recovery and inclusive regional economic growth.

Drawing from this study survey of employers and trainers, and conversations with tech trainers, employers and young tech professionals, this section sheds light on current regional capacities to provide wraparound services to current and aspiring tech talent and the potential ways these capacities could be expanded to help build the tech workforce pipeline for underrepresented individuals and create a more inclusive tech workforce in Buffalo Niagara.

Training does not take care of everything. It needs to be holistic and supported on all sides.

Paraphrase from trainer focus group, June 24, 2022

Nearly **190,000 adults ages 25-64 in Buffalo Niagara have no training beyond high school.**
They are **more than twice** as likely to **live in poverty and need assistance** beyond training.

2020 American Community Survey (5-yr estimates)

Many interested in working in tech would benefit from wraparound services.

Employer survey respondents estimated that over half of tech workers at their company would benefit from wraparound services such as employee resource groups, tuition reimbursement, and professional development events. Meanwhile, about two-thirds of tech trainers reported that individuals of color, urban populations, veterans and girls/women are priority populations for their tech training and education initiatives. Underrepresented populations disproportionately face barriers to learning and work in tech and may need more than training to jumpstart their career.

Young tech professionals who participated in a focus group said access to tools, networks, and mentors would help them and aspiring tech workers grow tech skills, learn about job opportunities, and advance their careers. The majority of the young professionals in the focus group had a relative who worked in tech. Some confirmed this increased their awareness of jobs in tech and influenced their decision to pursue a tech career. It also suggests that representation in tech can be influenced through social networks that might also include role models and mentors.

In considering other resources beneficial to these young professionals and the supports that would benefit others, they promoted self-paced coursework which is flexible and can be done on the user's personal schedule. Free or reduced cost access to online programs and certifications that are in-demand and accepted by local hiring employers would help workers acquire skills. They also mentioned access to equipment, acknowledging that not all workers have access to laptops and internet with the capacities to succeed in tech.

They thought mentorship opportunities for students and others interested in tech would help them along their pathway, with exposure to the nature of work in different tech roles, and pointing to opportunities to advance careers. Participants said the continued encouragement and support of family and friends helped them through their tech career. In some cases, these connections led to mentorship and career building opportunities.

"For people who don't have as much access...but who want to get into tech...I think if you offer free or reduced-price learning...or vouchers for certification, just to make it more accessible and cheaper."

Young professional focus group participant, August 10, 2022

52% of tech workers would benefit from wraparound services

Source: UBRI, TechBuffalo Employer Survey, 2022. n=42. 52% is the average value respondents gave when asked, "What percentage of your tech workforce would benefit from the wraparound/support services listed above?"

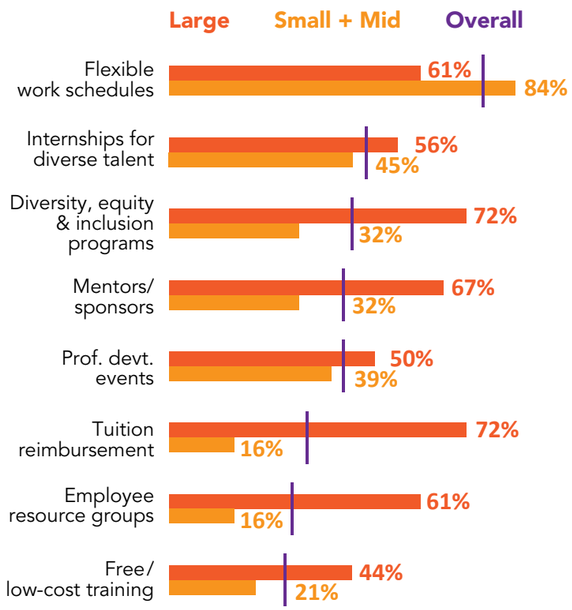
Trainers and employers do not have the capacity to provide wraparound services for trainees and workers.

Nearly a quarter of employers surveyed (23%) target recruitment on nontraditional sources, like immigrants to increase diversity. Most employers who responded to the survey offer a number of services to support diversity. This includes flexible work schedules, internships for underrepresented populations and diversity, equity and inclusion (DEI) programs With increased resources, large employers are more likely to offer wraparound services. These services are typically offered by the majority of large employers, but by less than half of small and mid-sized employers surveyed. Small and mid-sized companies are more likely to offer flexible schedules, which help workers juggle work and demands at home such as appointments, childcare, and additional training.

Overall, while the majority of employer survey respondents provide flexible work schedules, less than half offer wraparound services that could help retain and advance tech workers through tuition reimbursement, free or low-cost training, employee resource groups, or professional development events. To reduce turnover and increase retention, trainers participating in a focus group mentioned the need to provide additional onboarding assistance, especially for graduates who do not have much prior work experience.

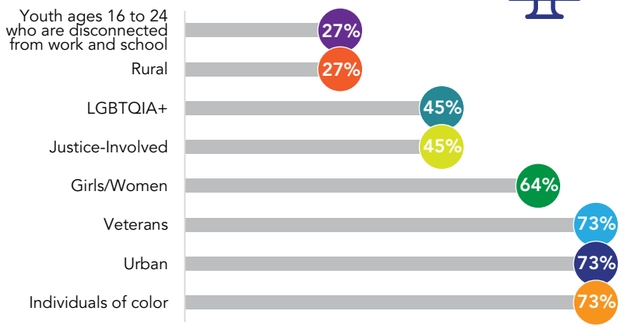
Most tech trainer respondents provide some wraparound services to boost student outcomes either directly or indirectly. Services most commonly offered with sufficient capacity include coaching/mentoring, job placement/ career development, flexible course scheduling, and services for students with disabilities. Services where capacity may be lacking because the service is not offered at all, offered but insufficient or offered through referrals only are shown on the chart on this page. For example, while nearly half of trainers say justice-involved individuals are a priority population, most do not offer wraparound services to address the barriers faced.

WRAPAROUND SERVICES OFFERED BY COMPANY SIZE, 2022



Source: UBRI, TechBuffalo Employer Survey, 2022. n=56. Large employers have 500 employees or more, small employers have under 100, and mid-sized employers have 100-499. Includes 18 responses from large employers and 38 from small mid-sized employers.

PRIORITY POPULATIONS FOR TECH TRAINING AND EDUCATION, 2022



Source: UBRI, TechBuffalo Trainer Survey, 2022. n=11. See the Trainer Survey in the appendix of this report for our definitions of these target populations, as used for the survey.

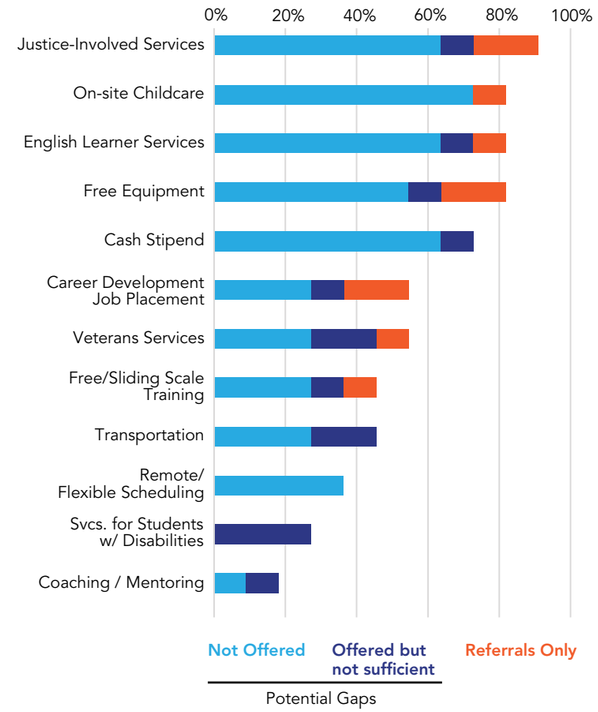
Trainers participating in focus groups described how cultivating talent diversity is a resource-intensive commitment, from outreach to wraparound services to post-graduation support needs. One trainer in Buffalo described screening 100 individuals for a class of 15. Others described "high touch" approaches and giving every student a mentor. Others talked about an exciting new pilot program (Live Well Erie County) that will provide comprehensive and individualized wraparound supports to student graduates through their first years of employment. Trainers also discussed how transportation remains a significant barrier in the transition from training to work. In the city of Buffalo, one out of four households headed by someone under age 65 do not have a vehicle. For those dependent on public transportation, it can take two buses and about an hour and a half to travel from Buffalo to destinations in neighboring municipalities.

In looking to the future, over three-quarters of trainer survey respondents reported plans to expand wraparound services over the next five years. In considering their dream scenario, focus group participants expressed desire for a simpler, nimbler, more efficient workforce system that's easier for potential students to navigate and employers to tap into, while also providing the training and wraparound services that students need.

"[What has] really benefited me in terms of career journey, pathways and knowing where you want to be in five years [is] having a strong mentor that mirrors that success. That's hard to find."

Young professional focus group participant, August 10, 2022

POTENTIAL GAPS IN WRAPAROUND SERVICES OFFERED BY TECH TRAINERS, 2022



Source: UBRI, TechBuffalo Trainer Survey, 2022. n=11. Intended to highlight where additional capacity for wraparound services is needed, this graphic does not display percentages for wraparound services that are offered with sufficient capacity.

"Are we talking about 10,000 people [who need training]? Then how do we find 10,000 mentors?"

Focus group with workforce trainers, June 24, 2022

Employers, trainers, and job seekers need better information to grow the region's workforce.

Data and information can empower tech employers, trainers and job seekers, as it supports informed decision making, investments and impacts. For tech employers, the latest data and information can help them understand and implement best practices, expand partnerships, and stay ahead of the competition for a more diverse and inclusive talent base. Tech trainers can use data to connect with their target student markets in underserved communities, develop relevant industry-driven programs that meet employer and student needs, and grow tech programs and services to fill gaps, avoid duplication and achieve efficiencies through partnerships and coordination. Expanded information could help job seekers choose the right career pathway in tech, develop skills employers desire, find a job and advance their career here in the region. Drawing from conversations with tech employers, trainers and young professionals, this section sheds light on some information gaps and needs that could be addressed to strengthen the tech workforce ecosystem.

"There is no such resource or guide available to students who are interested in tech... It simply doesn't exist for students....Yet there is a great need by employers for talent."

Focus group with workforce trainers, June 24, 2022

"I just didn't know about the resources."

Focus group with young professionals, August 10, 2022

Employer demand is increasing for tech skills, but training options can't always keep up with evolving industry needs.

Our region's next generation of tech talent has many career options vying for their attention, but information and resources to promote opportunities in tech are not always well known. A larger tech workforce will draw from expanded nontraditional sources including workers who are currently un/underemployed. Outreach with actionable information about opportunities in tech and options for learning and work will be important.

Activities and annual events to promote awareness and education in tech are important information channels in reaching the next generation of tech workers. Four out of five young professional focus group participants said activities, clubs, summer camps, or events helped spark their interest in tech and cultivate the leadership, project management, and other soft skills that are useful in their current roles. Some of the activities they mentioned included robotics and engineering clubs, tech or STEM camps, competitions during middle and high school, and scouts.

Strategic outreach with information to current college students is another opportunity for tech pipeline expansion. The young professionals in the focus group came into tech from different fields. Some switched majors and career pathways several times. They considered other careers, such as law, fashion, marketing, and business, and earned degrees in business and computer science. They were self-taught in tech and acquired skills through training outside of college coursework such as through Google, Microsoft and online courses through platforms like Udemy and Coursera, and LinkedIn. They said the use of online platforms took off after the COVID-19 pandemic.

While this group of young professionals described learning about training options by researching, networking with colleagues, and social media platforms, the also noted how many do not know of these opportunities and they may not be promoted as they could through typical college courses.

Information and awareness about career pathways in tech beyond an entry-level job could support more aspiring students as well. Young professional focus group participants said one challenge for them is picking a specialization and choosing a specific pathway in tech, since there are so many paths to take, even within subfields of tech, like cybersecurity. Many did not decide on or become aware of their career pathway while in college, instead they learned about careers by gaining work experience, networking with professionals in other tech roles, and doing their own research.

Some participants did not learn about free or reduced cost certification opportunities until after they graduated from college. They credit career advancement with a personal drive to achieve, and were promoted within a year. Employer focus group participants acknowledged career pathways are not always clear cut and there may be a lack of awareness of opportunities for advancement within companies. This may lead workers to search for higher paying or more advanced positions at another company or outside of the region.

"What's been a big help for me is [how] Microsoft does virtual training days. I've been going to those, getting free vouchers, and then taking the certification."

Young professional focus group participant, August 10, 2022

SELECTED INFORMATION NEEDS OF TECH EMPLOYERS, TRAINERS, AND JOB SEEKERS

	Employers	Trainers	Job Seekers
WORKFORCE	Process and cost to hire international student graduates Sources of talent for mid-level and senior roles Sources of talent for tech-aligned roles. Sources of talent to take start-ups to the next level Sources of student interns	Understanding of business needs Regional job openings and projections for tech Skills, skill levels and credentials that employers seek Career pathways within a company	Job opportunities and postings Hiring employers In-demand skills Wages Career pathways Remote work options Resume and job search services
TRAINING	Understanding of return on investment from training Training options for existing workers, especially free and discounted training Trainers that deliver (and can be trusted)	Understanding of business needs and what curriculum will meet the mark with employers Understanding of tech stacks or the suite of skills associated with tech roles College programs offered by other trainers, including degree non-degree programs Channels for outreach to underserved, underrepresented populations (such as churches, congregations, tech clubs, and community groups)	College and credentialing programs (including Google, Microsoft, Coursera), especially online, self-directed and free/reduced priced programs Upskilling programs (with emphasis on business and soft skills) Trainers with learn-and-earn models Tech events and activities
WRAPAROUND SUPPORTS	Providers and services for referrals	Providers and services for referrals Onboarding assistance offered by hiring companies	Tech activities for youth (camps for science, technology, engineering and math (STEM), robotics clubs, and computer-aided drafting classes) Activities that emphasize tech-aligned skills (scouting organizations) Internships, mentors and job shadowing opportunities Sources of free/low-cost laptops and other tech equipment
BEST PRACTICES	Playbooks that make workforce functions easier and more efficient Best practices for the amount of time and resources to allocate to upskilling for productivity and impact	Mentoring, including how to offer to all students in a way that's affordable and practical Best practices for leveraging WIBs Handshake hubs for tech students looking for a job Collective neighborhood workspaces that remove transportation barriers and create community for remote workers	Resume optimization for algorithms
OTHER	Tech hubs for inspiration and partnership building Information that promotes the resources and assets that make Buffalo Niagara a great place for tech Sources of post-seed funding for start-ups (banks, venture funders)		

Expanded information plays an important role in addressing the tech talent shortages.

In considering how to expand the pipeline of tech talent and increase diversity, employers mentioned that promoting awareness of tech training and job opportunities to underrepresented populations in tech could help enhance diversity and fill hiring gaps for the local tech workforce. This approach could also include expanded tech programming, information and outreach to K-12 schools, especially in urban districts where there is an opportunity to partner with nearby tech employers on industry-aligned training programs that improve outcomes for students, districts, and employers.

Employer focus group participants also spoke about facilitating the process to hire international tech talent who graduate from local colleges. Some employers expressed willingness to sponsor international employees or help them explore the process to citizenship, but many were unfamiliar with the process and described it as complex, ever changing and costly.

Employer focus group participants also expressed being unaware of what training exists in the local area to meet their hiring needs. At the same time, trainers expressed the challenge of not knowing about employer interest in partnering. The large majority of tech trainer respondents are interested in expanding their partnerships with tech employers. They see this as critical to program growth with the greatest opportunity related to upskilling/professional development and connections to underserved populations. Delivering better information to both employers and trainers could facilitate these partnerships to align supply and demand for tech talent.

Trainer focus group participants described wanting to hear firsthand from employers about what they are looking for in graduates in terms of skills, training, and credentials. Trainers also expressed interest in information from employers to better communicate with students about the career pathways available beyond an entry level job in tech. Trainers also described the need for an ecosystem map. Tech trainers mentioned needing greater understanding of the supply-demand gaps to support programmatic growth. Another trainer specifically mentioned the need for an online tool that "visualized the pull from employers and the push of available job seekers."

Advisory group members offered suggestions on the data delivery and processes to strengthen the tech workforce in Buffalo Niagara. They discussed making data publicly available for free in readable formats and incentivizing participation to develop more robust resources. They also noted the importance of communication, messaging, and looking closely for language (even words such as "tech") that create unnecessary barriers. Finally, they also mentioned delivering information through broad channels that reach wide audiences especially the underserved and underrepresented through partnerships with neighborhood-based organizations.

← Source: This chart draws from conversations with young professionals, trainers and employers who participated in focus groups or completed the survey of employers or trainers.

Recommendations

How Does the Region Grow an Inclusive Tech Workforce?

Three Strategies

Build

Build the Tech Workforce Pipeline

Attract/ Retain

Attract/Retain Tech Workers

Prepare

Prepare Employers

TECHBUFFALO

INTERMEDIARY

- Convenes, connects, facilitates collaboration
- Collects, analyzes and shares data across the ecosystem
- Supports programs that build an inclusive tech talent pipeline
- Moves the Needle Together

Build

Build the Tech Workforce Pipeline

Encourage students to pursue tech degrees by creating awareness of career pathways. Trainers could be tapped to inform students about tech opportunities with hiring employers beyond an entry level job.

Train unemployed and underemployed individuals from underserved and underrepresented communities for in-demand entry-level tech jobs.

Encourage participation from underrepresented segments (women and people of color) through targeted, direct outreach programs; assess training needs and connect with appropriate training programs.

Connect trainees and employees with wraparound services to ensure program and job success and mitigate barriers such as child care and transportation.

Upskill mid-level tech professionals and recent college graduates for more senior positions.

Define and build a continuum of opportunity that engages youth, up-skillers, re-skillers, and those who want to pursue tech degrees through:

- **Outreach** that meets people where they are on the continuum.
- **Alignment** of individuals with the most appropriate training based on where they are in the continuum.
- **Connecting** individuals to wrap around best suited services.
- **Coordinating** training groups to avoid program duplication.

Attract/ Retain

Attract and Retain Tech Workers

Increase opportunities for tech job internships and apprenticeships, enhance capacity of career services at local colleges and universities to connect graduates with industry, and bolster networking and "education on opportunity" events for students.

Retain the region's graduating college students who are earning tech and tech-aligned degrees by promoting job opportunities.

Attract experienced tech workers through increased outreach and building better connections with employers.

In coordination with Be In Buffalo, fully resource a large-scale marketing program focused on attraction and opportunities, and build programs offering direct, focused concierge services and residencies. A marketing plan will build awareness that a strong tech community is being developed in WNY and will support a "I see myself here, I want to be here" culture. One of the marketing "products" can be a physical shared convening space for tech organizations, trainers and professionals. Employee attraction efforts should start with "low hanging fruit" from outside the region – tech professionals who are most likely to move here such as expats and new professionals who attended school here and know the benefits of our region.

Prepare

Prepare Employers

Encourage closer, more frequent and embedded connections between trainers and employers so that trainers can hear first-hand what employers are looking for in program graduates in terms of skills, training and credentials. Trainers will have the opportunity to learn about the business problems/hiring needs that specialized training can help employers address.

Connect employers with trainers early on in the workforce pipeline for employers to provide input for curriculum development. Engage employers in meetings with trainees for two-way conversations.

Encourage employers to 1) Review and consider revising promoted job requirements to attract a larger pool of applicants including candidates who are skilled through alternative routes and 2) Create more non-traditional career pathways within their organizations.

Increase programs focused on creating inclusive cultures in the workplace to ease the transition from training to employment for nontraditional candidates.

Work to build and promote programs focused on onboarding, supporting, and retaining diverse populations.

Three **Strategies**

How Can We Get This Done?

Build on Existing Assets, Resources and Programs Across the Continuum of Opportunity

Invest in and support tech workforce training, outreach and employment programs and organizations and build programs that enhance and support the continuum of opportunity.

TECHBUFFALO

TechBuffalo Serves as an INTERMEDIARY

The tech workforce in Buffalo Niagara involves thousands of employers, workers and learners, and numerous training organizations. While employers struggle to fill good-paying job openings, those seeking to start or advance a career in tech face a confusing landscape of training options and employment opportunities. They also encounter job postings that describe preference for a bachelor's degree and lists of skills that no single program generates.

An intermediary organization like TechBuffalo is needed to make sense of this tech workforce maze.

As the intermediary, TechBuffalo would partner with schools, trainers, and employers to connect dots between programs, the community, key stakeholders, and funders. An intermediary is an organization with convening power and the capacity to coordinate engagement and collaboration across all connected stakeholders. An intermediary can ensure programs are successfully resourced and implemented, employers' needs are met, and agreed upon milestones are achieved leading to positive outcomes for the region.

This may include:

- Discovery and strategy development
- Convening and aligning stakeholders
- Collecting, analyzing and sharing data
- Tracking and reporting ecosystem progress
- Grant writing (connecting the dots to leverage opportunity and increase sustainability by diversifying funding sources)
- Managing a portfolio of funds and resources through program management

A dedicated, tech-workforce-focused intermediary will help to reduce silos; build collaboration between existing programs and organizations to maximize their impact and support from funders; and reduce program duplication to increase efficiency.

Recommendations

TechBuffalo as an **Intermediary...**

To convene, connect and facilitate collaboration.

Short Term Actions (1-3 years)

Host regular convenings for sharing information, inspiring, building partnerships, getting input and elevating the region as a tech hub.

Foster partnerships with employers and colleges/universities/trainers to define career pathways, support industry-driven training development, and expand career entry and upward mobility for all individuals.

Develop, manage, and maintain a physical space for convening and collisions by tech talent.

Foster deeper connections with community-based organizations in order to connect employers with potential talent and help build their cultural competency.

Work to identify and understand who is not participating in tech workforce programs, how to find/reach them, and help them overcome the "What is Tech" and the "How to Apply" gaps.

Long Term Actions (4-10 years)

Cultivate partnerships with youth apprenticeship programs to expand opportunities and access to tech training for all.

Build partnerships with peer organizations and neighboring tech hubs across Upstate New York, Ontario and Rochester.

Create playbooks with best practices and strategies for partnership building for tech employers and trainers.

To collect, analyze and share data across the ecosystem.

Short Term Actions (1-3 years)

Disseminate/share key data/ findings from this study in a simplified manner.

Promote research and relevant findings from partners, such as Invest Buffalo Niagara's labor market study and dashboard.

Raise awareness of work being done by industry leaders.

Promote defined career pathways in tech through outlets such as the Buffalo Niagara Partnership's new BuffaloFutures.com website.

Share all of the above through partners' channels, digital platforms and earned media.

Long Term Actions (4-10 years)

Invest in tools, resources and partnerships that keep data and analysis that is relevant to employers, trainers and tech talent up to date. With key stakeholders (funders, employers, community-based organizations), identify metrics to measure results across the region, e.g. retention, wages, composition of workforce.

Use data to track and report on outcomes and impacts and adapt strategies to emerging trends.

Through consistent messaging, continue to raise the profile of Buffalo Niagara as a hub for tech talent.

To support programs that build an inclusive tech talent pipeline.

Short Term Actions (1-3 years)

In partnership with employers, continue to implement successful programs such as a Data Analytics Bootcamp to train individuals for career pathways in tech focused on data analytics.

Support the onboarding of training programs identified to fill existing gaps, such as Bitwise.

Collaborate with Invest Buffalo Niagara to expand Be in Buffalo career pathways for current or aspiring tech professionals.

Develop and launch a referral program to connect current and aspiring tech workers with opportunities for training, upskilling and wraparound services. Referral programs are not "one-stop shops" offering all services. Rather, a referral program is a "go to" hub where individuals can find information on programs and/ or opportunities best suited for them.

With partners, develop and launch an ambassador program that helps with the onboarding of new entry-level tech workers offering mentorship, career guidance and inclusion.

Long Term Actions (4-10 years)

Evaluate collaborative strategies based on regular feedback and updated metrics.

Cultivate sustainable funding sources for all programs and remove financial barriers for participants; scale up pilots as needed.

Moving the Needle Together

The competition for tech talent across the nation will intensify in years to come. By investing in an intermediary to work together on focused strategies backed by data, the region can allocate funding more effectively; better align and coordinate existing public and nonprofit organizations; and attract and retain talent. The result will be the continued buildout of an inclusive, growing, and sustainable regional tech economy.

Recommendations

Tech Workforce **Ecosystem**

Challenges and Opportunities

Tech jobs are growing but we lag out peers.

Employers have a hard time filling tech jobs.

We train but don't retain tech talent.

Tech training programs and employer needs are disconnected but opportunities exist.

Workers need wraparound services, but employers and trainers lack capacity.

Employers, trainers, and job seekers need better information to grow the region's tech workforce.

Three Strategies

Build

Build the Tech Workforce Pipeline

- Outreach to youth, unemployed, underemployed, underserved
- Training
- Wraparound Services
- Program Coordination

Attract/ Retain

Attract and Retain Tech Workers

- Skills based hiring
- Cultural competency
- Onboarding
- Trainer-employer connections

Prepare

Prepare Employers

- Skills based hiring
- Cultural competency
- Onboarding
- Trainer-employer connections

TECHBUFFALO

INTERMEDIARY

- Convenes, connects and facilitates collaboration
- Collects, analyzes and shares data across the ecosystem
- Supports programs that build an inclusive tech talent pipeline
- Moves the needle together

Tracking Progress

Tracking Progress

Metrics That Matter

As recommendations and strategies are implemented, it is important to regularly measure, track and communicate Buffalo Niagara's progress toward a stronger and more diverse tech economy. While change doesn't happen overnight, these recommendations and strategies can yield significant impact over time and benefit job seekers, tech workers, employers and trainers. To ensure this happens, we propose tracking seven relevant performance indicators based on data that is regularly reported. Learnings can be used to evaluate what's working and what might need a different approach to meet regional needs. Potential data sources for these metrics include Lightcast (formerly Emsi/Burning Glass), NYS Department of Labor, US Census, US Census Quarterly Workforce Indicators, and the Integrated Postsecondary Education System.

	Tech Jobs	Worker Diversity	Tech Wages	Hiring Gaps	Worker Turnover	Tech Graduates	Graduate Retention
Definition	Number of tech jobs at all levels, including tech employment as a percentage of the overall regional economy.	Percentage of tech jobs held by women and people of color, particularly Black and Hispanic/Latinx individuals, relative to the nation overall.	Average annual wages in tech relative to the nation and adjusted for cost of living.	Gap between monthly average tech job postings and tech hires.	Average percentage of workers who separate from their current employer.	Ratio of tech graduates relative to tech job openings, relative to the nation and peer metros.	Tech alumni from local colleges and universities over the past year who live and work in Buffalo Niagara.
Why This Matters	Tech contributes to regional economic growth and competitiveness, supporting nearly every sector of the regional economy. Currently, Buffalo Niagara lags the US and peer metros in tech job growth. A stronger tech workforce will support tech job growth over future years and strengthen the region's economy overall.	A diverse inclusive tech workforce will expand the pipeline of available tech workers for hiring employers, contributing to economic growth and competitiveness. Currently women and people of color make up a smaller share of the tech workforce in Buffalo Niagara than across the nation. Greater diversity will represent regional progress toward a strong tech economy.	Competitive wages support talent attraction and retention. Tech wages in Buffalo Niagara are nearly $20,000 below the national median. They are also lower than peer cities, adjusted for cost of living, contributing to hiring and worker retention challenges.	Ensuring hiring employers have an ample supply of tech talent to fill job openings in a timely way contributes to their ability to grow, maintain operations and remain competitive. Currently, three out of five job postings in tech go unfilled. Closing this gap will strengthen the regional tech workforce.	Worker turnover can be costly to employers and puts constraints on internal pipelines of talent available for higher-level tech roles that are already hard to fill. Focus group participants say that unclear career pathways leading to higher paid employment contribute to turnover and even tech workers leaving the region. Reducing turnover through clearer career pathways, upskilling and wraparound services will strengthen Buffalo Niagara's tech workforce.	Buffalo Niagara's colleges, universities and other training organizations are major contributors to the supply of tech talent in the region and the 71% of tech job postings that require a bachelor's degree or more. We currently lag the nation.	With dozens of universities and thousands of graduates in tech and tech-aligned programs, the region does a good job attracting young people who are interested in tech. However, too many leave the region after graduation for small and large tech hubs across the nation. Retaining more of this talent through expanded training-employer partnerships and better promotion of existing career opportunities will expand the region's pool of available talent for hiring employers.
Desired Direction Over Time	↑	↑	↑	↓	↓	↑	↑

Potential Pathways into Tech Careers

Tech jobs can be found everywhere across the Buffalo Niagara region, from tech startups and tech companies of all sizes to banks, hospitals, schools, manufacturers, casinos, marketing and media firms and more. Many good jobs in tech are available with less than one year of training after high school. These entry-level jobs offer higher wages and career advancement potential. These pages offer a sampling of career pathways that are available to individuals with diverse interests, work experiences and skill levels. These focus on pathways in the areas of IT Support, Cybersecurity and Data Analytics.

Selected Tech Training Programs in WNY...

Jumpstart a Tech Career

Buffalo Center for Arts & Technology
- IT HelpDesk Support
- IT Security and Exam Prep

Goodwill of Western New York
- Goodskills Career Builder

SUNY Erie
- Information Technology Courses (Cloud, Networking, Security)

Trocaire College
- IT Career Exploration
- IT Career Reboot
- IT Career Jumpstart
- Cybersecurity Certificate
- Data Analytics Certificate

Advance a Tech Career

Canisius College
- Data Analytics Graduate Programs

Hilbert College
- Bachelor's in Cybersecurity

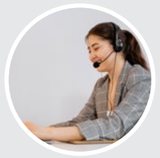
Trocaire College
- Cybersecurity Associate's Degree
- Data Analytics Associate's Degree

University at Buffalo
Department of Computer Science
- Computer Science Degree

The Center for Industrial Effectiveness
- Professional Education for Tech

School of Management
- MBA Analytics Concentrations

Source: Tech program information is from trainer websites. The list also draws from an inventory of trainers compiled by UBRI and information gathered in the trainer survey and focus groups.



From High School Grad to IT Helpdesk Tech

WORK

More than 2,400 individuals work as IT Help Desk Techs across the two-county region, or in similar job titles such as Computer User Support Specialist, IT technicians, Help Desk Analysts and IT Support Specialists.

LEARN

IT Help Desk techs typically have some training beyond high school. Goodwill of WNY, BCAT, Trocaire, and UB EOC offer training. The program at BCAT leads to a CompTIA IT Fundamental Certification.

GROW

With deeper technical expertise and work experience, IT helpdesk workers often transition into roles as network and computer systems administrators ($80,277), software developers and software quality assurance analysts and testers ($87,513) and first-line supervisors of office support workers ($59,210).

1,360+ Job postings
Sept. 2021 - Aug. 2022

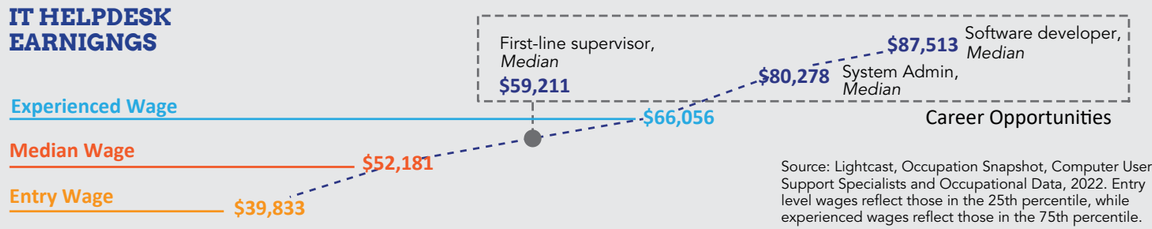
Only **1 out of 2 positions filled**

Top hiring employers
- Best Buy
- M&T
- UB
- Crossfuze
- Teksystems

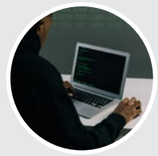
IN DEMAND

Top Tech Skills	Top Credentials
Help Desk Support	CompTIA A+
Technical Support	Comp TIA Network+
Operating Systems	MS Certified Professional

IT HELPDESK EARNIGNGS



Source: Lightcast, Occupation Snapshot, Computer User Support Specialists and Occupational Data, 2022. Entry level wages reflect those in the 25th percentile, while experienced wages reflect those in the 75th percentile.



From IT Help Desk to Cybersecurity

WORK

Demand is growing for workers with cybersecurity skills. Over the last 12 months, 114 employers competed to fill 310 unique job openings for Security Analysts, Security Engineers, Cybersecurity Specialists IT Auditors.

LEARN

Certification is a top credential for this role and can jumpstart a career. BCAT offers training leading to a certificate. Other options include UB's cybersecurity bootcamp, ECC's cybersecurity certificate, and Trocaire's certificate and associate's degree in cybersecurity.

GROW

Workers can advance into higher-level roles such as software development, network and computer system administration, and computer and information systems management. Those who become managers experience the biggest salary jump by cultivating leadership, strategic planning, and communications skills. Manager roles typically require five years or more of experience.

320+ Job postings
Sept. 2021 - Aug. 2022

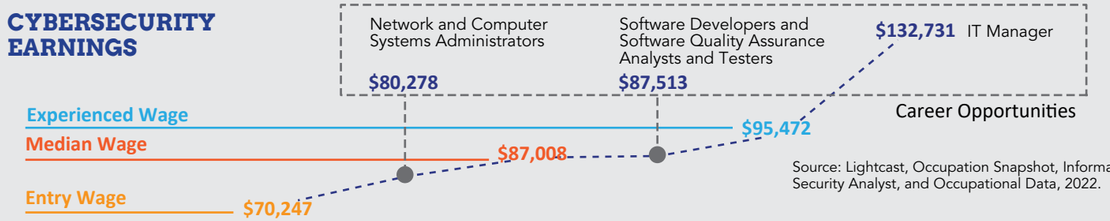
Only **1 out of 2 positions filled**

Top hiring employers
- M&T
- PricewaterhouseCoopers
- Anthem Blue Cross
- Paychex
- Moog

IN DEMAND:

Top Tech Skills	Top Credentials
Cybersecurity	Cert. Info Sys. Sec. Prof
Auditing	Cert. Info. Sec. Mgr.
Risk Management	Certified Info. Sys. Auditor (CISA)

CYBERSECURITY EARNINGS



Source: Lightcast, Occupation Snapshot, Information Security Analyst, and Occupational Data, 2022.

From a Non-Tech Background to Data Analyst

WORK

More than 1,400 individuals across Buffalo Niagara work as a Data Analyst in or in a similar job title such as Client Data Analyst or Business System Analyst. Nearly 240 companies competed for qualified candidates over the last 12 months.

LEARN

While the majority of Data Analysts have a 4-year degree, a bootcamp is another way to jumpstart a data analyst career. UB offers a Data Science and Analytics Bootcamp. General Assembly will also offer a Data Analytics Bootcamp.

GROW

With additional skills and training, many data analysts transition into higher-skill, higher-wage technical roles such as Software Developer, Management Analyst and emerging Computer Occupations. Cultivating management skills offers another pathway to career advancement and a higher salary, as some data analysts transition to roles as Marketing Manager and IT Manager with at least five years of experience.

890 Job postings
Sept. 2021 - Aug. 2022

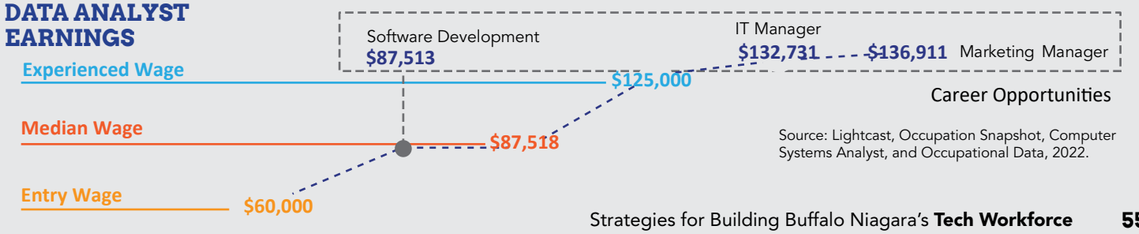
Only **1 out of 2 positions filled**

Top hiring employers
- M&T
- CTG
- Anthem Blue Cross
- Citigroup
- Delaware North

IN DEMAND:

Top Tech Skills	Top Credentials
Business Systems Analysis	MBA
Project Mgmt.	Bachelor's-Business
Agile Methodology	Internatl. Institute of Business Analysis (IIBA) Certified

DATA ANALYST EARNINGS



Source: Lightcast, Occupation Snapshot, Computer Systems Analyst, and Occupational Data, 2022.

Best Practice Models to Support Recommended Strategies for TechBuffalo

Capital CoLAB

The Greater Washington Partnership launched the Capital CoLAB to help grow the supply of workers to fill high-demand tech roles in the broader Washington DC region. The initiative offers a free Digital Tech Credential (DTC) program focused on key skills for entry-level tech and tech-adjacent jobs for students at local schools. Students receive badges and credentials recognized by participating employers. Capital CoLAB's TalentReady program is a regional partnership with employers to create career pathways connecting high school classes, certifications, degree programs with real-world work experiences in tech careers.

https://greaterwashingtonpartnership.com/capital-colab/

Cin-Day Cyber

The Cincinnati-Dayton Cyber Corridor (Cin-Day Cyber) is a coalition of universities, k-12 schools, and economic development and industry partners. The project was supported by a grant from the National initiative for Cybersecurity Education. The organization works to share information, initiate collaboration between industry and education, and promote awareness of job opportunities to develop a robust regional workforce for cybersecurity. The program hosted internship fairs, conferences, and conducted outreach to employers, k-12 schools, hosted an industry higher-ed roundtable, and placed over 70 undergraduates in internships.

Cyber Mountain, Colorado Springs

A consortium of private companies, education institutions, and other organizations created Cyber Mountain, a brand to market the Colorado Springs region as the national epicenter of cybersecurity for space operations. The website features key statistics on the cybersecurity ecosystem, links to active job postings, a community calendar with related events, and links to workforce development programs in cybersecurity including services for veterans.

https://coloradospringscybersecurity.com/ecosystem/

Massachusetts High Technology Council

The Massachusetts High Technology Council hosts an online Technology Workforce Dashboard with data visualizations and deep dives into tech employment trends, job postings, demographics, and more. The website also features links to other resources, services, and events for job seekers and businesses. The TechBuffalo website could use a similar format to share data, information, and point to resources offered by partner organizations. The data dashboard on tech could also be integrated into the Invest Buffalo Niagara labor market dashboard.

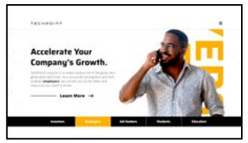
https://www.mhtc.org/technology-workforce-dashboard/

Technology Association of Oregon (TAO)

Technology Association of Oregon (TAO) is focused on creating a world-class innovation hub in the state of Oregon. They offer a paid membership to tech and tech-enabled companies which provides access to networking events, marketing opportunities, member-to-member discounts on tech products and services, and other resources. They also share newsletters, job postings, and advocate to promote policies that help grow and connect the regional tech community.

https://www.techoregon.org/

TechPoint



TechPoint seeks to make Indiana a leading tech hub. The organization serves to support and connect students, job seekers, educators, employers, and investors in the tech industry. Their website provides research, events, job postings, success stories, and other resources to help grow Indiana's tech community.

https://techpoint.org/

The San Diego Workforce Partnership

The San Diego Workforce Partnership works with job seekers, employers, and students to promote career pathways and support regional economic development. The Partnership hosts a range of career events, including education sessions, career awareness and planning, meetings with mentor teams, and more. The Partnership website promotes even more programs and services offered by other workforce training partners, including colleges, career centers, and tech credential programs offered by companies like CompTIA, Google, and Microsoft. The site also features resources for businesses, like recruitment, talent-matching, and capital access.

https://workforce.org/events/

UpSkill Houston

UpSkill Houston is an initiative of the Greater Houston Partnership that works to fill talent needs of employers. They train and place workers in higher-paying career pathways that require training after high school but not a college degree. The program assembled a coalition of over 200 stakeholders, including community colleges, nonprofits, employers, K-12 schools, and public agencies, to work together. The coalition hosted an UpSkill Works Forum Series for local employers, education institutions, and nonprofits to discuss collective actions to strengthen workforce development. UpSkill Houston's website features videos of these sessions and other meetings, monthly newsletters, career resources for job seekers and employers, and more.

https://www.houston.org/upskillhouston##editions

The Virginia Space Grant Consortium

The Virginia Space Grant Consortium connects local university students with companies who offer internships in cybersecurity in southeast Virginia. The Consortium subsidizes companies for the cost of internships up to $2,200. The program is a partnership with Old Dominion University. Over 100 undergraduate STEM interns were placed over the first three years of the program, giving students useful experience in cybersecurity and helping to fill skills gaps for employers.

Sources: https://www.houston.org/news/talent-developers-have-new-pipeline-employers; https://vsgc.odu.edu/wp-content/uploads/2018/09/2018-CyberFlyer-Small.pdf; https://nvlpubs.nist.gov/nistpubs/ir/2020/NIST.IR.8287.pdf; https://www.bizjournals.com/washington/news/2022/03/10/capital-colab-gwp-digital-tech.html

Appendices

Training Resources

This section offers a guide to tech training resources in this region and beyond. It builds on the information in Potential Career Pathways in Tech. The information is organized by learning pathway, from postsecondary skills-based training and bootcamps to programs leading to certification and college degrees.

This compilation draws from information gathered for this study's inventory of tech trainers, as well as input received through the focus groups and surveys. Training resources from outside the region include those that were more commonly mentioned and offer online, self-directed learning.

This is not intended to be an exhaustive list of tech training resources but rather a starting guide and foundational resource for aspiring tech students, employers, and tech trainers.

Skills Training and Bootcamps

Bitwise Industries *Workforce Training*	**Program focus:** Web development, Javascript, React, Paid apprenticeships	www.bitwiseindustries.com
Coursera *Online Courses*	**Free Programs:** Computer Science, Bitcoin and Cryptocurrency, Code Yourself!, COVID-19 Contact Tracing, Algorithms, Part 1	www.coursera.org
Goodwill of Western New York *Goodskills Career Builder*	**Program Focus:** Tech	www.goodwillwny.org/workforce
TechBuffalo/Tech Academy *Data Analytics Bootcamp*	**Program Focus:** Data Analytics	www.techbuffalo.org/tech-academy
University at Buffalo *Digital Skills Bootcam*	**Program Focus:** Cybersecurity, Digital Marketing, Software Development, Data Science and UI/UX Design	www.digitalskills.buffalo.edu

Industry-Recognized Certification

Buffalo Center for Arts and Technology *Adult Learning Programs*	**Program Focus:** IT Help Desk, IT Security	www.buffaloartstechcenter.org
Buffalo Educational Opportunity Center *Information Technology Programs*	**Program Focus:** Google IT Certificate, Advanced Technology Training & Information Networking	www.buffalo.edu/eoc/eocprograms
CompTIA *Stackable IT Certifications*	**Program Focus:** Core Skills, IT Infrastructure, Cybersecurity, Data Analytics, Project Management	www.comptia.org/certifications/which-certification
Google *Career Certificates*	**Program Focus:** Data Analytics, IT Support, UX Design Digital Marketing, Project Management	www.grow.google/certificates/
Microsoft *Microsoft Certifications*	**Program Focus:** App Maker, Data Analyst, Data Engineer, Data scientist, Developer, DevOps Engineer, Functional Consultant, Security Engineer, Solution Architect	www.learn.microsoft.com/en-us/certifications
Trocaire College *IT Jump Start Program*	**Program Focus:** Basic internet security, IT foundations, Tech Support	www.trocaire.edu/academics/workforce-development/it-training/it-career-jump-start-program/

Associate's Degree

Erie County Community College	**Academic Programs:** Computer Science (AS)	www.ecc.edu/academics/computer-science.html
Niagara County Community College	**Academic Programs:** Computer Science (AS)	www.niagaracc.suny.edu/programs/comp/
Trocaire College Technology Professions	**Programs Focus:** Cybersecurity (AS), Data Analytics (AS)	www.trocaire.edu/academics/technology-professions/

Bachelor's Degree and Up

Buffalo State College	**Academic Programs:** Computer Information Systems (BS, Minor)	www.cis.buffalostate.edu/cis-program
Canisius College	**Academic Programs:** Data analytics (MS), Business Analytics (MS)	www.graduate.canisius.edu/graduate-analytics
Hilbert College	**Academic Programs:** Cybersecurity (BS)	www.hilbert.edu/academics/undergraduate-programs/cybersecurity
University at Buffalo	**Academic Programs:** Computer science (BA, BS, Minor), Computer science and engineering (MS), Computer science (BS)/MBA, Computational Physics (BS), and Cybersecurity (Minor)	www.engineering.buffalo.edu/home/academics/undergrad/programs/majors/computer-science.html
Niagara University	**Academic Programs:** Computer & Information Sciences (BS), and Information Security and Digital Forensics (MS)	www.niagara.edu/cis

Data Sources and Notes

More on the Data Sources

LIGHTCAST

Formerly Emsi / Burning Glass, Lightcast is an online labor market analysis tool that compiles and analyzes a range of data sources on regional workforce factors. This includes economic data from the US Census, US Bureau of Labor Statistics, State Departments of Labor or equivalents, as well as data provided by Lightcast through an analysis of online job postings and worker profiles. Lightcast regularly improves the processes used to gather, aggregate and analyze this information. Data gathered from Lightcast in August and September of 2022 is a primary data source for this report. All job postings data is based on newly posted, unique postings. Unless otherwise noted, job postings include both remote-hybrid and in-person positions. All data is based on employed individuals covered by unemployment insurance as reported in official government labor data, which excludes self-employed. For more information on Lightcast data, visit https://kb.emsidata.com

Surveys

EMPLOYER SURVEY

In total, 94 representatives of local employers responded to a survey on tech job demand and workforce challenges facing the Buffalo Niagara region. Sixty (60) completed the survey. The survey was carried out from March to May 2022 and collected responses from managers, recruiters, and other representatives of tech companies and tech-enabled employers that leverage tech talent for processes and products in non-tech industries.

The survey was distributed directly to tech and tech-enabled employers across the two-county Buffalo Niagara region. The survey was also widely distributed to employers using an inventory of relevant employers compiled by UBRI, with targeted outreach by TechBuffalo and partners. The employers who took the survey accounted for 23% of all tech job postings made across Buffalo Niagara in 2021 (Lightcast).

Smaller companies with less than 100 employees make up about half (51%) of the employers who responded to the survey, while large companies (500 jobs or more) make up nearly a third of respondents (30%).

Tech employers, or those who indicated that tech jobs made up the majority of their total workforce, comprised just under half (48%) of all companies who took the survey. The other 52% of respondents were tech-enabled employers who estimated that tech workers make up less than half of their workforce based on survey responses.

TRAINER SURVEY

A survey of tech trainers generated 15 responses and provided perspectives from 11 unique tech trainer organizations with a presence in the Buffalo Niagara region. The tech trainer survey was conducted between March and May 2022.

The survey was distributed directly to all tech trainers in the two-county Buffalo Niagara region using an inventory of tech trainers compiled by UBRI. The survey was also widely distributed through TechBuffalo and partner organizations including UBRI. Responses to the survey reflect about a 35% response rate, considering the total number of entities in Buffalo Niagara with postsecondary tech training.

Trainers who responded include public and private colleges and universities, BOCES, nonprofit community-based trainers and for-profit trainers including corporate training programs. Half of trainer respondents were relatively small, enrolling no more than 100 students in the past academic year. Nine out of ten respondents said their tech training programs lead to a certificate, while two ed to an Associate's degree.

Focus Groups

EMPLOYER FOCUS GROUPS

A series of four focus group discussions with a variety of employers were conducted in partnership with Invest Buffalo Niagara and Newmark on July 13 and 15. The meetings engaged thirty employers in four separate smaller group conversations, each with five to ten participants. Each meeting brought together a different group of employers: small and mid-sized tech employers, large tech employers, tech-enabled employers, and small businesses and entrepreneurs.

Each group of employers discussed pressing workforce challenges, hiring demands for tech skills, gaps and barriers affecting the tech workforce, and more. Although each different employer group offered a unique perspective, the focus group discussions clarified common needs, challenges and opportunities faced by employers of every type and size across Buffalo Niagara.

TRAINER FOCUS GROUPS

Two focus groups were completed in June 2022 with tech trainers and other workforce developers. The first focus group, completed on June 7, in partnership with Invest Buffalo Niagara and Newmark, engaged 11 workforce developers in a large group discussion on talent supply/demand alignment, partnerships, diversity and inclusion, and wraparound services. This was followed by a smaller group breakout session with tech trainers focused on solutions for the next generation of tech workers.

A second conversation with tech trainers completed on June 14 engaged five tech trainers from the project advisory group. Discussion focused on key themes coming out of the June 7 conversation.

YOUNG TECH PROFESSIONAL FOCUS GROUP

Five young tech professionals met in an online focus group on August 10, 2022 to share their experience navigating a tech career pathway in Buffalo Niagara. Participants included recent graduates of regional colleges and current students with internships and other local experience in tech. They worked in roles that involved cybersecurity, tech sales, IT project management, app development, and tech support. Focus group participants were invited to participate through networks developed by TechBuffalo and UBRI.

The 70 focus group participants reported on page 5 reflects a rounded estimate across the eight focus groups and listening sessions. A few individuals participated in more than one focus group and were counted in both.

Data Definitions

STANDARD OCCUPATIONAL CODES USED TO DEFINE TECH:

Includes 18 occupational codes from the Standardized Occupational Classification (SOC 2021) system that are inclusive of hundreds of unique job titles that are more relevant to today's tech job market. All data on tech jobs in this report applies this definition, which is based off of the definition of Computer Tech jobs used by CompTIA for their annual Cyberstates reports.

Computer Systems Analysts (15-1211), Information Security Analysts (15-1212), Computer and Information Research Scientists (15-1221), Computer Network Support Specialists (15-1231), Computer User Support Specialists (15-1232), Computer Network Architects (15-1241), Database Administrators (15-1242), Database Architects (15-1243), Network and Computer Systems Administrators (15-1244), Computer Programmers (15-1251), Software Developers (15-1252), Software Quality Assurance Analysts and Testers (15-1253), Web Developers (15-1254), Web and Digital Interface Designers (15-1255), All Other Computer Occupations (15-1299), Data Scientists (15-2051), All Other Mathematical Science Occupations (15-2099).

Classification of Instructional Programs (CIP) used to Define Tech and Tech-Aligned Degree Programs and Graduates:

TECH DEGREE/CERTIFICATE PROGRAMS:

These are academic programs in information and computer science that are closest aligned with tech jobs. These codes are used to determine the number of tech graduates and alumni.

11.01: Computer and Information Sciences; 11.02: Computer Programming; 11.04: Information Science/ Studies; 11.05: Computer Systems Analysis; 11.07: Computer Science; 11.08: Computer Software and Media Applications; 11.09: Computer Systems Networking and Telecommunications; 11.10: Computer/Information Technology Administration and Management; 11.99: Computer and Information Sciences and Support Services, Other; 14.09: Computer Engineering; 14.47: Electrical and Computer Engineering; 15.12: Computer Engineering Technologies/Technicians

TECH-ALIGNED DEGREE/CERTIFICATE PROGRAMS:

These degree programs often include tech skills that could be used by graduates to pursue a tech degree. The list includes degree programs connected to tech jobs through degree-occupation mapping (CIP-SOC crosswalk) by the US Bureau of Labor Statistics and Lightcast. This list was further refined by UBRI to omit broad programs without a direct connection to tech and to add specific programs where 100 or more local alumni currently work in tech jobs, based on six-digit CIP codes. This final list includes some programs that are not offered in Buffalo Niagara but may be included in national and peer metro numbers. These codes are used to find the number of tech-aligned graduates.

10.0301: Graphic Communications; 10.0304: Animation, Interactive Technology, Video Graphics, and Special Effects; 11.0301: Data Processing; 14.01: Engineering, General; 14.10: Electrical, Electronics and Communications Engineering; 14.18: Materials Engineering; 14.19: Mechanical Engineering; 14.27: Systems Engineering; 14.35: Industrial Engineering; 15.0305: Telecommunications Technology/ Technician; 26.1103: Bioinformatics; 27.0101: Mathematics; 27.0301: Applied Mathematics; 27.0303: Computational Mathematics; 27.0305: Financial Mathematics; 27.0501: Statistics; 27.9999: Mathematics and Statistics; 30.0601: Systems Science and Theory; 30.3001: Computational Science; 30.7001: Data Science; 30.7101: Data Analytics; 40.08: Physics; 45.0701: Geography; 45.0702: Geographic Information Science and Cartography; 47.0101: Electrical/Electronics Equipment Installation and Repair; 47.0103: Communications Systems Installation and Repair Technology; 47.0104: Computer Installation and Repair Technology/Technician; 47.0199: Electrical/ Electronics Maintenance and Repair Technology, Other; 50.0102: Digital Arts; 50.0401: Design and Visual Communications; 50.0409: Graphic Design; 50.0499: Design and Applied Arts, Other; 51.0706: Health Information/Medical Records Administration/ Administrator; 51.0707: Health Information/ Medical Records Technology/Technician; 51.2706: Medical Informatics; 52.0101: Business/Commerce; 52.0201: Business Administration and Management; 52.0299: Business Administration, Management and Operations, Other; 52.0305: Accounting and Business/Management; 52.0399: Accounting and Related Services, Other; 52.0407: Business/Office Automation/Technology/Data Entry; 52.0703: Small Business Administration/Management; 52.08: Finance and Financial Management Services; 52.1101: International Business/Trade/Commerce; 52.1201: Management Information Systems; 52.1299: Management Information Systems and Services, Other; 52.1399: Management Sciences and Quantitative Methods, Other; 52.9999: Business, Management, Marketing, and Related Support Services, Other; 9.0702: Digital Communication and Media/Multimedia; 9.09: Public Relations, Advertising, and Applied Communication.

TECH-RELATED DEGREE/CERTIFICATE PROGRAMS:

This includes both the tech and tech-aligned degree/ certificate programs and graduates defined above.

CATEGORIES OF TECH SKILLS:

To understand how employer demands and workforce trends vary across different types of tech skills, UBRI and TechBuffalo classified tech skills into nine categories. Keywords related to each type of tech skill were used in searches of job postings to find how posting activity and advertised wages varied by tech skills category. The keywords used for each tech skill category are:

Cloud: Amazon Web Services, Cloud Computing, DevOps, Infrastructure As A Service (IaaS), Microsoft Azure, Platform As A Service (PaaS)

Cybersecurity/Infrastructure: Microsoft Windows Server Administration, Cloud Access Security Broker Tools (CASBs), Active Directory, Microsoft Advanced Group Policy Management For Windows, Proxy Servers, Cyber Security, Data Loss Prevention, Windows Embedded Firewall, Network Management, Windows Servers, Citrix Systems, Perimeter Security, Windows PowerShell, Proxy Networks, Red Hat Enterprise Linux, Virtualization, Microsoft Intune (Mobile Device Management Software), Windows Server Update Services, Windows Server Virtualization

Data Analysis/Visualization: Data Analysis, Data Visualization, Power BI, Tableau

Database Management: Database Management, Unix, Microsoft Dynamics, Salesforce, SQL (Programming Language)

Data Science: Artificial Intelligence, R (Programming Language), SPSS (Statistical Software), Machine Learning, Predictive Modeling, SAS (Software), Data Science

IT Services and Support: Software Testing, Technical Support, Help Desk Support, IT Service Management, Software Quality (SQA/SQC)

Software Development/Engineering: .NET Framework (0, 1, 3, and 4), C/C#/C++ (Programming Language), Java (Programming Language), Kotlin, PHP, Python, Software Development, Software Engineering, Swift

Technical Sales and Marketing: Customer Relationship Management, Technical Analysis, Certification In IT Project Management, Marketing Research, Software Project Management, Technical Communication, Technical Management, Technical Sales, Technical Services

Web Development: HyperText Markup Language (HTML), JavaScript (Programming Language), Application Programming Interface (API), Angular (Web Framework), Cascading Style Sheets (CSS), Web Development

SELECTION OF PEER CITIES:

A variety of criteria and cities were evaluated to determine the peer cities used for this analysis. The criteria used to select peer metros were chosen because there are distinguishing workforce features that relate to key challenges for the tech sector: diversity and inclusivity represented by the percent of the overall workforce made up by people of color, lower-income represented by median household income, a lower share of prime working age population (ages 25 to 64) due to a high presence of both seniors (65+) and college-aged individuals, and a lack of population growth (2016 to 2021 population change). Lightcast data was collected on these factors for the largest 100 metros in the US by 2021 population. The metros were sorted and ranked by these metrics, and those that rank in the bottom half of the top 100 metros in each of these criteria, are outside of the top 40 highest income metros, and are relatively similar in population size are selected as peers for this study. Other metros that meet this criteria but have a population more than 150% larger, or 15% smaller than Buffalo Niagara are not included.

DETERMINING TOP TECH METROS:

Lightcast analysis, 2022, using data from the US Bureau of Labor Statistics, Occupational Employment Statistics (2021). Tech employment determined using eighteen SOC codes that make up the tech sector. The 100 largest metros in the US by 2021 population were sorted by total tech employment in 2021.

Data Notes

EXECUTIVE SUMMARY

Tech Job Growth 2010-2019: Lightcast analysis of US Bureau of Labor Statistics and state departments of labor or equivalent, 2022.

Expected Tech Job Growth 2022-2032: Lightcast analysis of US Bureau of Labor Statistics and state departments of labor or equivalent, 2022. Projections are built off of data from the NYS Department of Labor and are based on past trends, and do not account for factors such as recent investments and local workforce initiatives around tech.

Tech Jobs as % of all jobs: Lightcast analysis of US Bureau of Labor Statistics and state departments of labor or equivalent, 2022. Number for peer metros represents the average of the seven selected peer metropolitan regions. The share of all jobs in tech in peer metros ranges from 2.1% (Grand Rapids, MI) to 3.6% (Cleveland, OH).

"Job Postings vs. Hires" Gap: Lightcast analysis of unique Job Postings and Hires from the US Census Quarterly Workforce Indicators, and US BLS Occupational Separations data, Buffalo Niagara, January through August 2022. Job postings include any experience/education level. More details on Lightcast's methodology can be found here https://kb.emsidata.com/methodology/hires-methodology/

Tech Workforce, People of Color: Lightcast, 2022. Based on data from US Census Quarterly Workforce Indicators and American Community Survey. More details on Lightcast's methodology can be found here https://kb.emsidata.com/methodology/industry-and-occupation-demographics-methodology/

Median Annual Earnings in Tech: Lightcast, 2022. Based on data from US Bureau of Labor Statistics, Occupational Employment Statistics, 2021. More details on Lightcast's methodology can be found here https://kb.emsidata.com/glossary/occupation-earnings/

"85% of employers…": UBRI, TechBuffalo Employer Survey, March-May, 2022. n=55.

5 graduates per tech job opening: Lightcast analysis of online job postings (2021) and UBRI analysis of degree-certificate completions from the National Center for Educational Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS), 2021. Based on 2021 preliminary data that is subject to revision. Includes both tech and tech-aligned degree/certificate programs. See "Classification of Instructional Programs (CIP) used to Define Tech and Tech-Aligned Degree Programs and Graduates" under "Data Definitions" for more details.

International students: UBRI analysis of NCES, IPEDS, 2021. Preliminary data, subject to revision.

"7 out of 10 tech alumni": Lightcast analysis of online worker profiles, 2022. Only includes profiles updated since 2020. Refers to any graduate of a Buffalo Niagara college/university who now works in a tech job (as defined by 18 SOCs). More details on Lightcast's methodology can be found here https://kb.emsidata.com/methodology/profiles-methodology/

"4 out of 5 trainers": UBRI, TechBuffalo Trainer Survey, March-May 2022. n=11.

"23% of employers": Source: UBRI, TechBuffalo Employer Survey, March-May 2022. n=55.

"% Change in Job Postings, 2020-2022": Lightcast, Sept. 2021 through Aug. 2022. Based on a search of keywords that fall under each category of tech skills. See "Categories of Tech Skills" under Data Definitions for more details.

"52% of workers": UBRI, TechBuffalo Employer Survey, March-May 2022. n=42. 52% is the average value respondents gave when asked, "What percentage of your tech workforce would benefit from the wraparound/support services listed above?"

"Supportive services": UBRI, TechBuffalo Trainer Survey, March-May 2022. n=11.

KEY FINDINGS

Page 8: Tech job growth and projections: Lightcast analysis of US Bureau of Labor Statistics and state departments of labor or equivalent, 2022. Occupation employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Projections for 2032 are built off of data from the Department of Labor and are based on past and current trends, and do not account for factors such as recent investments and local workforce initiatives around tech.

Page 9: Tech jobs and wages: Lightcast, 2022. Analysis of the US Census, the US Bureau of Labor Statistics' Occupational Employment Estimates, and State Departments of Labor or equivalents. Occupation employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Wage estimates are based on Occupational Employment Statistics and the American Community Survey.

Page 10: Percent Change in Tech Jobs: Lightcast analysis of US BLS OES and state departments of labor or equivalent, 2022. Projections for 2032 are built off of data from the NYS Department of Labor and are based on past trends, and do not account for factors such as recent investments and local workforce initiatives around tech.

Median Earnings Vs Tech Jobs as a Percentage of the Economy, Buffalo Niagara, US And Selected Peer Metros, 2022: Lightcast, 2022. Based on data from the US Census, the Bureau of Labor Statistics' Occupational Employment Estimates, and State Departments of Labor or equivalents. Occupation employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Wage estimates are based on Occupational Employment Statistics and the American Community Survey. Wages are adjusted for cost of living using the Council for Community and Economic Research (C2ER) Cost-of-living index, 2022. C2ER provides cost of living figures for metropolitan regions based on surveys and statistical modeling. The COL estimates factor for regional price variations in housing, transportation, child care, health care, energy, groceries and miscellaneous goods, and does not include taxes. The COL ratio for Buffalo Niagara is 104.7, indicating that the COL in the region is 4.7% higher than the national average. More on C2RE's COL methodology can be found here - https://www.coli.org/wp-content/uploads/sites/3/2017/12/2018-COLI-Manual.pdf

Page 11: Top Tech Occupations By Employment, Buffalo Niagara, 2022: Lightcast, 2022. Based on data from the US Bureau of Labor Statistics' Occupational Employment Estimates, and State Departments of Labor or equivalents. Occupation employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Common job titles are among the most frequently posted specific job titles under each general occupation shown based on Lightcast job postings from Sept. 2021 through Aug. 2022. Job titles are intended to better describe the types of roles that fall under each occupational code.

Page 12: Industry Sectors With The Most Tech Workers, Buffalo Niagara, 2022: Lightcast, 2022. Based on Inverse Staffing Patterns from the NYS Department of Labor. Industries defined using a combination of 2-6 digit NAICS industry codes. 2-digit NAICS industry sectors are used unless an industry makes up more than 8% of all tech jobs in the region, then more detailed and descriptive 3 to 6 digit industry codes with over 3% of the region's tech jobs are used. Industries are categorized and renamed to be more descriptive and representative of the region. Computer systems design = 541512, Computer programming services = 541511, Corporate Offices = 551114, Manufacturing = 31-33, Finance = 521 (Monetary Authorities-Central Banks), 522 (Credit Intermediation and Related Activities), 523 (Securities, Commodity Contracts, and Other Financial Investments), 525 (Funds, Trusts, and Other Financial Vehicles), Insurance = 524, Education = 61, 90361 (Education - Local Government), 90261 (Education - State Government), Scientific R&D = 5417, Wholesale = 42, Administrative Services = 56, Software Publishers = 511210. Note: The NAICS code for Corporate Offices (551114) includes corporate headquarters/offices of companies from a mix of industries. Local examples may include Delaware North, M&T Bank, and National Fuel.

Sectors with largest % Increase in Tech Jobs: Lightcast, 2022. Based on Inverse Staffing Patterns from the NYS Department of Labor. Represents the 2-6 digit NAICS industry codes with the most tech job growth from 2012-2022. Software Publishers = 511210, Electrical Equipment, Appliance, and Component Manufacturing = 335, Advertising, Public Relations, and Related Services = 5418, Social Assistance = 624, Finance = 521, 522, 523, 525, Custom Computer Programming Services = 541511.

Page 13: Tech job postings by employer location: Lightcast, job postings, September 2021 to August 2022. Includes unique, newly posted job postings. Includes both remote-hybrid and in-person positions.

People living in poverty and people of color in the City of Buffalo. US Census, American Community Survey, 5-year estimates, 2016-2020. Percentages represent the City of Buffalo's share of the total for the two-county Buffalo Niagara region.

Page 14: Tech job posting activity: Lightcast, job postings, September 2021 to August 2022.

Hires: US Census Quarterly Workforce Indicators, and US BLS Occupational Separations data, Buffalo Niagara, January through August 2022. More details at https://kb.emsidata.com/methodology/hires-methodology/

"In a survey…": UBRI, TechBuffalo Employer Survey, March-May, 2022. n=55.

Page 15: Top In-Demand Tech Job Titles from Employer Survey: UBRI, TechBuffalo Employer Survey, March-May, 2022. n=60. Titles are normalized to account for free-form variation in responses and provide accurate counts of specific job titles. For example, the count for Business Systems Analyst would include responses such as "Business Analysts" and "Business/System Analyst."

Page 16: Hiring Demands by Tech Skills Category, Buffalo Niagara, September 2021 - August 2022: Source: Lightcast, Sept. 2021 through Aug. 2022. Based on a search of keywords that fall under each category of tech skills. Salary data is limited to postings for jobs defined as tech. See "Categories of Tech Skills" in the Data Definitions for more details.

Page 17:

"From Sept. 2021…": Ibid.

"Jobs that require…": Ibid.

"More than one out of two…": Lightcast analysis of Job Postings and Hires from the US Census Quarterly Workforce Indicators, and US BLS Occupational Separations data, Buffalo Niagara, January through August 2022.

Page 18: "Top Factors That Make Tech Hiring A Challenge": Source: UBRI, TechBuffalo Employer Survey, 2022. n=54.

Tech-enabled employers are those who indicated that tech workers make up less than half of their workforce based on survey responses.

Page 19: % of Respondents with Challenges Hiring Tech Workers, by Company Type

Median advertised salary: Lightcast, job postings,

January 2019 to August 2022. Figures are based on the 12% of tech job postings in the region that provided useful advertised starting salaries over this time period. 25% of all job postings in the region provide advertised wages, which are used to find the regional median wage.

Page 20: Tech job postings specifying remote or hybrid work, 2017-2022:Lightcast analysis of Job Postings, Buffalo Niagara, January 2019 through August 2022. Shows job postings that are specified as a remote-hybrid position as a share of all job postings, including those that do not specify whether they are remote-hybrid or in-person. The majority of tech job postings over this time period did not specify a work location type, both in the region (86%) and across the US (84%).

Page 22: UBRI, TechBuffalo Employer Survey, 2022. n=43. Degree names are normalized to account for free-form variation in responses and provide accurate counts of specific degree types. For example, the count for Bachelor's Degree would include responses such as "Bachelors" and "BS."

Page 23: Hires to achieve equal representation in tech by 2032: UBRI analysis of Lightcast, 2022 data from US Census and NYS DOL. The projected number of tech job openings from 2022-2032 is multiplied by the percent of the overall workforce comprised by each demographic to estimate hires.

Page 25: Tech-related degree grads: National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS), 2021. Preliminary data subject to revision. Tech degrees are computer/information science degrees defined using 12 Classification of Instructional Programs (CIP) codes. See "Classification of Instructional Programs (CIP) used to Define Tech and Tech-Aligned Degree Programs and Graduates" under "Data Definitions" for more details on tech, tech-aligned, and all tech-related degree grads.

Page 27: H-1B Visa Costs: Red Bus 2 US, "GUIDE to H1B Fee – How Much? Who pays for What? [2022]," Accessed August, 2022 at https://redbus2us.com/h1b-visa-filing-fee-summary/ See also https://www.upcounsel.com/blog/what-is-the-costs-for-an-employer-to-sponsor-an-h1b-visa

Tech Grads Overall, by Nationality, and Institution: NCES, IPEDS, 2021. Preliminary data subject to revision. Tech degrees are computer/information science degrees defined using 12 Classification of Instructional Programs (CIP) codes. See "Classification of Instructional Programs (CIP) used to Define Tech and Tech-Aligned Degree Programs and Graduates" under "Data Definitions" for more details on tech, tech-aligned, and all tech-related degree grads.

Page 28: Tech/-Aligned Grads by Degree Type: Ibid.

Page 29: Employer - trainer partnerships: UBRI, TechBuffalo Employer Survey, 2022. n=51.

Page 30: Metro Areas with Most Buffalo Niagara Alumni Working in Tech: Lightcast analysis of online worker profiles of alumni from Buffalo Niagara colleges and universities. Includes profiles that have been updated since 2020. See "Classification of Instructional Programs (CIP) used to Define Tech and Tech-Aligned Degree Programs and Graduates" under "Data Definitions" for more details on tech, tech-aligned, and all tech-related degree grads. More details on Lightcast's online profiles methodology can be found here https://kb.emsidata.com/methodology/profiles-methodology/

Page 31: "Across the region there are 75,000 adults…." US Census, 2020 American Community Survey (5-year estimates). This number reflects adults ages 25-64 have at least some college but are unemployed or out of the labor force.

Page 32: "Large and mid-sized employers were more likely to say tech training partnerships...": UBRI, TechBuffalo Employer Survey, 2022. n=59. Includes 26 responses from small employers.

Page 33: "Nearly all (94%) of employers... ": UBRI, TechBuffalo Employer Survey, 2022. n=56. Includes 26 responses from small employers.

Page 36: "nearly 190,000 adults ages 25-64 in Buffalo Niagara…". US Census, 2020 American Community Survey (5-year estimates). The poverty rate for adults with no education beyond high school is 17% versus 7% for those with at least some postsecondary training. The number of adults with no training beyond high school reflects those ages 25 to 64. Poverty rates are for all adults ages 25+.

Page 38: "... services are typically offered by the majority of large employers... ": UBRI, TechBuffalo Employer Survey, 2022. n=56. Large employers have 500 employees or more. Includes 18 responses from large employers and 38 from small mid-sized employers.

Page 39: "…one out of four households headed by someone under age 65 do not have a vehicle." US Census American Community Survey (5-yr estimates).

Page 52: Data Sources for Tracking Progress Metrics: **Tech Jobs**: Lightcast, US Bureau of Labor Statistics and NYS Department of Labor, Occupational Employment Estimates; **Worker Diversity:** Lightcast, US Census Quarterly Workforce Indicators and American Community Survey; **Tech Wages**: Lightcast, US Bureau of Labor Statistics, Occupational Employment Statistics, Job Postings, Hires from US Census Quarterly Workforce Indicators, and US BLS Occupational Separations data; **Worker Turnover**: Lightcast, US Census Quarterly Workforce Indicators, Separations data; **Tech Graduates:** National Center for Educational Statistics, Integrated Postsecondary Education Data System; Lightcast, Job Openings; **Graduate Retention**: Lightcast, Online Worker Profiles.

TECH WORKFORCE · TECHBUFFALO · University at Buffalo Regional Institute

TechBuffalo Employer Survey

Employer Survey

TechBuffalo is partnering with the University at Buffalo Regional Institute (UBRI) to develop a regional workforce strategy for tech. Your input is critical to this strategy.

TechBuffalo is looking to help local employers address hiring challenges and skills gaps for tech jobs.

By completing this survey, you will receive a free copy of TechBuffalo's Regional Workforce Strategy report later this year (if you share your email). This report will provide key insights into the regional tech labor market and guidance on how to address hiring gaps in the tech workforce.

We suggest this survey be completed by your company's leader, human resources manager, and/or hiring manager(s) most closely aligned to tech roles. Please focus responses on your need for tech workers, unless otherwise noted. We define tech broadly to include all the skills and jobs involved in creating, enabling, integrating, or supporting IT or computer technology.

This survey **should take about 10 minutes** to complete.

To ensure your input is included in our research findings and final report, **please complete this survey no later than Friday, May 13, 2022.** Your responses will be kept confidential. Findings will be aggregated for reporting.

Any questions about this survey can be directed to Sharon Ana Entress at UBRI at 716-878-2429 or entress@buffalo.edu

Thank you in advance for completing this survey!

TechBuffalo Employer Survey
Tell us about your company.

1. Address

Name of Business
Street Address
City
ZIP/Postal Code

2. Please provide your contact information. By sharing your email and completing the survey, you will receive a free copy of TechBuffalo's Regional Workforce Strategy report later this year.

Name
Job Title
Telephone
Email

3. Tell us about your employees...

	... companywide in Buffalo Niagara?	... filling Tech job titles?
How many workers do you employ...		

TechBuffalo Employer Survey
Tell us about your tech workforce needs.

Looking out over the next two years...

4. List the top 5 tech job titles your company expects to hire over the next 2 years (for example Software Engineer, Data Analyst, etc...).

1
2
3
4
5

5. Over the next 2 years, how many positions do you expect to post that will require each of the following tech skills categories? (*If None, leave blank.*)

	1-10	11-24	25-49	50+
Foundational / Computer Literacy	◯	◯	◯	◯
IT Services & Support	◯	◯	◯	◯
Tech Adjacent or Aligned (e.g., Sales & Marketing)	◯	◯	◯	◯
Web Development	◯	◯	◯	◯
Software Development / Engineering	◯	◯	◯	◯
Cybersecurity / Infrastructure	◯	◯	◯	◯
Cloud	◯	◯	◯	◯
Database Management	◯	◯	◯	◯
Data Analysis / Visualization	◯	◯	◯	◯
Data Science	◯	◯	◯	◯

Other (please specify)

6. Please check any programming languages that your company will be hiring for over the next 2 years.

- ☐ C/C#/C++
- ☐ Java/Javascript
- ☐ Python
- ☐ HTML/CSS
- ☐ .NET Framework
- ☐ SAS/SPSS/R

Other (please specify)

7. Please check any tech support, tech-adjacent or tech-aligned skills that your company will be hiring for over the next 2 years.

- ☐ Agile Methodology
- ☐ IT Project Management
- ☐ Technical Marketing
- ☐ Help Desk
- ☐ Software Quality & Testing
- ☐ Technical Sales/Customer Relationship Mgmt

Other (please specify)

Focusing on entry-level tech talent...

8. List the top 3 **entry-level** tech job titles (*requiring under 3 years experience*) that your company expects to hire over the next 2 years.

1
2
3

9. What degree and/or certificates does your company require most often for entry-level tech jobs ? (List up to 3)

1
2
3

TechBuffalo Employer Survey

Tell us about how you address gaps in tech skills.

10. When faced with a technical skills gap, how does your organization typically respond? (Select all that apply.)

- ☐ Upskilling/retraining existing employees
- ☐ Hiring new employees with those skills
- ☐ Increasing contingent labor (e.g., contractors)
- ☐ Recruiting apprentices and/or graduates and providing training
- ☐ Outsourcing the necessary tasks to another organization
- ☐ Other (please specify)

Tell us about your recent experience recruiting for tech jobs.

11. For hiring, what recruitment strategies does your company use to fill tech job openings? (Select all that apply.)

- ☐ Job posting websites (such as indeed.com)
- ☐ Recruitment agencies
- ☐ Postings on social media
- ☐ Word of mouth
- ☐ College and university based recruiting
- ☐ Targeted sourcing of nontraditional talent sources (e.g., immigrants and refugees, veterans)
- ☐ Targeted sourcing of talent from outside the Buffalo-Niagara region

Other (please specify)

Tell us about your recent tech hiring experience.

12. What best describes your experience hiring workers with technical skills over the past twelve months?

- ◯ Very easy to hire workers with technical skills
- ◯ Fairly easy...
- ◯ Somewhat challenging...
- ◯ Moderately challenging...
- ◯ Very challenging to hire workers with technical skills

13. Have any of the following factors made it more challenging to hire workers with technical skills over the past twelve months? (Select all that apply.)

- ☐ Low number of applicants overall
- ☐ Applicants lack work-readiness skills (e.g. communication, teamwork, problem solving)
- ☐ Applicants lack basic/introductory technical skills
- ☐ Applicants lack specialized technical skills
- ☐ Applicants lack necessary degrees, credentials and/or certifications
- ☐ Other (please specify)
- ☐ Applicants lack required experience
- ☐ Regional wages are not competitive
- ☐ Competition from other employers
- ☐ Limited options for upskilling/reskilling current employees
- ☐ Low number of demographically diverse job candidates

TechBuffalo Employer Survey

Tell us how you partner with tech trainers for training and recruiting.

For these questions, consider colleges, universities, tech boot camps, and postsecondary trainers with tech certificate programs.

14. Which types of training services does your organization provide employees? (Select all that apply.)

- ☐ On-the-job training
- ☐ Online learning
- ☐ In-house development programs
- ☐ Peer-to-peer coaching
- ☐ Formal certifications
- ☐ Job rotation
- ☐ Job shadowing
- ☐ External conferences/training/events
- ☐ N/A – no learning or development
- ☐ Other (please specify)

15. Please identify the ways you currently engage with tech trainers, schools, colleges, and/or universities. (Select all that apply.)

- ☐ Offering internships or apprenticeships for students
- ☐ Providing job opportunities for program graduates
- ☐ Sending job postings for students to apply
- ☐ Attending career fairs and other events
- ☐ Other (please specify)
- ☐ Developing curriculum for courses
- ☐ Providing shared physical space and/or equipment for learning
- ☐ Instructing courses or giving lectures

16. Please list any tech trainers, schools, colleges, and/or universities you engage with.

17. How important are partnerships with trainers to growing your tech workforce, on a scale of 1 *(not important)* to 5 *(very important).*

1	2	3	4	5
◯	◯	◯	◯	◯

18. Which services do you offer to supporting increasing the diversity of your workforce? (Select all that apply.)

- ☐ Mentors/sponsors
- ☐ Free or low-cost training
- ☐ Professional development events and opportunities
- ☐ Flexible work schedules
- ☐ Internships/apprenticeships for diverse talent
- ☐ Connections to basic support services (e.g., childcare, transportation, housing or legal assistance)
- ☐ Equal pay
- ☐ Other (please specify)
- ☐ Additional maternity/paternity leave beyond government mandates
- ☐ Career advice and coaching for individuals transitioning back into the workforce
- ☐ Ambassadors in schools/colleges who recruit diverse talent
- ☐ Employee resource groups
- ☐ Diversity, equity and inclusion programs and/or training
- ☐ Tuition reimbursement/student loan forgiveness

19. What percentage of your tech workforce do you estimate would benefit from the wraparound/support services listed above?

0% 50% 100%

TechBuffalo Employer Survey

Stay engaged.

20. Would you be interested in participating in a conversation to discuss findings from this survey?

- ◯ Yes
- ◯ No
- ◯ Maybe/Not Sure

TECH WORKFORCE — TECHBUFFALO — University at Buffalo Regional Institute

TechBuffalo Trainer Survey

Trainer Survey

TechBuffalo is partnering with the University at Buffalo Regional Institute (UBRI) to better understand training for tech jobs in the region. Your input is critical to this strategy.

Tell us what's needed to strengthen the region's tech workforce for individuals, hiring companies, community-based service providers and the region as a whole.

By completing this survey, you will receive a free copy of TechBuffalo's Regional Workforce Strategy report later this year (if you share your email). This report will provide key insights into the regional tech labor market and guidance on how to address hiring gaps in the tech workforce.

We suggest this survey be completed by your organization's leader and/or director of tech programming. Please focus your responses on your tech programs (or IT and computer-related programs).

This **survey should take about 15 minutes** to complete.

To ensure your input is included, **please complete this survey no later than Friday, May 13, 2022.** Your responses will be kept confidential. Findings will be aggregated for reporting.

Any questions about this survey can be directed to Sharon Ana Entress at UBRI at 716-878-2429 or entress@buffalo.edu

Thank you in advance for completing this survey!

TechBuffalo Trainer Survey

Tell us about the tech skills included in your training.

1. Please tell us a little about yourself. By sharing your email, you will receive a free copy of TechBuffalo's Regional Workforce Strategy report later this year.

Name	
Job Title	
Organization	
Email Address	
Phone Number	

2. Please indicate if your organization offers training for these categories of skills and the level of training that students receive.

	Beginner Level *(introduction/fundamentals)*	Intermediate Level *(requires prerequisite knowledge or skills)*	Advanced Level *(advanced knowledge and professional-level expertise)*
Foundational/Computer Literacy	☐	☐	☐
IT Services & Support	☐	☐	☐
Tech Adjacent or Aligned (e.g., Sales & Marketing)	☐	☐	☐
Web Development	☐	☐	☐
Software Development/Engineering	☐	☐	☐
Cybersecurity / Infrastructure	☐	☐	☐
Cloud	☐	☐	☐
Database Management	☐	☐	☐
Data Analysis / Visualization	☐	☐	☐
Data Science	☐	☐	☐

Other Skills (please specify name and level)

3. Please check any programming languages or web development skills that you include in training. (Select all that apply.)

- ☐ C/C#/C++
- ☐ Python
- ☐ HTML/CSS
- ☐ SAS/SPSS/R
- ☐ Java/Javascript
- ☐ Angular (Web Framework)
- ☐ .NET Framework
- ☐ Application Programming Interface (API)
- ☐ Other (please specify)

4. Please check any tech support, tech-adjacent or tech-aligned skills that you include in training. (Select all that apply.)

- ☐ Agile Methodology
- ☐ Software Quality & Testing
- ☐ Help Desk
- ☐ Technical Marketing
- ☐ IT Project Management
- ☐ Technical Sales/Customer Relationship Mgmt
- ☐ Other (please specify)

5. Please check any cybersecurity/infrastructure skills, specialties, or platforms that you include in training. (Select all that apply.)

- ☐ Active directory
- ☐ Proxy/Firewall/DLP/CASB (Perimeter & Data Loss Prevention)
- ☐ Citrix Virtualization
- ☐ RHEL (RedHat Enterprise Linux OS)
- ☐ Cybersecurity
- ☐ Windows OS (e.g. GPOs, Powershell, OSD, SCCM, Intune)
- ☐ Network Management
- ☐ Windows Server
- ☐ Other (please specify)

6. Please check any data-related tech skills, specialties, or platforms that you include in training. (Select all that apply.)

- ☐ MS Dynamics
- ☐ Power BI
- ☐ SalesForce
- ☐ Tableau
- ☐ Unix OS
- ☐ Predictive Modeling (e.g., AI / Machine Learning)
- ☐ Other (please specify)

7. Please check any cloud-related tech skills, specialties, or platforms that you include in training. (Select all that apply.)

- ☐ Amazon Web Services
- ☐ MS Azure
- ☐ DevOps
- ☐ Platform as a Service
- ☐ Infrastructure as a Service
- ☐ Other (please specify)

8. What credentials are offered by your tech training programs? (Select all that apply.)

- ☐ Certificate
- ☐ Masters degree/PhD
- ☐ Associates degree
- ☐ Bachelor's degree
- ☐ Please name any specific credentials you offer.
- ☐ No credential

9. Do you partner with other tech trainers, including third party providers such as Coursera, to offer tech education and training to your students?

- ◯ Not sure
- ◯ No
- ◯ Yes. Please tell us who you partner with.

10. What is the minimum education requirement for enrollment in your tech training and/or education program(s).

- ☐ English literacy
- ☐ Associate's degree
- ☐ Less than high school
- ☐ Bachelor's Degree
- ☐ High school diploma (or equivalent)
- ☐ Master's Degree or higher
- ☐ Certification in IT field
- ☐ Other requirements for tech training programs (please specify)

11. In the last calendar year, approximately how many students did your organization serve in your tech training programs?

Enrolled in Training	
Graduated Training	
Placed in Job by 3 months of graduation	

12. Are any of the following a priority population or target demographic for your tech training and education programs? (Select all that apply.)

- ☐ Individuals of color (e.g. individuals who are not white by race and/or ethnicity)
- ☐ Urban (e.g. densely populated locations such as Buffalo and Niagara Falls)
- ☐ Rural (e.g. where residents may be geographically far from training, jobs and other services)
- ☐ Girls/Women
- ☐ Veterans
- ☐ Other (please specify)

[ ]

- ☐ None of the above
- ☐ Justice-Involved (e.g. recently incarcerated individuals)
- ☐ Opportunity Youth (16-24 year-olds who are unemployed and not enrolled in school)
- ☐ LGBTQIA+

13. Please indicate whether your organization makes referrals or directly offers any of the following services. If so, indicate whether or not you believe the services meet your students' current needs.

	Not offered	Not offered, but referrals made to other providers	Offered but not sufficient to meet current student needs	Offered and has capacity that meets current student needs
Free training and/or sliding fees based on income	◯	◯	◯	◯
Cash stipend based on income or financial need	◯	◯	◯	◯
Free equipment for training (e.g. computers, laptop)	◯	◯	◯	◯
Transportation (e.g. discounted NFTA pass, van, Uber rides, bike sharing)	◯	◯	◯	◯
Affordable, on-site childcare	◯	◯	◯	◯
Job placement / Career Development	◯	◯	◯	◯
Coaching / Mentoring	◯	◯	◯	◯
Flexible course scheduling / remote learning	◯	◯	◯	◯
Services for Veterans	◯	◯	◯	◯
Services for Students with Disabilities	◯	◯	◯	◯
Services for English Learners	◯	◯	◯	◯
Services for Justice Involved Individuals	◯	◯	◯	◯

Other (please specify service and capacity level)

[ ]

14. If you make referrals, please indicate which community-based providers your organization refers to for the services in the previous question.

[ ]

15. Approximately what percentage of your students need or could benefit from the availability of the following services?

	No/Negligible Demand	1% - 24% of students	25% - 49% of students	50% - 74% of students	75% or more of students
Training that is free or available at sliding scale cost	◯	◯	◯	◯	◯
Free equipment for training (e.g. computers, laptop)	◯	◯	◯	◯	◯
Transportation (e.g. discounted NFTA pass, van, Uber rides, bike sharing)	◯	◯	◯	◯	◯
Affordable, on-site childcare	◯	◯	◯	◯	◯
Job placement / Career Development	◯	◯	◯	◯	◯
Coaching / Mentoring	◯	◯	◯	◯	◯
Flexible course scheduling / remote learning	◯	◯	◯	◯	◯
Services for Veterans	◯	◯	◯	◯	◯
Services for Students with Disabilities	◯	◯	◯	◯	◯
Services for English Learners	◯	◯	◯	◯	◯
Services for Justice Involved Individuals	◯	◯	◯	◯	◯

Other Services (please specify)

[ ]

TechBuffalo Trainer Survey

Tell us how you partner with employers for tech training and recruiting.

16. Do you partner with employers in any of the following ways? (Select all that apply.)

- ☐ Offering internships or apprenticeships for students
- ☐ Providing job opportunities for program graduates
- ☐ Sending job postings for students to apply
- ☐ Attending career fairs and other events at the trainer/school
- ☐ Other (please specify)

[ ]

- ☐ Developing curriculum for courses
- ☐ Providing shared physical space and/or equipment for learning
- ☐ Instructing courses or giving lecturers

17. Which employers do you have the strongest partnerships with?

[ ]

18. What are your organization's biggest challenges to expanding employer partnerships for tech training programs? (Select all that apply.)

- ☐ Don't know which employers are interested in partnering
- ☐ Don't know who to contact
- ☐ Don't know the skills needs of employers
- ☐ Internal constraints on staff time and capacity
- ☐ Limited funding or resources
- ☐ A lack of local employers who hire our graduates
- ☐ Other (please specify)

[ ]

19. Would your organization be interested in expanding employer partnerships for tech training programs, such as curriculum development, student instruction, internships, job placement for students, shared space/equipment/technology, or professional development programs?

- ◯ Yes
- ◯ No
- ◯ Not sure

20. Please score the following on a scale of 1 (least important) to 5 (most important) for potential expanded partnerships with employers who hire tech talent.

	1	2	3	4	5
Curriculum development	◯	◯	◯	◯	◯
Connect with underserved populations	◯	◯	◯	◯	◯
Internships for students	◯	◯	◯	◯	◯
Professional development /Upskilling	◯	◯	◯	◯	◯
Shared space/equipment/technology	◯	◯	◯	◯	◯

Other (please specify)

TechBuffalo Trainer Survey

Tell us about your future plans.

21. Does your organization have plans over the next 5 years to expand your tech training programs and initiatives?

◯ Yes

◯ No

◯ Not sure

22. Does your organization have plans over the next 5 years to expand the wraparound services you provide to students?

◯ Yes

◯ No

◯ Not sure

23. Please describe your future plans to expand your tech training programs or wraparound services.

24. Please share any other comments you have on your tech training programs or what's needed to strengthen organizations like yours and the region's tech workforce overall.


TECHBUFFALO


University at Buffalo
Regional Institute
School of Architecture and Planning