

MICHIGAN INFORMATION TECHNOLOGY

INDUSTRY CLUSTER WORKFORCE ANALYSIS



STATE OF MICHIGAN

Department of Technology, Management & Budget

Michigan Center for Data and Analytics

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ABOUT THIS REPORT

This report is the product of a partnership between the Michigan Center for Data and Analytics and the Michigan Department of Labor and Economic Opportunity. It is designed to explore the Information Technology industry cluster in Michigan through leveraging a variety of data sources. These include key occupations, education and training requirements, real-time online job ad demand, labor force projections, workforce demographics, the talent pipeline, and more. The intention of this report is to support workforce development across the state and to highlight the position of Information Technology in Michigan.



Key Findings

- Employment in Information Technology has grown every year since the end of the Great Recession except for 2020. Current employment for the cluster sits at 148,800 compared to 142,400 in 2015. The cluster makes up 3.6 percent of total statewide employment which is smaller than other clusters such as Healthcare. However, Information Technology's share of Michigan employment has been growing slightly over the past decade.
- The cluster has a sizable number of highly educated workers and numerous opportunities for those obtaining further education credentials. This in turn leads to the higher-than-average earnings in Information Technology. The industry cluster median wage is \$29.98, significantly higher than the statewide average of \$21.73.
- Statewide employment is projected to grow by 8.8 percent through 2030. Many occupations in Information Technology are expected to outpace this growth rate over the same time period. Some prominent occupations for the cluster have growth rates more than double the statewide rate, such as *Software developers* (22.8 percent).
- Opportunities in Information Technology are not evenly distributed across Michigan. Four prosperity regions hold the majority of employment in the cluster. These regions hold many of the metropolitan areas of the state and individuals in more rural areas may find it necessary to move toward higher concentrated areas for more opportunities.
- Women in Information Technology are employed at nearly half the rate of men. For every one woman in the cluster there are 1.9 men. Additionally, men earn between 25 to 30 percent more than women in the cluster despite nearly equivalent levels of educational attainment.



Introduction

An **industry cluster** is a strong concentration of related industries in one location.

These clusters consist of related employers, suppliers, and support institutions in a product or service field. Industry clusters that are prevalent in a particular region fuel the regional economy, generate payrolls, and create innovation by leveraging the knowledge and resources of all involved.

Information Technology is integrated with everything we do. It impacts work, home life, communication, travel and more. As technological advancements continue, reliance on Information Technology will grow stronger. This industry cluster offers a range of career opportunities and can provide high earnings to many Michigan residents.

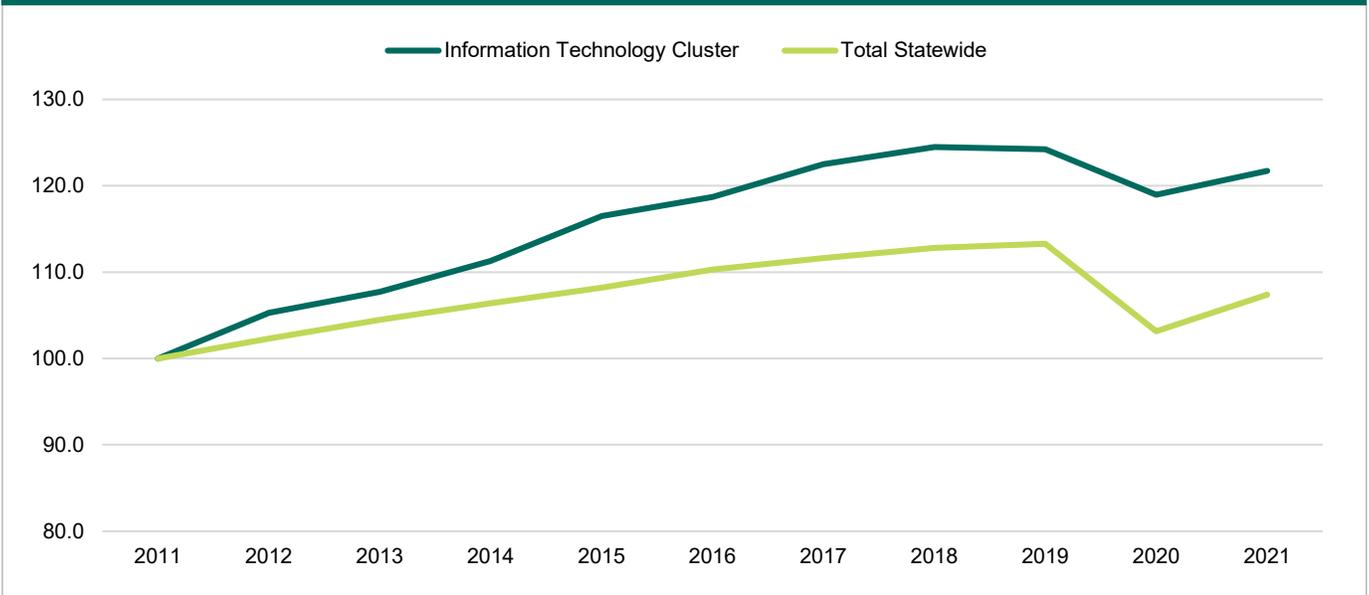
The Information Technology cluster consists of four subclusters:

- IT Providers and Support Services
- IT Sales and Consulting Services
- IT Manufacturing
- Other



Employment and Wages

FIGURE 1: EMPLOYMENT INDEX, MICHIGAN INFORMATION TECHNOLOGY CLUSTER (INDEX YEAR: 2011)

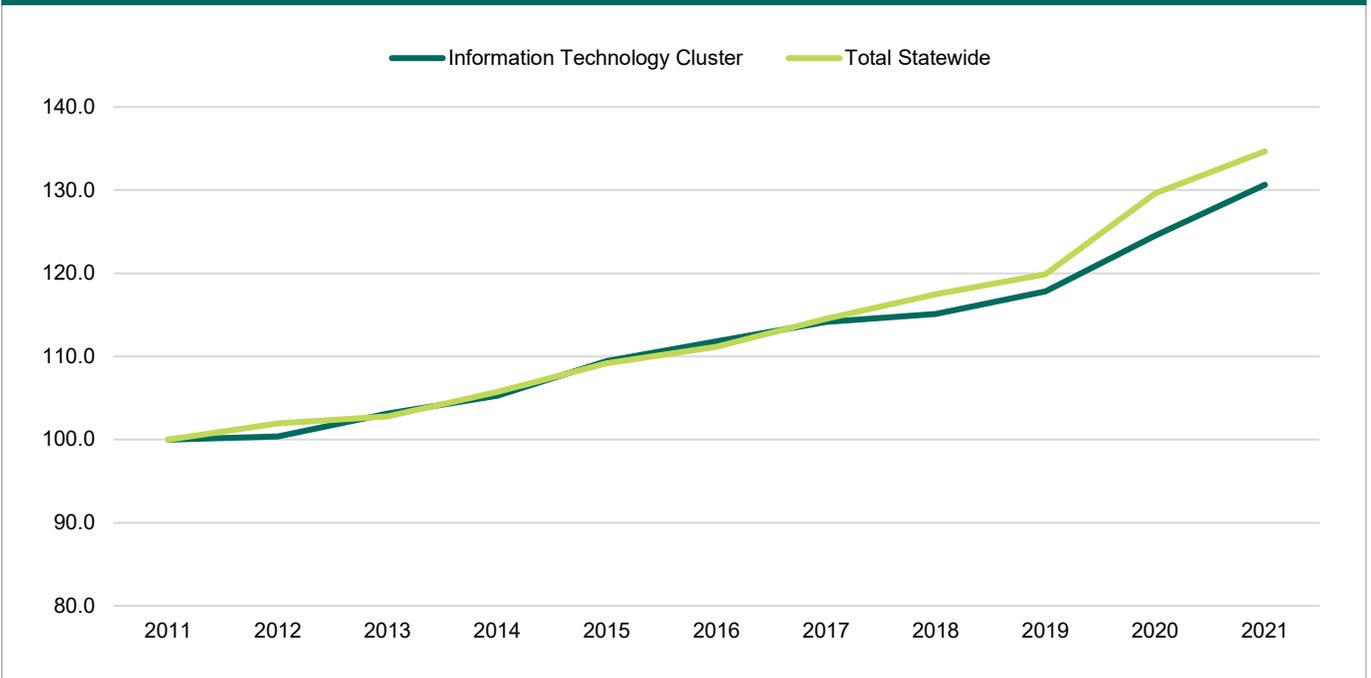


Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics

Employment in the Information Technology industry cluster has been continuously growing, apart from 2020 and the impacts of the COVID-19 pandemic. To calculate the growth rates in Figure 1, employment was set equal to 100 in 2011 for both Information Technology and Michigan and changes were calculated from there. Employment in the cluster has been growing at a much faster pace than total statewide employment growth since 2011. Over the last decade, employment in Information Technology grew by just under 22 percent from 122,300 employees to 148,800. Over the same time period, statewide employment grew by 7.4 percent.



FIGURE 2: NOMINAL WAGE* INDEX, MICHIGAN INFORMATION TECHNOLOGY CLUSTER (INDEX YEAR: 2011)



Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics
 *Nominal wages are not adjusted for inflation.

Average annual salaries in Information Technology increased by more than 30 percent since 2011. This represents an increase of about \$2,100 per year from \$75,500 in 2011 to \$98,700 in 2021. Nominal wages (non-inflation adjusted) indexed to 2011 are shown in Figure 2 for both Michigan and the cluster. Prior to 2017, the state and Information Technology were increasing earnings at similar rates. Since then, the cluster has fallen slightly behind the state's pace of growth. However, Information Technology workers currently earn average salaries much higher than the statewide average of \$61,700.

Subclusters

FIGURE 3: SUBCLUSTER EMPLOYMENT DISTRIBUTION, MICHIGAN INFORMATION TECHNOLOGY CLUSTER, 2021



Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics

IT Providers and Support Services

- Computer Systems Design and Related Services
- Data Processing, Hosting, and Related Services
- Electronic and Precision Equipment Repair and Maintenance
- Telecommunications

Information technology providers and support services makes up exactly half of the employment in the Information Technology industry cluster. This subcluster employs 74,500 individuals, with the majority working in *Computer systems design and related services*. Individuals working in this subcluster earn an average annual salary of \$103,400, which is slightly above the average for the cluster overall (\$98,700).

IT Sales and Consulting Services

- All Other Telecommunications
- Computer and Computer Peripheral Equipment and Software Merchant Wholesalers
- Computer Training
- Electronic Shopping and Mail-Order Houses
- Internet Publishing and Broadcasting and Web Search Portals
- Marketing Consulting Services
- Other Electronic Parts and Equipment Merchant Wholesalers
- Other Management Consulting Services
- Other Scientific and Technical Consulting Services
- Software Publishers
- Telecommunications Resellers

Information technology sales and consulting services holds nearly a quarter of all employment for the cluster. This equates to roughly 36,100 individuals working in this subcluster. Nearly half of the employment in this subcluster is distributed between *Software publishers*, *Marketing consulting services*, and *Electronic shopping and mail-order houses*. Individuals working in *IT sales and consulting services* can earn an average of \$109,400 per year, greater than the average annual salary for the Information Technology cluster overall by more than \$10,000.



IT Manufacturing

Computer and Electronic Product Manufacturing

Electrical Equipment Manufacturing

Mechanical Power Transmission Equipment
Manufacturing

Other Electrical Equipment and Component Manufacturing

Other Industrial Machinery Manufacturing

Semiconductor Machinery Manufacturing

Just over one-fifth of the cluster employment is within *Information technology manufacturing*. Nearly 20,300 employees out of 33,400 in the subcluster are within *Computer and electronic product manufacturing*.

Workers in the IT manufacturing subcluster earn an average of \$77,600 per year. While this is below the average earnings for the Information Technology cluster overall, it is still much higher than the average statewide salary of \$61,700.

Other

Power and Communication Line and Related Structures
Construction

Only one industry makes up the *Other* subcluster for Information Technology. The 3.3 percent of cluster employment in this area measures out to approximately 4,900 workers. Individuals working in *Power and communication line and related structures construction* can earn an average annual salary of \$92,100. While this is below the overall average earnings for the cluster, it is not far off and is more than \$30,000 above average statewide earnings.

Key Occupations

Occupational analysis is important to understanding an industry cluster. Key occupations are chosen by a favorable mix of criteria that include the occupation's share of the cluster's total employment, the concentration within the cluster, and the projected outlook for that occupation. Due to the occupations having large volumes within the cluster, they are generally representative of the expected wages, education, and skills within the industry cluster.

- Most Information Technology cluster key occupations require some level of higher education. Bachelor's degrees are required for 17 of the 25 key occupations. These occupations have high earnings potential and are more representative of the average annual earnings for the cluster.
- Opportunities do exist in Information Technology for those without a bachelor's degree. Four of the key occupations require a high school diploma and some on-the-job training. These occupations have below-average earnings for the cluster but with time and experience, can provide wages much closer to the cluster median of \$29.98.
- Information Technology is a high earnings potential cluster, and its key occupations reflect that. Even with varying levels of education and training requirements, 80.0 percent of the key occupations typically offer entry wages above the statewide median of \$21.73.
- The key occupations in Information Technology are expected to offer over 29,300 average annual openings through 2030. Annual openings for an occupation occur for a variety of reasons; retirements and labor force exits, career transfers, or expansion of the occupation.

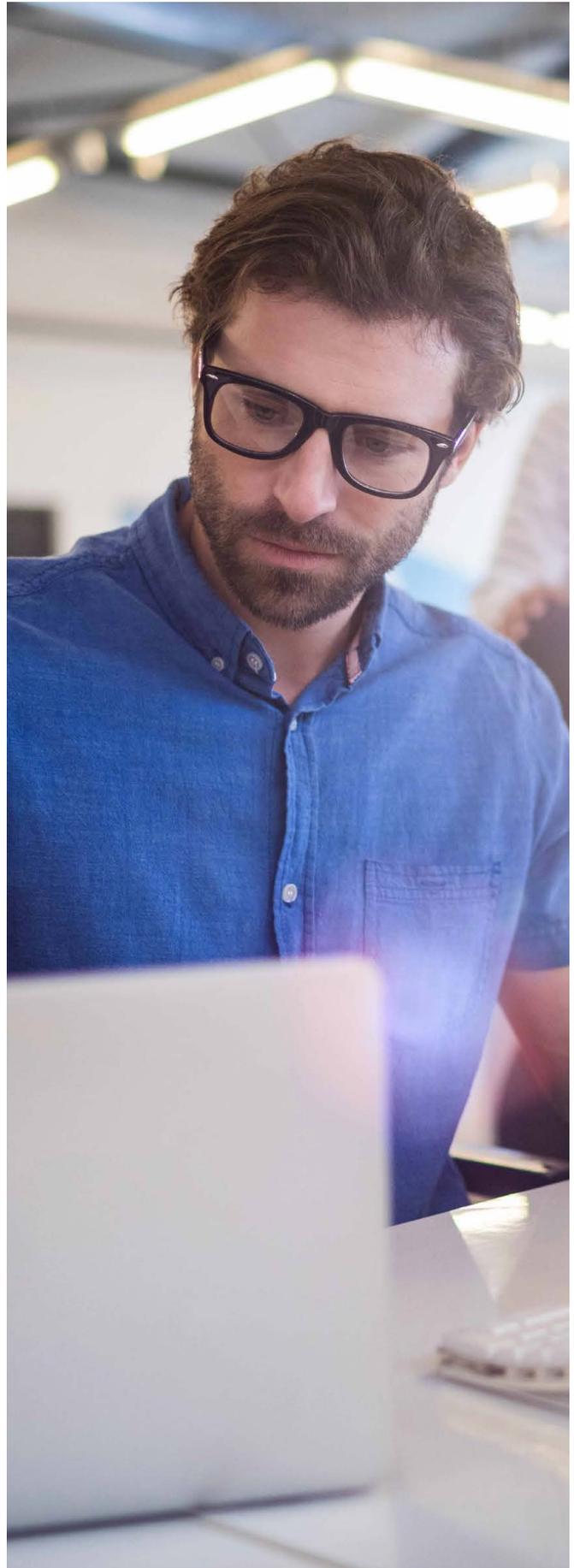


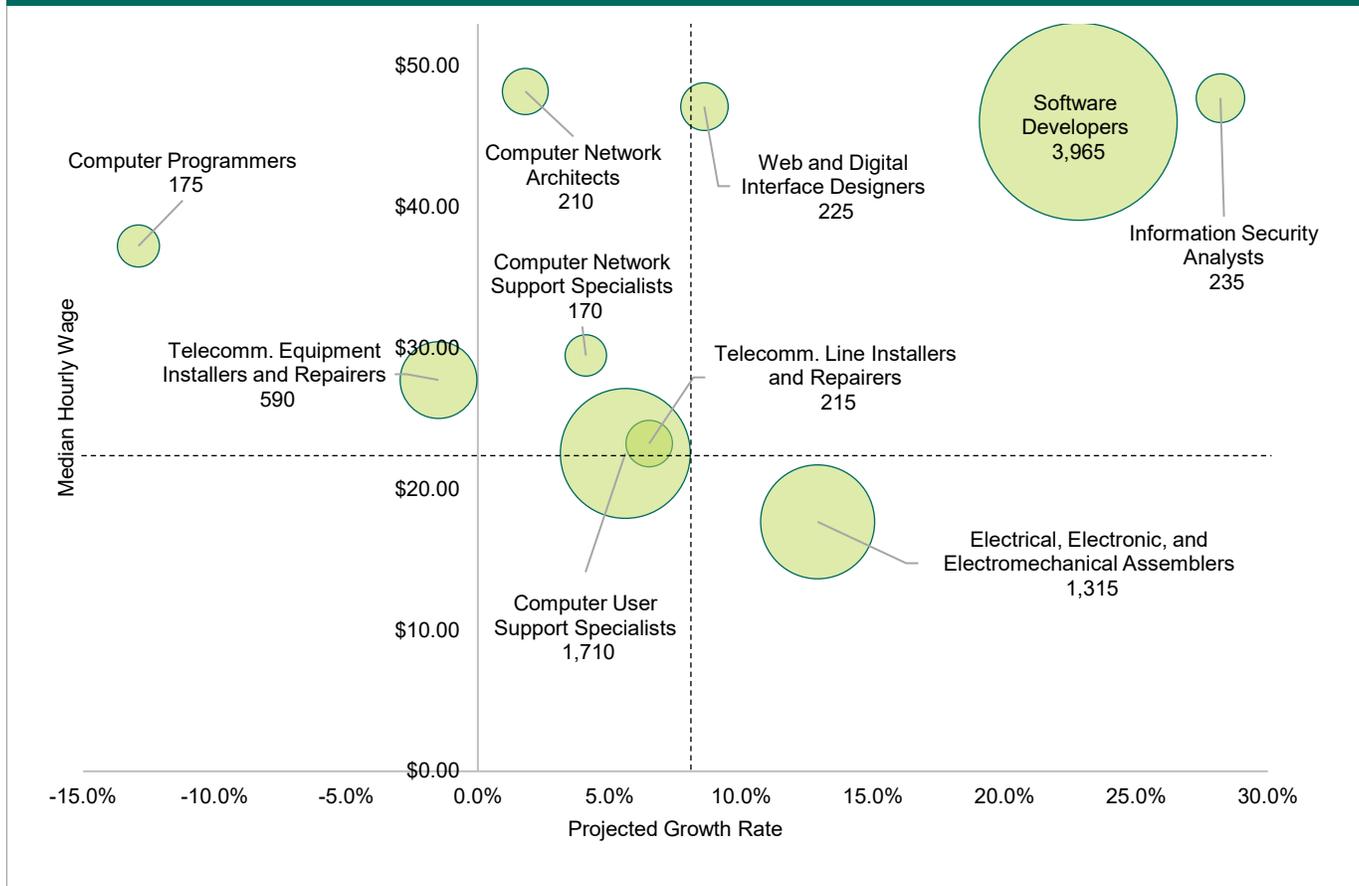
FIGURE 4: KEY OCCUPATIONS, MICHIGAN INFORMATION TECHNOLOGY CLUSTER, 2021

KEY OCCUPATION	CLUSTER EMP.	MICHIGAN EMP.	CLUSTER WAGE RANGE (HOURLY)	ANNUAL OPENINGS	TYPICAL EDUCATION AND TRAINING OJT: ON-THE-JOB TRAINING
Software Developers	19,280	37,490	\$31–\$58	3,965	Bachelor's Degree
Computer User Support Specialists	8,440	21,530	\$18–\$29	1,710	Some College, No Degree
Electrical, Electronic, and Electromechanical Assemblers	5,620	8,670	\$14–\$18	1,315	High School Diploma or Equivalent and Moderate-term OJT
Sales Representatives of Services	5,340	25,680	\$19–\$38	3,010	High School Diploma or Equivalent and Moderate-term OJT
Computer Systems Analysts	4,220	14,750	\$38–\$61	1,100	Bachelor's Degree
Computer and Information Systems Managers	3,790	12,040	\$50–\$79	925	Bachelor's Degree
Telecommunications Equipment Installers and Repairers	3,530	4,030	\$22–\$30	590	Postsecondary Nondegree Award and Moderate-term OJT
Project Management Specialists	2,530	22,070	\$36–\$61	3,770	Bachelor's Degree
Market Research Analysts and Marketing Specialists	2,330	17,870	\$23–\$39	2,465	Bachelor's Degree
Telecommunications Line Installers and Repairers	2,120	2,270	\$19–\$29	215	High School Diploma or Equivalent and Long-term OJT
Management Analysts	1,950	15,720	\$24–\$50	1,960	Bachelor's Degree
Computer Occupations, All Other	1,850	6,830	\$23–\$48	730	Bachelor's Degree
Computer Programmers	1,810	3,730	\$29–\$48	175	Bachelor's Degree
Computer Network Architects	1,410	2,720	\$30–\$63	210	Bachelor's Degree
Computer Network Support Specialists	1,170	2,440	\$23–\$37	170	Associate Degree
Information Security Analysts	1,110	2,820	\$27–\$49	235	Bachelor's Degree
Electrical Power-Line Installers and Repairers	1,090	3,750	\$2–\$46	335	High School Diploma or Equivalent and Long-term OJT
Sales Representatives, Technical and Scientific Products	1,050	4,900	\$30–\$63	635	Bachelor's Degree and Moderate-term OJT
Network and Computer Systems Administrators	990	6,600	\$29–\$47	435	Bachelor's Degree
Software Quality Assurance Analysts and Testers	930	2,480	\$29–\$48	3,965	Bachelor's Degree
Marketing Managers	800	5,010	\$48–\$96	500	Bachelor's Degree
Web and Digital Interface Designers	670	1,340	\$30–\$48	225	Bachelor's Degree
Data Scientists	660	2,990	\$36–\$48	215	Bachelor's Degree
Computer and Office Machine Repairers	570	1,700	\$14–\$23	230	Some College, No Degree and Short-term OJT
Web Developers	570	1,720	\$30–\$47	225	Bachelor's Degree

Source: Cluster employment, Michigan employment, and Wage range: Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics (2021); Annual Openings: 2020–2030 Long-term Occupational Projections, Michigan Center for Data and Analytics; Typical Education and Training: U.S. Bureau of Labor Statistics

Note: Cluster employment is the total count of the occupation within the defined industry cluster, while Michigan employment is the total count of that occupation in the state across all industries.

FIGURE 5: KEY OCCUPATIONS, MICHIGAN INFORMATION TECHNOLOGY CLUSTER, 2021



Source: 2021 Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics (Wages); 2020–2030 Long-term Occupational Projections, Michigan Center for Data and Analytics (Projected Growth Rate and Annual Openings)

Many of the key occupations for the cluster are displayed in Figure 5. They show a mix of projected long-term growth, projected average annual openings, and statewide median wages. The circle sizes are determined by the number of average annual openings. The lines at 8.8 percent and \$21.73 indicate statewide projected employment growth through 2030 and the statewide median wage from 2021.

Every occupation shown, except for *Electrical, electronic, and electromechanical assemblers*, has median hourly wages above statewide. This is in line with the earnings expectations within Information Technology overall, showing it to be a higher paid industry cluster, on average.

All but two occupations displayed are projected to grow in employment between 2020 and 2030. Although *Computer programmers* and *Telecommunications equipment installers and repairers* are expected to decline in overall employment over the time period, they are still expected to offer annual openings. Three occupations, *Electrical, electronic and electromechanical assemblers*; *Software developers*; and *Information security analysts* are projected to outpace the statewide growth rate.

Potential Information Technology Career Pathway



<p>Computer Numerically Controlled Tool Operators</p> <ul style="list-style-type: none"> • \$19.44 • High School Diploma or Equivalent • Moderate-term On-the-Job Training 	<p>Computer Numerically Controlled Tool Programmers</p> <ul style="list-style-type: none"> • \$29.22 • Postsecondary Nondegree Award • Moderate-term On-the-Job Training 	<p>Computer Programmers</p> <ul style="list-style-type: none"> • \$37.34 • Bachelor's Degree 	<p>Computer Systems Analyst</p> <ul style="list-style-type: none"> • \$47.76 • Bachelor's Degree 	<p>Computer Science Instructors, Postsecondary</p> <ul style="list-style-type: none"> • \$46.89 • Doctoral or Professional Degree
<p>Computer User Support Specialist</p> <ul style="list-style-type: none"> • \$23.12 • Some College, No Degree 	<p>Computer Network Support Specialist</p> <ul style="list-style-type: none"> • \$28.87 • Associate Degree 	<p>Software Quality Assurance Analysts and Testers</p> <ul style="list-style-type: none"> • \$37.89 • Bachelor's Degree 	<p>Software Developers</p> <ul style="list-style-type: none"> • \$47.39 • Bachelor's Degree 	

Pathway Source: <https://careerwise.minnstate.edu/careers/transportation-systems-infrastructure-pathway.html>
 Wage Range: 2021 Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics
 Typical Education and Training: U.S. Bureau of Labor Statistics

High School Diploma or Equivalent or Short-term Training

Customer Service Representatives
Laborers and Freight, Stock, and Material Movers
Office Clerks, General
Secretaries and Administrative Assistants
Shipping, Receiving, and Inventory Clerks

Most occupations in Information Technology require some level of education past high school, however, some opportunities do exist for individuals who are not seeking to further their formal education and prefer to learn on the job or through shorter trainings and certifications. Each of these highlighted occupations require a high school diploma or equivalent and short-term on-the-job training (typically less than one month). Although present in many other industry clusters, these occupations earn median wages between \$18 and \$22 per hour in IT.

Postsecondary Certificate or Moderate-term Training

Computer User Support Specialists
Electrical, Electronic, and Electromechanical Assemblers
Sales Representatives of Services
Sales Representatives, Wholesale and Manufacturing, Nontechnical
Telecommunications Equipment Installers and Repairers

A considerable number of opportunities exist that require a postsecondary certificate or moderate-term training (more than one month but less than 12) in the Information Technology cluster. The highlighted occupations have high levels of employment ranging from 2,800 workers to 8,400 across Michigan. These jobs also provide a wide range of median wages from \$18 to \$37.

Associate Degree or Long-term Training or Apprenticeship

Computer Network Support Specialists
Electrical Power-Line Installers and Repairers
Industrial Machinery Mechanics
Machinists
Telecommunications Line Installers and Repairers

Occupations in this area of Information Technology usually require either an associate degree or long-term training (more than 12 months). The occupations highlighted have employment levels greater than 1,000, except for *Industrial machinery mechanics* (600 employed). Of the occupations highlighted here, *Electrical power-line installers and repairers* has the highest median wage at \$30 per hour. However, every occupation listed pays median hourly earnings above the statewide rate (\$21.73).

Bachelor's Degree or Higher

Computer and Information Systems Managers
Computer Programmers
Computer Systems Analysts
Industrial Engineers
Software Developers

Most opportunities in Information Technology exist for those with a bachelor's degree or higher. These jobs pay well and typically have high employment levels. The highlighted occupations have median hourly earnings ranging from \$37 per hour for *Computer programmers* to \$63 per hour for *Computer and information systems managers*. *Software developers* earn a median of \$46 hourly and is the largest occupation for the cluster at 19,300 workers.



Apprenticeships

In the Information Technology cluster, there were 129 active registered apprentices in 2021. Most of these apprentices (93.0 percent) were in *Computer and electronic product manufacturing*. The cluster had a lower share of apprentices who were women (0.8 percent) and people of color (3.9 percent) compared to the statewide averages of 11.6 and 12.2 percent, respectively. There was an above-average share of veterans (10.9 percent), however. West Michigan had the largest share of active apprentices in Information Technology at 76.0 percent. This was followed by East Central Michigan (11.9 percent) and Southwest Michigan (6.2 percent).

From 2014 to 2020, there were more than 50 new apprentices in Information Technology each year. This number peaked at 96 in 2017. In 2021, there were just 17 new apprentices in the cluster, the lowest since 2009. There were just two apprenticeship completers in Information Technology in 2021—the fewest over the analyzed period and the first time since 2015 that there were fewer than 10 completers.

Although 2021 shows below-average numbers of new apprentices and completers compared to recent years, the overall trend from the past five years has been positive. As apprenticeship expands across the state, it will be important for IT to continue its upward momentum.

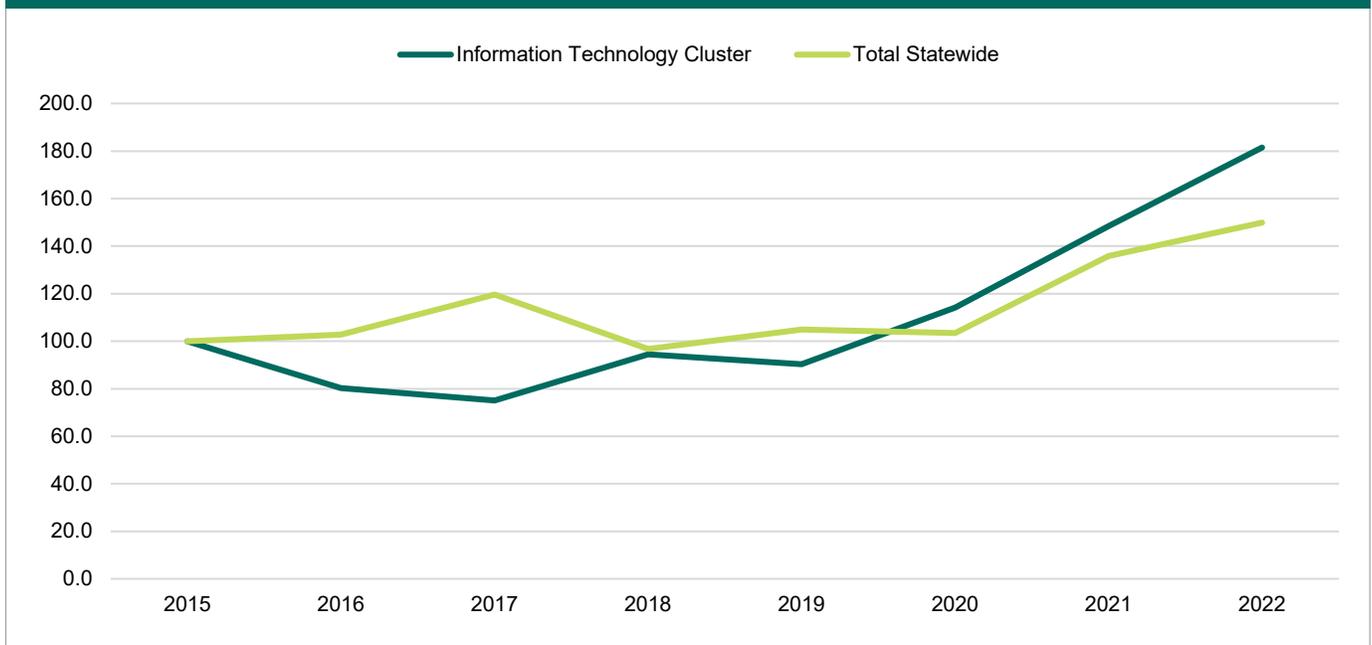
Real-Time Demand

Real-time demand is measured as the number of job advertisements posted online for an occupation or industry. The data is provided by Burning Glass Technologies and The Conference Board Help Wanted Online. Over time, online job advertisements have become more prevalent as technology becomes a more prominent method of communication. The use of online job postings still varies by industry with some areas of the economy being more reliant on methods such as word of mouth or local advertisements. Online job advertisements, however, can provide a mix of information about an industry cluster such as total available ads, top requested skills and certifications, minimum education requirements, and more.

Online job advertisements in the Information Technology cluster generally have lagged behind the growth in total statewide advertisements (Figure 6). In the figure, online job advertisements in the Information Technology cluster and the state are indexed to 2015. To calculate growth rates, employment in 2015 was set equal to 100 and percent changes were calculated from there. In 2017, the cluster began trending upward and in 2020, surpassed the total statewide rate of growth. In 2022, there were 1.8 advertisements in the cluster for every one in 2015, compared to a rate of 1.5 statewide.

Real-time demand is measured as the number of job advertisements posted online for an occupation or industry.

FIGURE 6: ONLINE JOB ADVERTISEMENTS INDEX, MICHIGAN INFORMATION TECHNOLOGY CLUSTER (INDEX YEAR: 2015)



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

The upward trend in online job advertisements for the cluster since 2017 (Figure 7) not only suggests an increased demand for workers in Information Technology, but also the adaptation to online applicant sourcing methods. Three occupations driving the differences between 2017 and 2022 are *Software developers, applications; Computer occupations, all other; and Managers, all other*. Each of these occupations have increased by more than 1,400 online advertisements between the data periods. The increase in *Software developers, applications* and *Computer occupations, all other* coincides with the continual growth of technology-related resources. These two occupations were also two of the top driving factors in the steep increase in ads between 2020 and 2022 for the cluster.

The Information Technology cluster is one that typically requires its job seekers to have higher levels of education. This is evident in online job ads for the cluster as an overwhelming majority specify a minimum requirement of a bachelor’s degree. Nearly 72 percent of all online ads in the cluster during 2022 were for those holding a bachelor’s degree or higher. The higher education requirements in this cluster align with the typical education and training required for the key IT occupations listed on page 11.

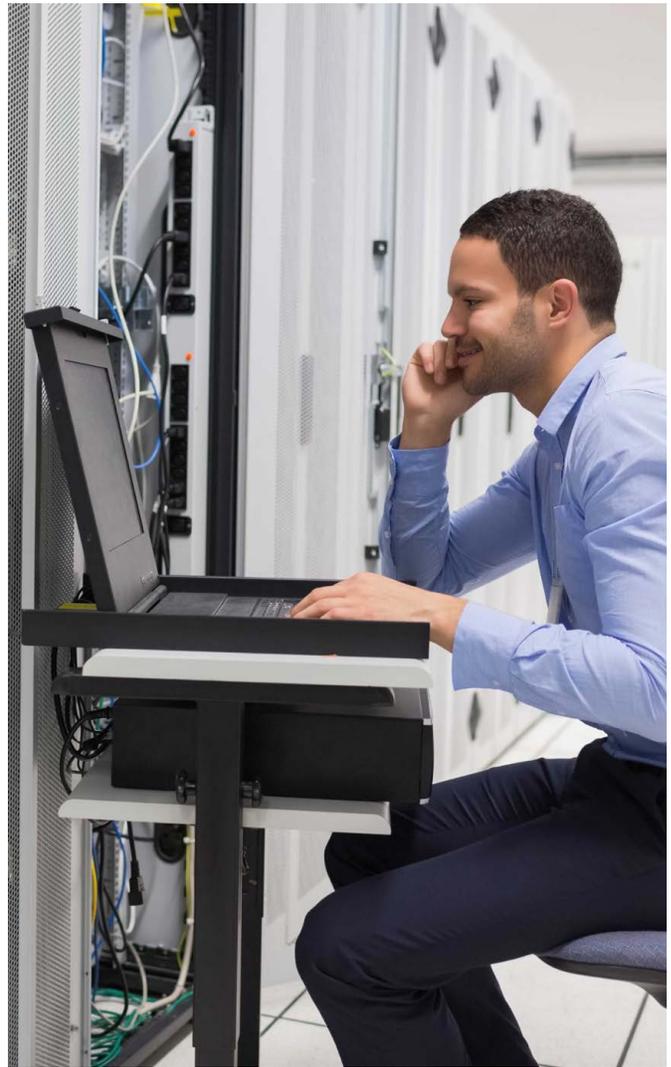
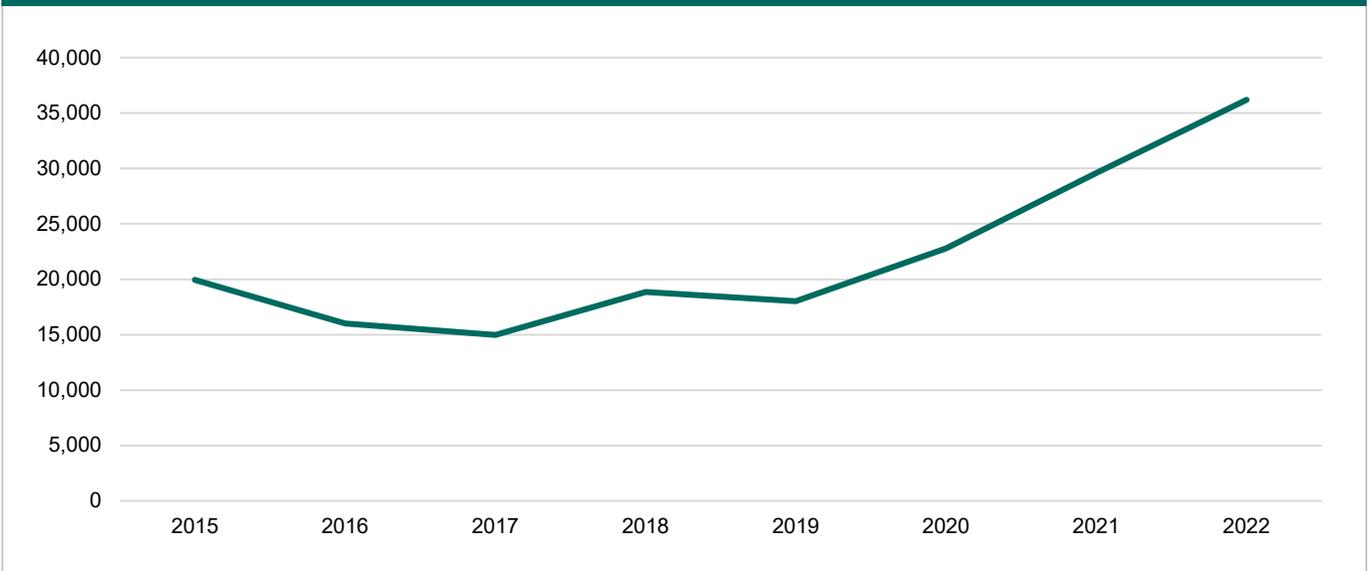


FIGURE 7: ONLINE JOB ADVERTISEMENTS, MICHIGAN INFORMATION TECHNOLOGY CLUSTER



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies



The top 10 certifications and baseline or specialized skills are determined from the number of times the skill or certification is listed in an online job advertisement for the specific time period (July 2021–June 2022). Certifications are designated credentials earned by an individual to verify skills or knowledge gained to perform a job. Baseline skills are often called foundational skills and are defined as the common nonspecialized skills that cut across a broad range of occupations. Lastly, specialized skills include professional and job-specific skills requested in job advertisements.

Certifications and Skills Requested in Michigan Information Technology Cluster Online Job Ads

Top 10 Certifications

- Certified Information Systems Security Professional (CISSP)
- Certified Public Accountant (CPA)
- Cisco Certified Network Associate (CCNA)
- First Aid CPR AED
- IT Infrastructure Library (ITIL) Certification
- Project Management Certification
- Project Management Professional (PMP)
- Registered Nurse
- Security Clearance
- Six Sigma Certification

Note: Driver's license is not listed here but did appear in the top 10 certifications for every industry cluster.

Top 10 Baseline Skills

- Communication Skills
- Creativity
- Detail-Oriented
- Microsoft Excel
- Organizational Skills
- Planning
- Problem Solving
- Research
- Teamwork/Collaboration
- Troubleshooting

Top 10 Specialized Skills

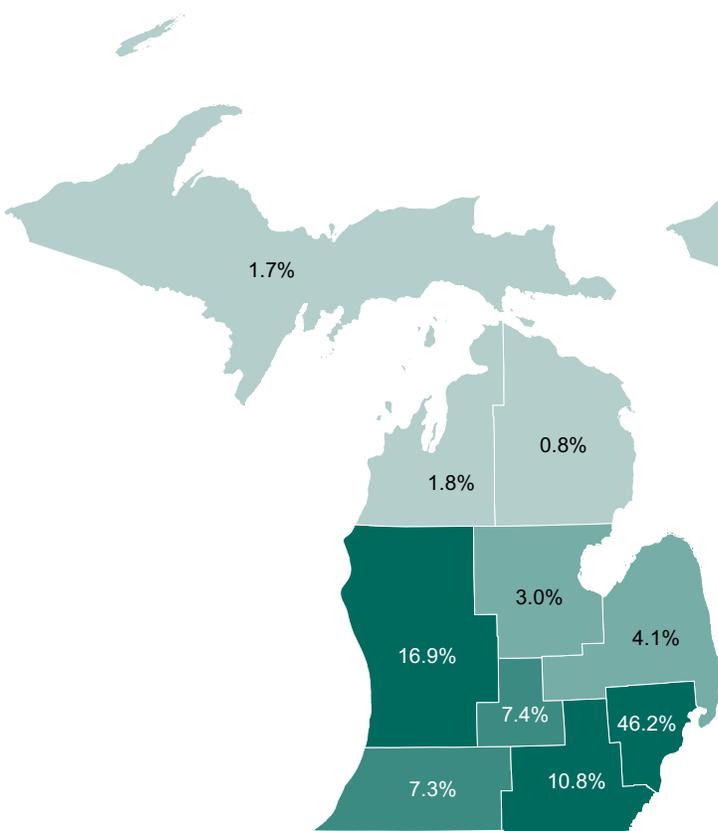
- Budgeting
- Customer Contact
- Customer Service
- Project Management
- Python
- Sales
- Scheduling
- Software Development
- Software Engineering
- SQL

Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

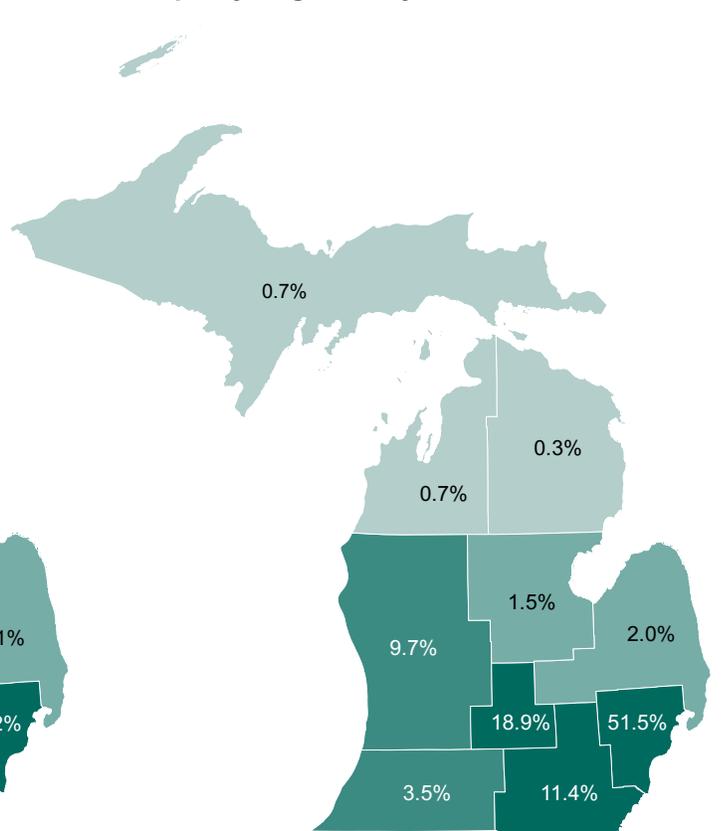


Online job advertisements in the Information Technology industry cluster are more heavily concentrated in the South Central, Southeast, and Detroit Metro prosperity regions. South Central is a unique region, as it holds 18.9 percent of all online ads for the cluster, but only 7.4 percent of total online advertisements across the state. Comparatively, West Michigan holds just under 10 percent of the ads in IT but has 17 percent of the total ads in Michigan. This can also be observed in the employment map by prosperity region (page 21), where IT is slightly more prominent in South Central's employment than it is in West Michigan's.

Share of Total Job Advertisements by Michigan Prosperity Region, July 2021 to June 2022



Share of Information Technology Cluster Job Advertisements by Michigan Prosperity Region, July 2021 to June 2022



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

Employment Projections

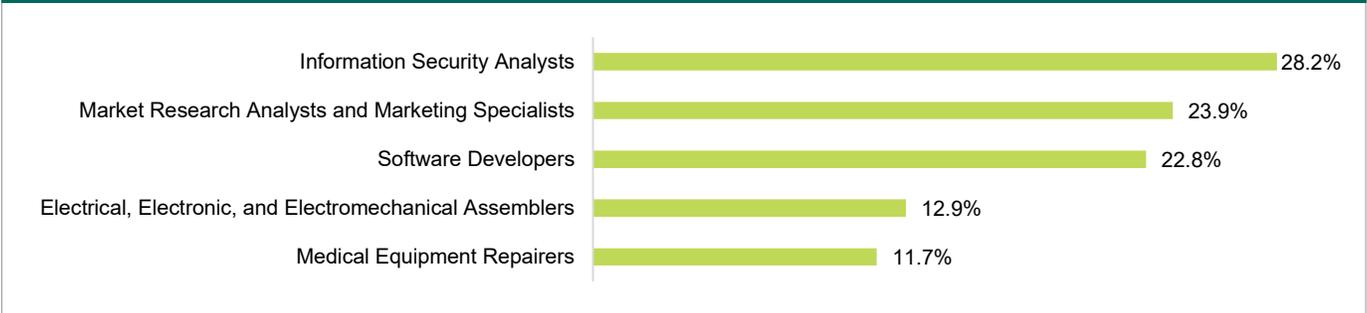
Projections do not exist for industry clusters, but they do exist for industries and occupations that make up the industry cluster. Although projections through 2030 show nearly 9 percent growth in total statewide employment, it is important to remember that these projections begin with a base year of 2020, where total employment was down compared to prior years.

The top five occupations by projected employment growth in Information Technology are shown in Figure 8. All of them, except for *Medical equipment repairers*, are also part of the key occupations for the industry cluster. Together, these five occupations are expected to increase employment by 15,400 across the state during the 2020–2030 time period. There is a mix of education and training requirements among these five occupations,

but the majority require a bachelor’s degree. *Medical equipment repairers* typically require an associate degree and moderate-term training while *Electrical, electronic, and electromechanical assemblers* require at least a high school diploma and moderate-term training.

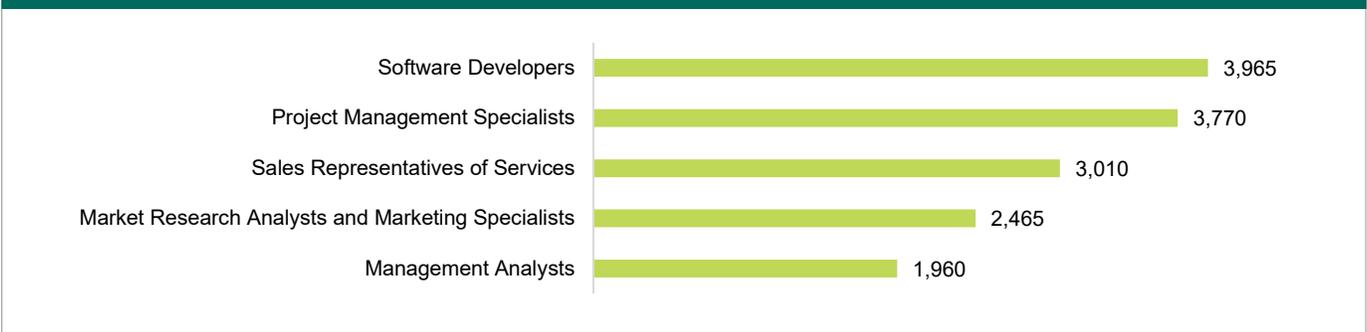
Occupations with large numbers of annual openings typically coincide with occupations that have large employment bases. The top five occupations by most annual openings in IT are displayed in Figure 9. Each of these occupations are in the key occupations for the cluster. They are high in total employment and pay well. *Sales representatives of services* require a high school diploma and moderate-term training while the remaining four occupations require a bachelor’s degree.

FIGURE 8: MICHIGAN INFORMATION TECHNOLOGY CLUSTER OCCUPATIONS WITH THE MOST PROJECTED GROWTH THROUGH 2030

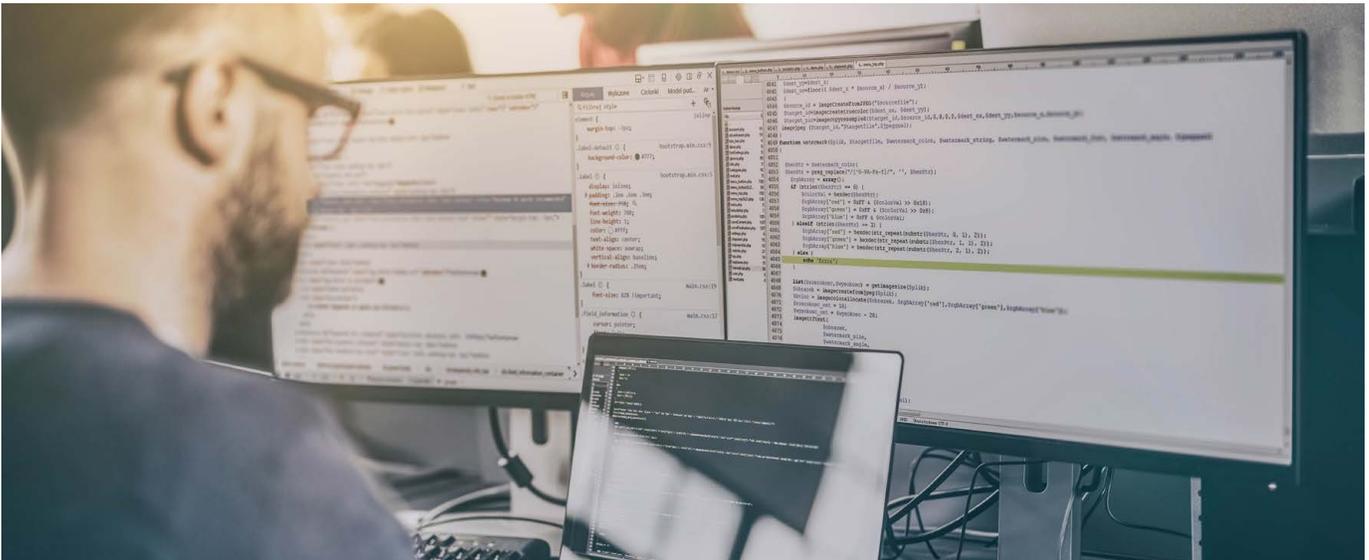


Source: 2020–2030 Occupational Employment Projections, Michigan Center for Data and Analytics

FIGURE 9: MICHIGAN INFORMATION TECHNOLOGY CLUSTER OCCUPATIONS WITH THE MOST PROJECTED ANNUAL OPENINGS THROUGH 2030



Source: 2020–2030 Occupational Employment Projections, Michigan Center for Data and Analytics

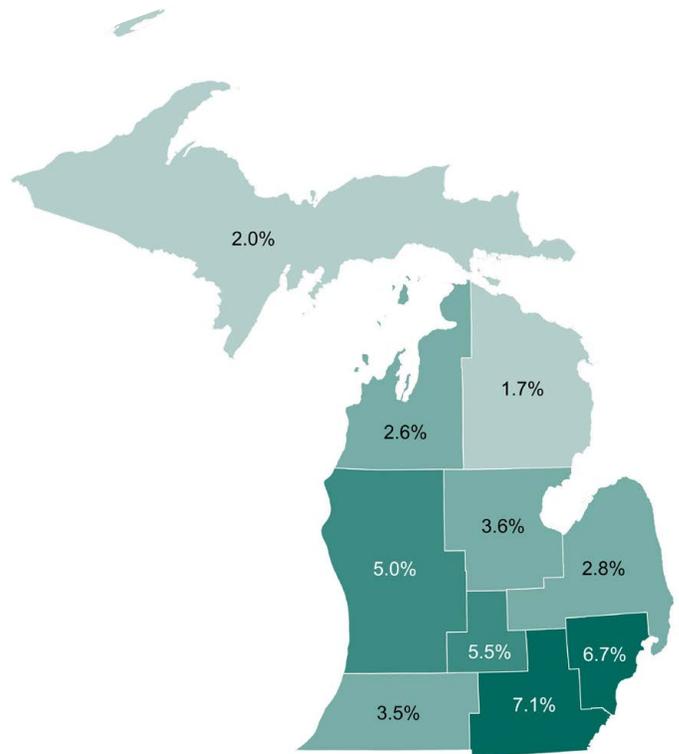


Workforce Demographics

Data on workforce demographics such as gender, age, education, and race and ethnicity are important to identifying industry cluster characteristics and evaluating potential disparities. Understanding and addressing gaps in education and skills across demographic groups can aid in the growth of an industry cluster. In order to maintain a young workforce across an industry cluster, employers may need to acclimate to what their workforce values, such as opportunities for financial and professional gain. The following section displays characteristics of the Information Technology workforce in Michigan. These data analyses rely on the Longitudinal Employer-Household Dynamics and may vary slightly from industry data published by the Quarterly Census of Employment and Wages due to limitations in data availability and differences in collection time periods.

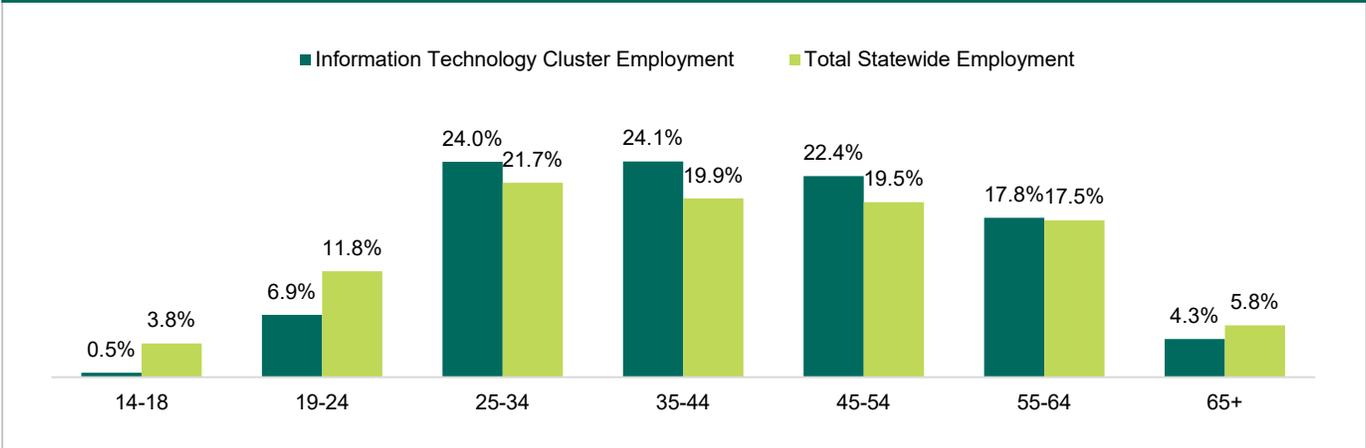
Employment in Information Technology is most heavily concentrated in the Detroit Metro, Southeast, South Central, and West Michigan prosperity regions. These prosperity regions also hold many of the metropolitan areas of Michigan. These more populous areas hold most of Michigan's major universities and many of the state's larger businesses. This combination works well for Information Technology as it is dependent on higher education and new graduates seeking employment.

Information Technology Cluster Share of Total Employment by Michigan Prosperity Region



Source: Longitudinal Employer-Household Dynamics, U.S. Census Bureau

FIGURE 10: MICHIGAN INFORMATION TECHNOLOGY CLUSTER EMPLOYMENT BY AGE, THIRD QUARTER 2021

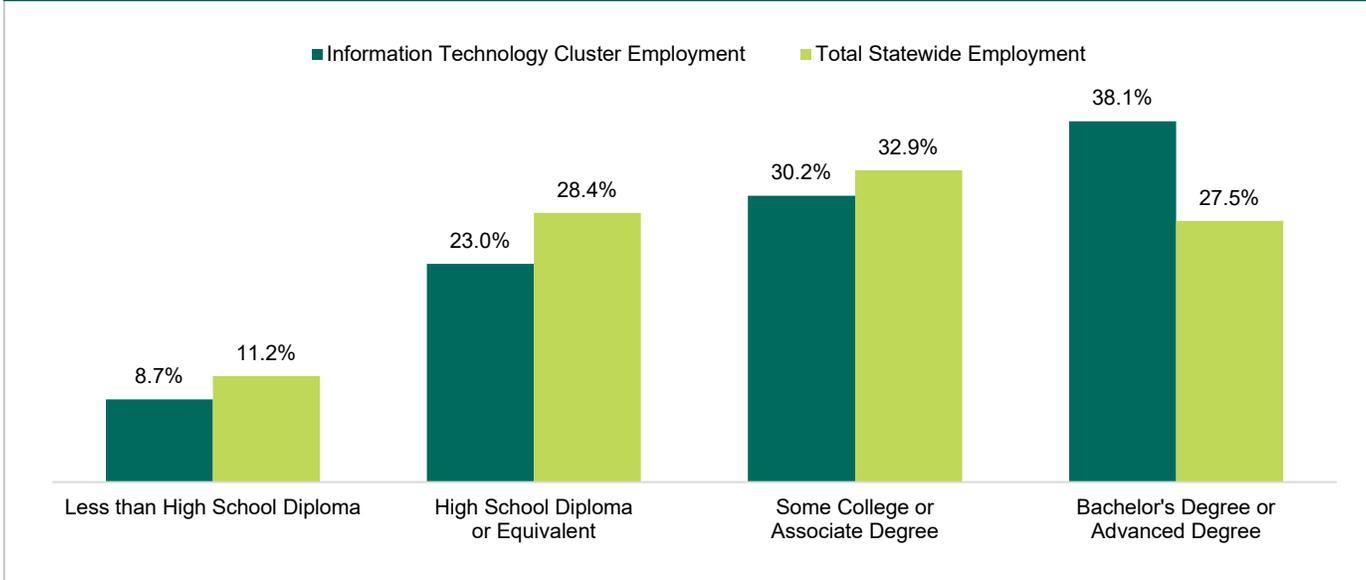


Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

Information Technology has larger shares of employment within prime working-age groups compared to the statewide averages. There are fewer workers in IT who are under 25 or over 65. Over 70 percent of employees in Information Technology are between the ages of 25 and 54. This is nearly 10 percentage points greater than the statewide employment within this age group.

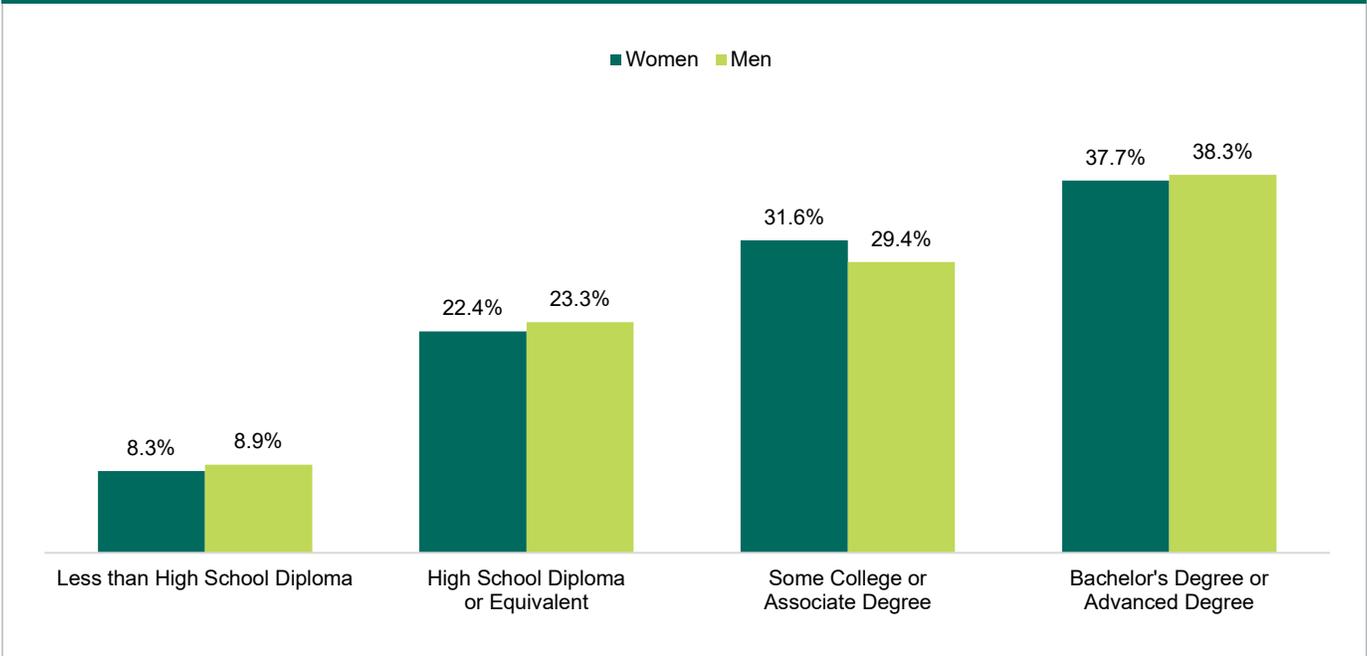
In the Information Technology industry cluster, 38 percent of workers have a bachelor's degree or higher. This is compared to the statewide average of 28 percent, a 10-percentage point difference. In lower levels of educational attainment, Michigan outpaces the industry cluster. This is not unexpected, as most careers in Information Technology require some level of higher education, typically a bachelor's degree or more.

FIGURE 11: MICHIGAN INFORMATION TECHNOLOGY CLUSTER EMPLOYMENT BY EDUCATION, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

FIGURE 12: MICHIGAN INFORMATION TECHNOLOGY CLUSTER EMPLOYMENT BY EDUCATION AND GENDER, THIRD QUARTER 2021

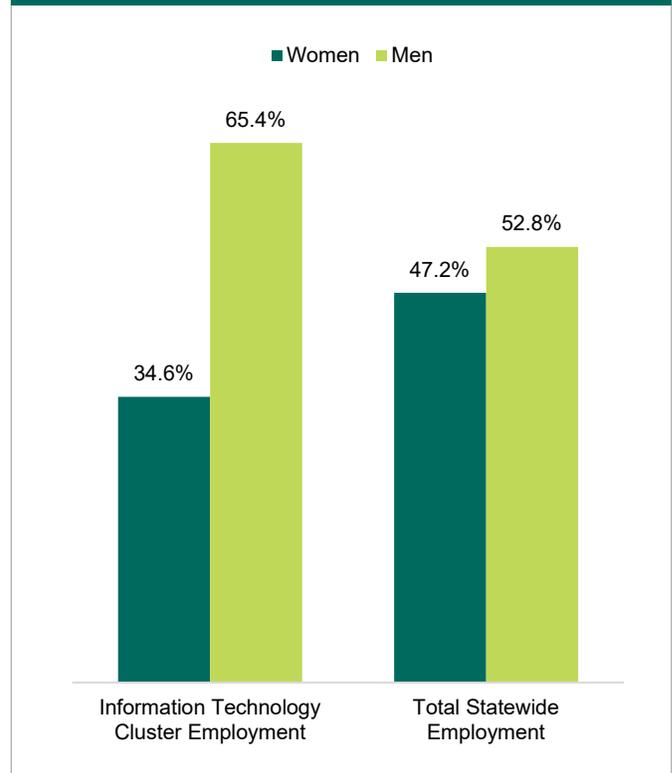


Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

Men and women have nearly equivalent levels of educational attainment within Information Technology. Women slightly outpace men in levels of some college or associate degree by over 2 percentage points, but men slightly outpace women in all other levels, by less than 1 percentage point each time. Despite similar levels of education, women in Information Technology earn less than 75 percent of what a male earns at every level of educational attainment. For those with a bachelor's degree or higher, women earn approximately 74 cents per one dollar that a male counterpart earns.

Information Technology is dominated by men. This is true among many other industry clusters in the state including Energy and Mobility. Men account for 65 percent of all employment in the cluster compared to 53 percent statewide. For every one woman employed in IT, there are nearly two men.

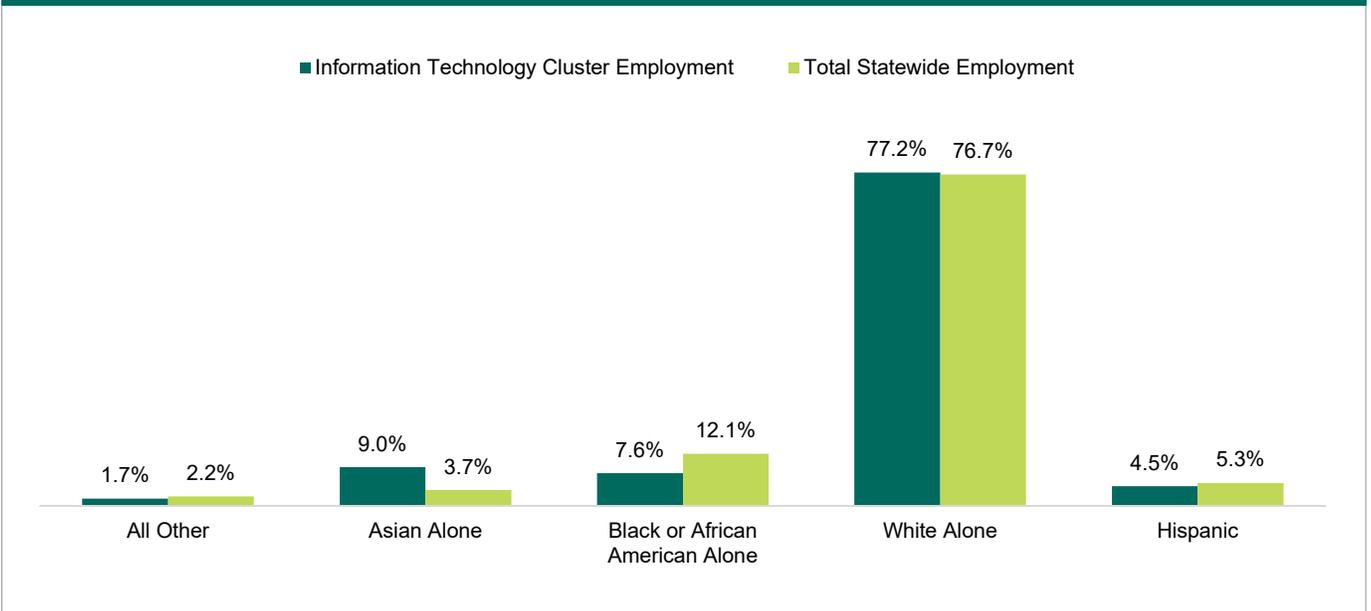
FIGURE 13: MICHIGAN INFORMATION TECHNOLOGY CLUSTER EMPLOYMENT BY GENDER, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau



FIGURE 14: MICHIGAN INFORMATION TECHNOLOGY CLUSTER EMPLOYMENT BY RACE AND ETHNICITY, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

The industry cluster is closely aligned with total statewide employment by race and ethnicity for many groups including white alone, Hispanic individuals, and all other. Information Technology outpaces the state in employment for those who are Asian alone by more than double. Those who are Black or African American are underrepresented in IT employment compared to their statewide share.

Talent Pipeline

Data for education program completers of instructional programs are available from the National Center for Education Statistics. These data can be used to estimate ever-changing levels of supply for some occupations in the labor market. There are no officially defined programs for clusters. Certain programs are more likely to lead to work in the Information Technology cluster than others, but there are opportunities across the educational spectrum including business, social work, and manufacturing programs to name a few. This section will highlight only a few of hundreds of possible programs that can lead to a job in the Information Technology cluster. Many factors can shift completers, such as increase in student enrollment during periods of high unemployment or difficulties attending school during a pandemic. For example, demand for workers may be causing upward pressures on programs while other factors such as a lack of instructors are causing total completers to decrease.

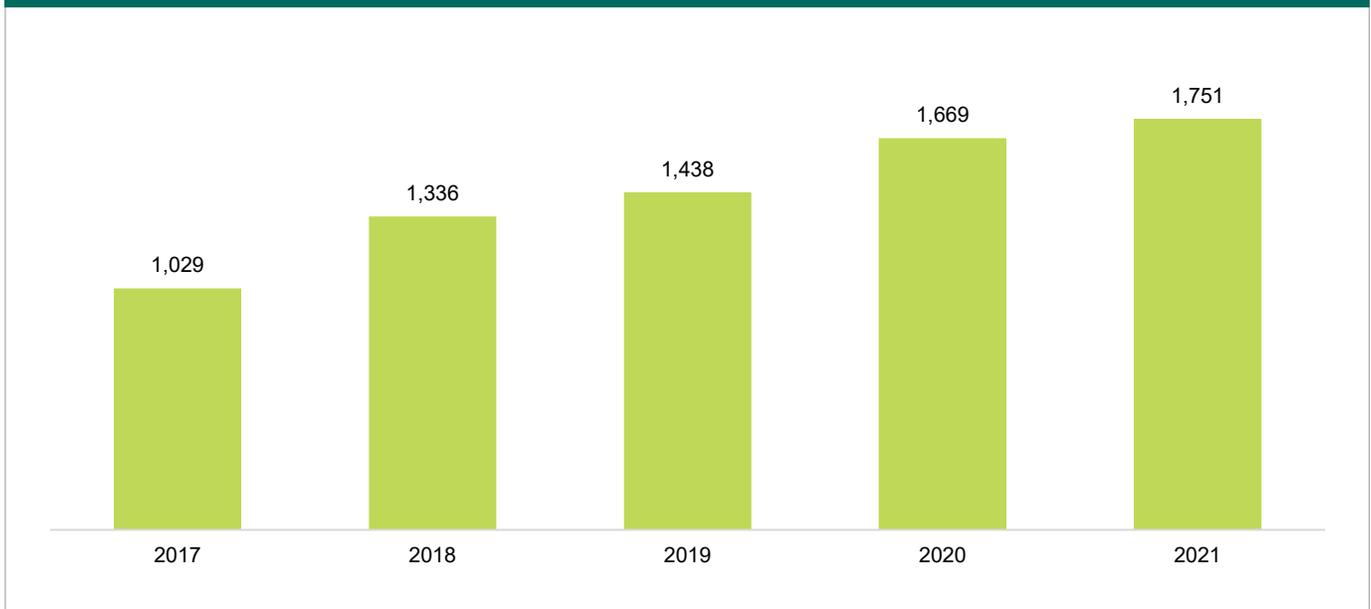
Nearly 84 percent of higher education graduates within Information Technology have obtained a bachelor's degree or higher. The two most common programs for

bachelor's degree or higher completions are *Business administration and management, general* and *Computer and information sciences, general*. Both were led by graduates of the University of Michigan-Ann Arbor. The third most common program within Information Technology completers was *Marketing/marketing management, general*. This program was led in graduates by Grand Valley State University.

Management occupations are common among graduates who are in the Information Technology cluster. The top five occupations by graduate counts within the cluster all require a bachelor's degree and are manager positions. Other than management, common occupations for the cluster include *Business operations specialists*, *Computer network architects*, and *Data scientists*.

Over the past five years, total graduate counts related to Information Technology have seen slight variations. However, they have averaged above 39,000 each year. Between 2020 and 2021, the total number of graduates related to the cluster increased by nearly 300 across the state.

FIGURE 15: MICHIGAN COMPUTER AND INFORMATION SCIENCES PROGRAM COMPLETERS



Source: National Center for Education Statistics, Integrated Postsecondary Education Data System

Conclusion

The Information Technology cluster is smaller than some prominent industry clusters in Michigan such as Healthcare or Manufacturing. However, it continues to grow, provides high earnings potential, and interacts with nearly every sector of the economy. The services and technological advancements that this industry cluster contributes to the state are prevalent in everyday life and are becoming more important as new developments take place.

Strengths

Growing Employment

Employment in the Information Technology cluster has been on an upward trend and growing at a quicker pace than the statewide average. As technology develops and remains a part of the workforce, the Information Technology cluster can be expected to continually expand.

Above-Average Earnings

Individuals employed in the Information Technology cluster can expect to earn above-average wages compared to the Michigan average. The median hourly wage in the cluster is nearly \$30 compared to just under \$22 for the state. The cluster has a variety of key occupations and most have high earnings potential.

High Education

Positions in Information Technology typically require advanced degrees, usually four years or more. There are some opportunities for those with less than a bachelor's degree, but these employment opportunities are fewer in number. Incoming higher education graduates can help cultivate the growth the cluster is facing.

Apprenticeship Expansion

Total registered apprentices in Information Technology have been growing in recent years. The average of 62 new registered apprentices per year between 2017 to 2021 shows growth in interest and expansion of programs related to the cluster. This will be important to the future successes of the cluster as apprenticeship expands across the state and provides applied experience and expertise.





Challenges

Gender Inequities

Men and women in Information Technology have similar levels of educational attainment but differing shares of employment and earnings. Women make up just 35 percent of all employment in the cluster and earn about 25 to 30 percent less than their male counterparts, on average. Addressing these inequities will be valuable to the cluster to continuously improve and expand Information Technology in Michigan.

Regional Concentration

Jobs in Information Technology are highly concentrated in four of the state's 10 regions. This provides more opportunities for individuals currently living in these areas. However, job seekers in more rural areas of the state with an interest in the cluster may need to relocate.

Continuously Evolving Industry

The technology sector frequently changes the way we work, communicate, travel, and more. As a rapidly evolving industry, advancements in Information Technology rely on new training, education, and business practices. Employers and employees alike will need to collaborate effectively in order to keep up with innovation in IT.



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