MAY 2018

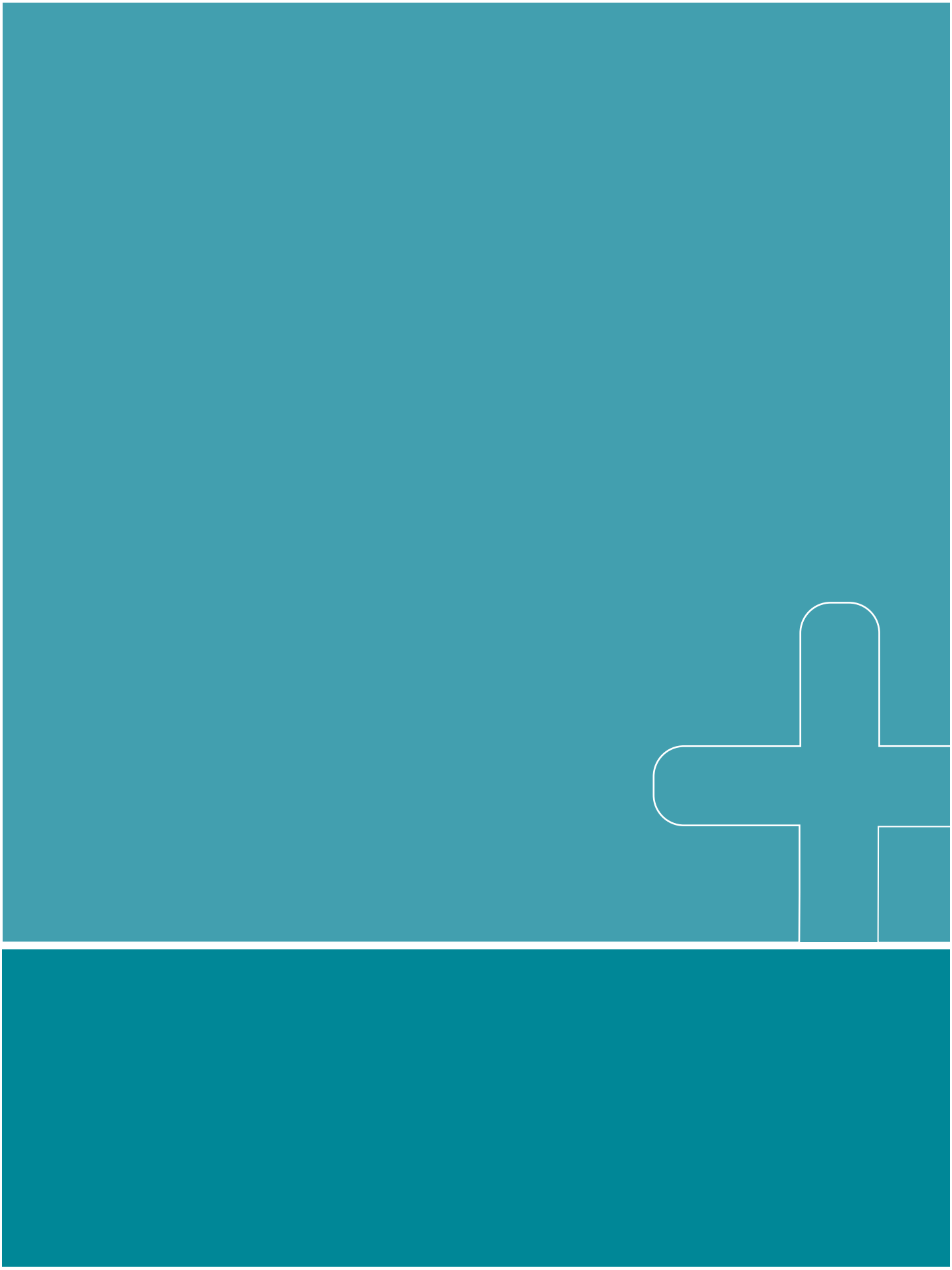
ALIGNING OPPORTUNITIES IN NORTHEAST OHIO

A RESOURCE TO AID IN ADDRESSING THE DEMAND AND SUPPLY IMBALANCE IN THE REGION'S WORKFORCE

Prepared by TeamNEO

In partnership with Cleveland Foundation

Generous support of Sherwin-Williams



FOREWARD

Northeast Ohio offers outstanding job and career opportunities. The challenge for our workforce, employers and economy, however, is that these opportunities don't necessarily align with the knowledge and skill sets of our current talent pool. Jobs in growing, high-potential industries, many offering family-sustaining wages, often sit vacant due to the limited number of qualified, credentialed candidates.

The Cleveland Foundation and Team NEO are taking steps to bridge this divide. The following report, an update of Team NEO's Aligning Opportunities 2017 report, in partnership with the Cleveland Foundation, analyzes the job demand and supply picture for the 18 counties of Northeast Ohio. It looks at programs being offered by 134 institutions, 96 occupations and 19 wealth-creating occupation groups. The report is made possible by a grant from the Cleveland Foundation and generous support of The Sherwin-Williams Company.

Two new indicators were added to 2018's report: entry alignment (looking at alignment of positions that list less than five years of experience) and risk of automation (probability of computerization for an occupation within the next 20 years). Further, a new occupation group, Education, was added to all sections of the report. We also take a deep dive into three occupation groups: Computer/IT, Healthcare and Manufacturing.

The objective of this report is to provide secondary and postsecondary educational institutions across Northeast Ohio with insights into the evolving needs of our region's employers. The findings clearly illustrate a need for re-evaluating professional and technical education and training programming as we support our youth, as well as our established workforce, in their quest for meaningful, well-paying employment. Their career success will fuel our economic growth in the future.

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INTRO

REPORT OVERVIEW

SECTION	FOCUS	MAJOR TAKEAWAY
Labor Force Trends PAGES 6-12	Provides regional workforce data - job-related education requirements, education attainment levels, commuting patterns, and employment distribution across occupation and industry.	By 2020, 65 percent of Ohio jobs will require a postsecondary credential. In 2016, 54 percent of Northeast Ohio residents, 25 years and older, had attended some college (includes certificate earners) or earned a graduate, bachelor's or associate degree.
Job Demand PAGES 13-17	Describes 46 key professional and technical occupations using six key variables: demand, entry demand, earning potential, share of total jobs, projected growth and risk of automation.	Nineteen of the 46 professional and technical occupations reviewed meet all or most criteria. Most require some postsecondary credential.
Talent Supply PAGES 18-25	Reviews student completion data at the secondary level (9-12 career and technical education (CTE)) and the postsecondary level (sub-baccalaureate, baccalaureate and graduate).	Regional secondary and postsecondary institutions are producing too few students with the credentials (certificates and degrees) needed in many high-demand technical fields (e.g., only 3.3 percent of all certificates and associate degrees and 2.6 percent of all bachelor's and master's degrees awarded in 2015 were in Computer & Information Science).
Demand/Supply Alignment PAGES 26-30	Aligns data produced on demand across key occupational areas (section 2) with data on credential output from postsecondary institutions in the region (section 3).	There is substantial misalignment between the demand for workers and the supply of appropriately credentialed workers in key areas including IT, Health, Manufacturing, and Finance and Business Services.
Industry Deep Dive PAGES 31-56	Looks at top requested skills and their growth rate, risk of automation, wage, and projected job growth information for occupations in key industry groups.	The most in-demand sectors are Manufacturing, Healthcare, and Computer and IT. Northeast Ohio has a tremendous opportunity to connect people to good-paying jobs in these significant industries.
Implications PAGES 57-59	Lists implications of the research at the conclusion of the report.	Although there are significant opportunities to better align supply and demand, it will require a systemic effort.


Reliability
Process
AUTOMATION
Productivity
Innovation
Repeatability
System

SECTION 1

LABOR FORCE TRENDS

SECTION 1

LABOR FORCE TRENDS

This section provides data related to Northeast Ohio's workforce: job-related educational demand, education attainment levels, commuting patterns, and industry and occupational employment data. Key observations:

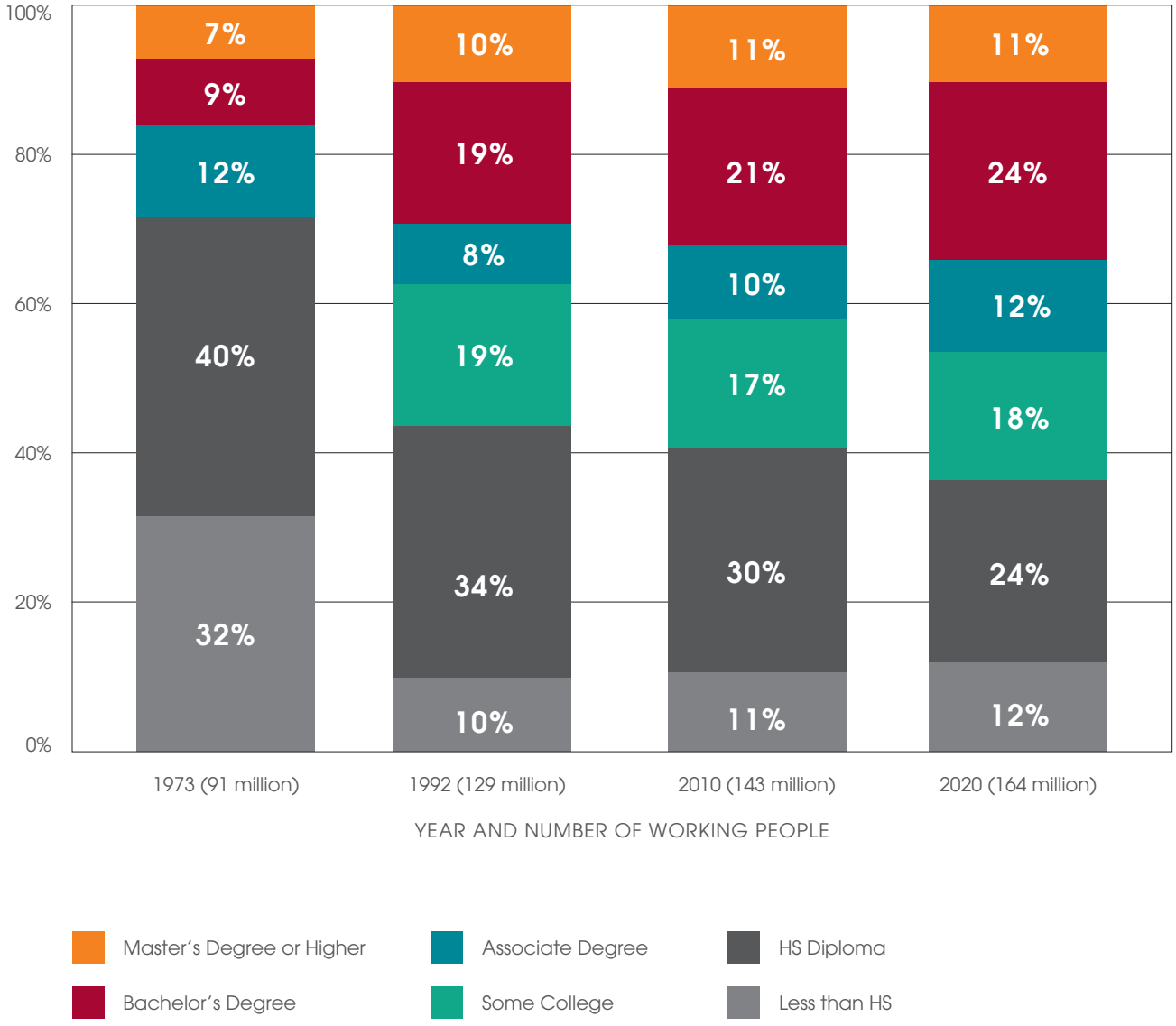
- The demand for skilled and educated talent is increasing. By 2020, the majority of jobs in Ohio will require some type of postsecondary credential.
- Only 54 percent of adults in Northeast Ohio have the required education or skill level to meet the demand predicted by 2020. Eleven percent growth is necessary to achieve the 2020 projected demand of 65 percent.
- Data show that residents with higher levels of education – from a one-year credential to a two-year degree to a baccalaureate degree – are more likely to be employed and earn more money.
- Residents in Northeast Ohio often travel across county lines for jobs: 43% work in a different county than they live.
- Employment is spread across many occupational groupings and industry sectors.

SECTION 1

LABOR FORCE TRENDS

Demand for educational credentials is growing. Since 1973, jobs have required increasing levels of educational attainment across the United States.

EDUCATIONAL DEMANDS FOR U.S. JOBS, 1973-2020



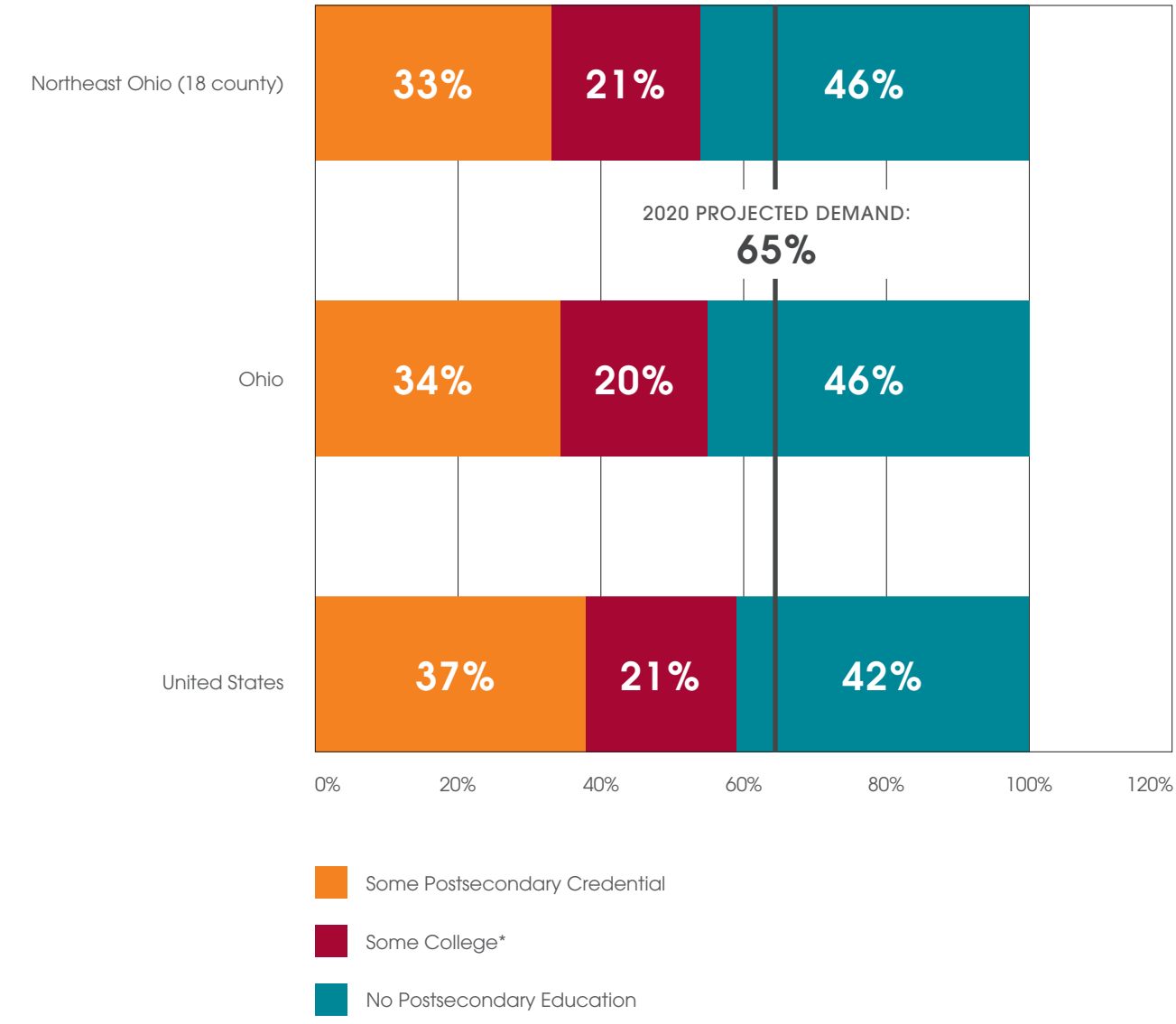
Source: Anthony Carnevale, et al., "Recovery: Projections of Jobs and Education Requirements Through 2020," June 2013.

SECTION 1

LABOR FORCE TRENDS

The gap is significant between what is projected for demand (65 percent of Ohio jobs will require a postsecondary credential by 2020) and current levels of educational attainment in Northeast Ohio.

GAP BETWEEN EDUCATION REQUIRED BY 2020 AND EDUCATIONAL ATTAINMENT OF POPULATION 2016



*Some College includes both those who have started, but not completed, a college degree program and those who may hold a certificate or other training credential that is not a degree.

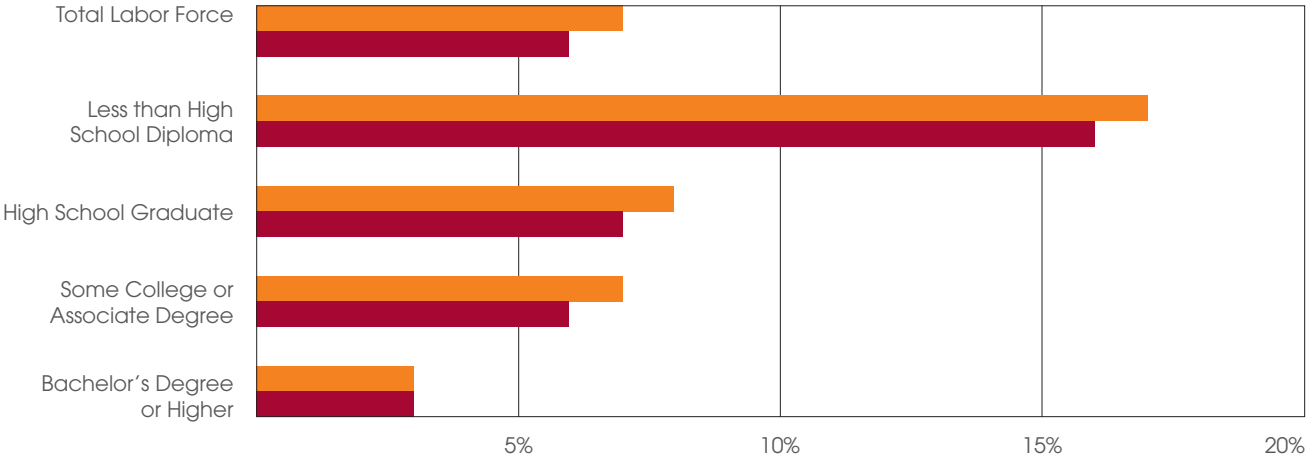
Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates. Civilian population ages 25+.

SECTION 1

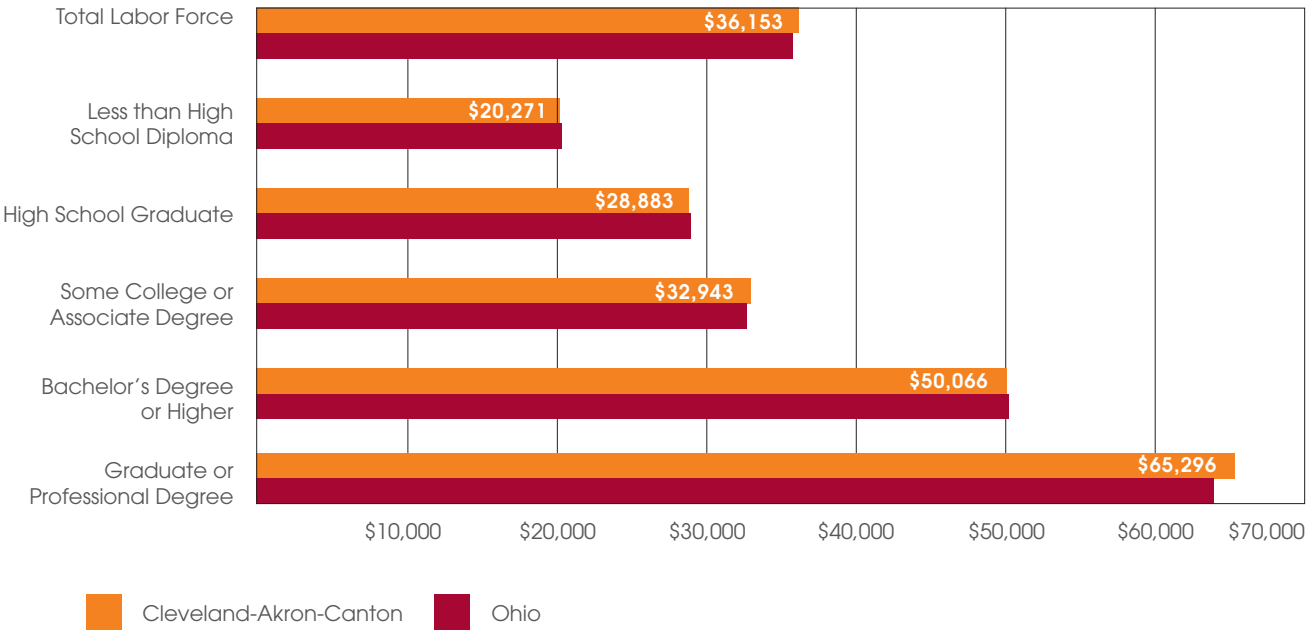
LABOR FORCE TRENDS

Educational attainment is tied to jobs and income. Regional residents with higher levels of education have lower unemployment rates and greater incomes.

UNEMPLOYMENT RATE BY EDUCATION



MEDIAN SALARY BY EDUCATION

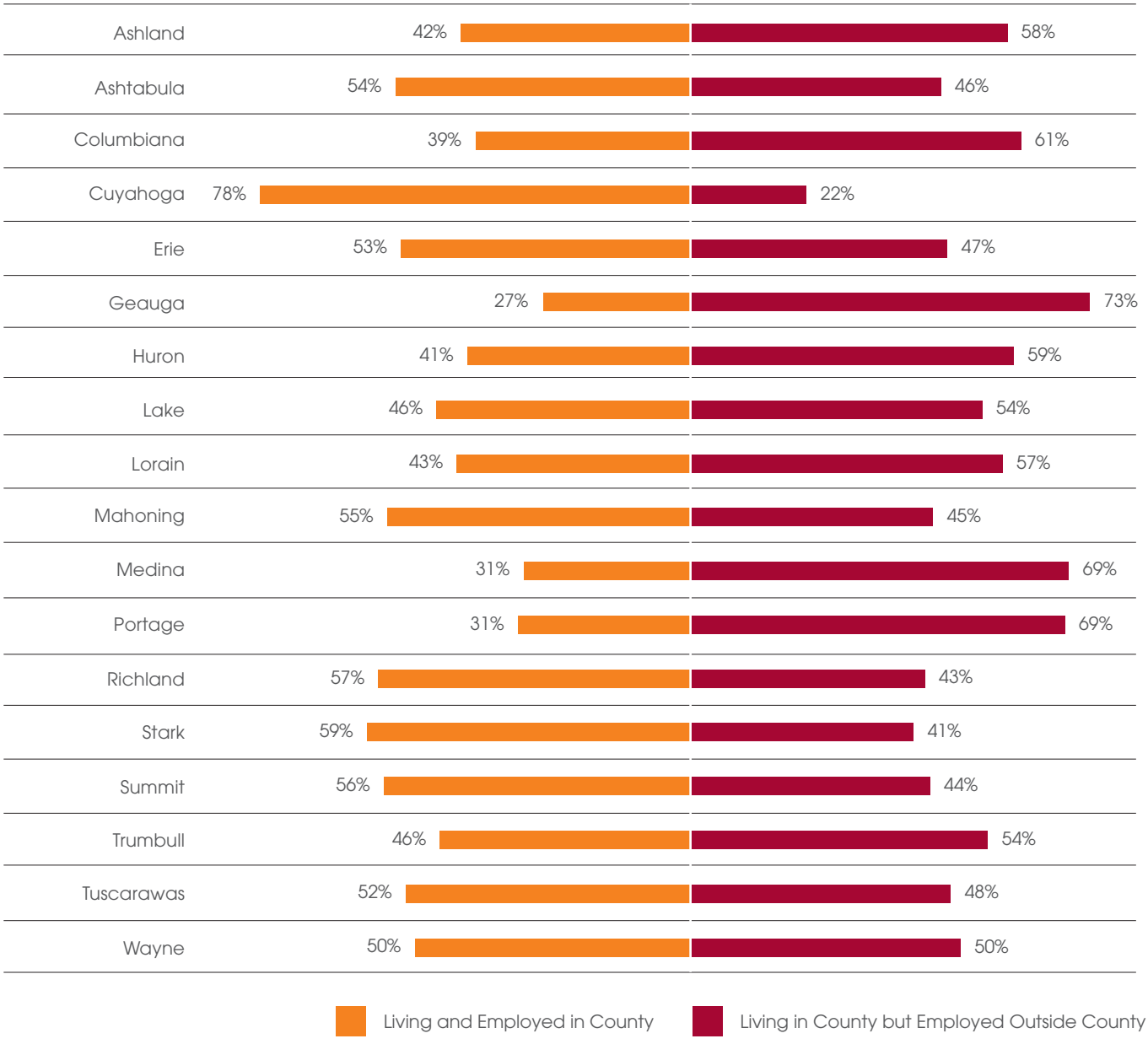


Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates. Civilian population ages 25+.

SECTION 1

LABOR FORCE TRENDS

NORTHEAST OHIO WORKER COMMUTE PATTERN BY COUNTY, 2015



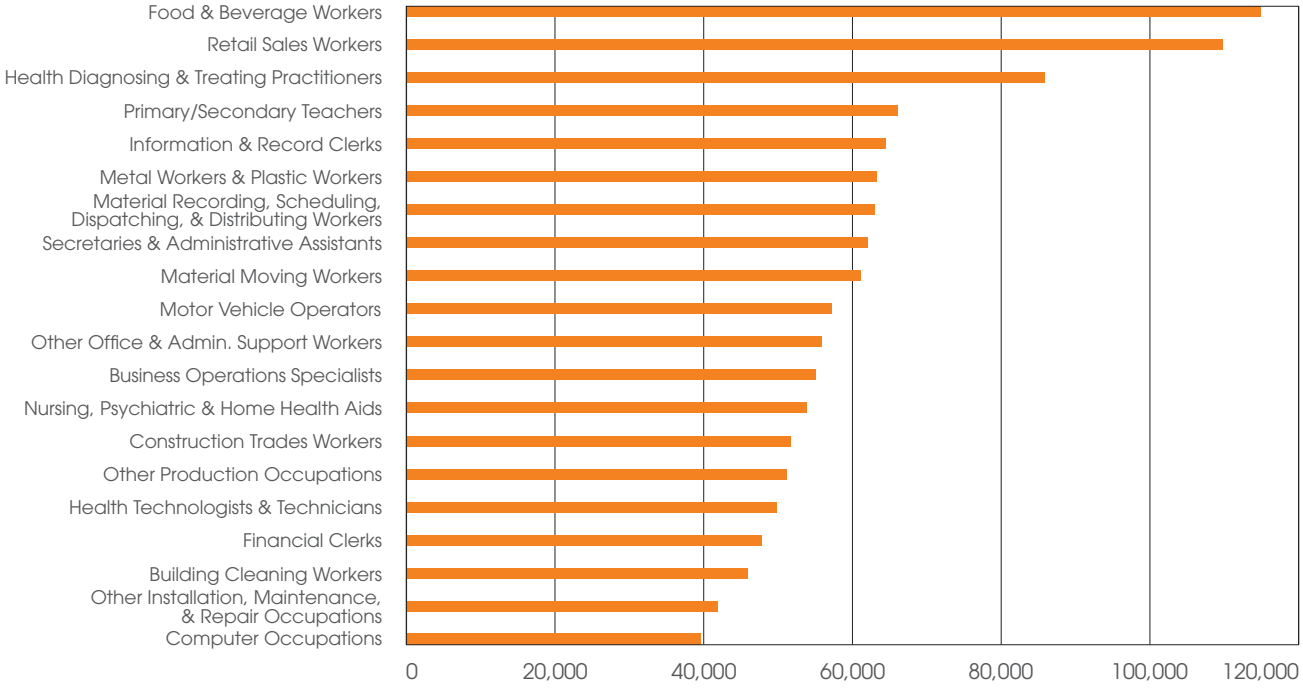
Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (2015).

SECTION 1

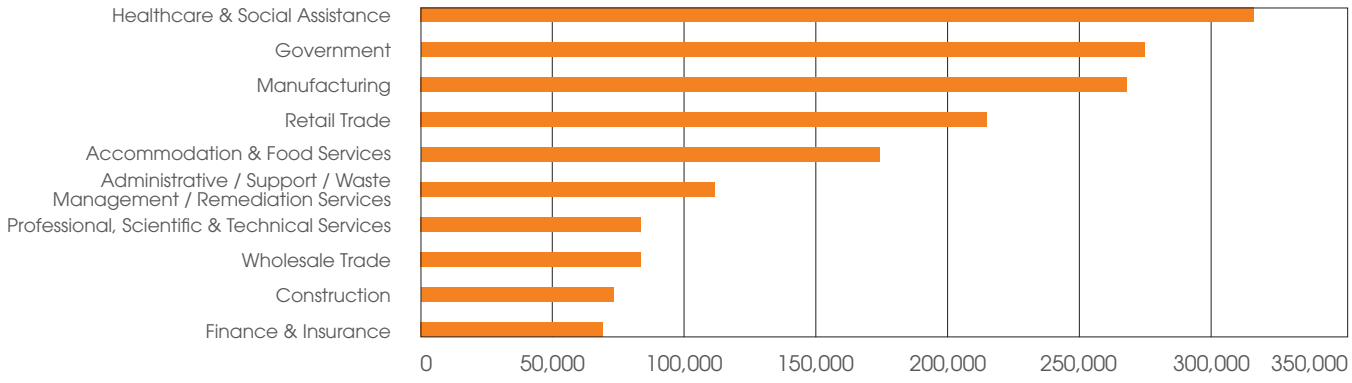
LABOR FORCE TRENDS

Employment opportunity is spread across occupation and industry in Northeast Ohio, a similar pattern to employment opportunity in the Metropolitan Statistical Area (MSA).

TOP JOBS BY OCCUPATION, NORTHEAST OHIO, 2016



TOP JOBS BY SECTOR, NORTHEAST OHIO, 2016



Source: U.S. Bureau of Labor Statistics (BLS), Quarterly Census of Employment and Wages (QCEW) Employees, Non-QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2017.4 Class of Worker. Data are for NEO 18-county region.

SECTION 2

JOB DEMAND

SECTION 2

JOB DEMAND

Team NEO worked with the occupational groups identified by FutureWorks in 2014. An Education occupation group is a new addition for this version of the report. There are now 46 key professional and technical occupational groups tied to the five wealth clusters originally identified by FutureWorks' weighted "Core Demand Index." In the tables that follow, we analyzed these groups using the following key variables:

- **DEMAND**
  Demand is a calculation of projected annual job openings (Bureau of Labor Statistics) and real-time job postings (Burning Glass Labor Insight) for occupations in the 18-county region of Northeast Ohio.

- **ENTRY DEMAND**
  Entry demand is derived using the same calculation as demand, but only includes job postings that list less than five years of experience.

- **FAMILY-SUSTAINING WAGE**
  According to a national Living Wage Calculator developed by Amy K. Glasmeier at Massachusetts Institute of Technology, the hourly wage that an individual in Cuyahoga County must earn to support his/her family of four is $23.19 as of January 2018. Our update of FutureWorks' index calculates whether the mean wage of each occupational group "meets" the family-sustaining wage standard (within 10 percent of the county average), is "below" the county wage standard (more than 10 percent below the county average), or is "above" the county wage standard (more than 10 percent above the county average). We chose to use the Cuyahoga County family-sustaining wage for consistency, but it is important to recognize the localized differences in the region.

- **TOTAL JOBS**
  This is a 2021 calculation of the total number of jobs in the region from EMSI's model of projected jobs from the U.S. Bureau of Labor Statistics, using data from the Quarterly Census on Employment and Wages (QCEW). FutureWorks' index calculates whether the share of total jobs in the occupational group is in the "top," "middle," or "bottom" third of total jobs in the economy of the MSA.

- **PROJECTED GROWTH**
  FutureWorks uses EMSI's BLS projections of job growth from 2016 to 2021 to calculate whether each occupational group is projected to have "high" growth (above 2 percent), "moderate" growth (0-2 percent), or "low" growth (less than 0 percent).

- **RISK OF AUTOMATION**
  This is a Burning Glass variable describing the probability of computerization for an occupation within the next 20 years. It is based on the seminal Oxford University study on automation. High risk of automation is the top quartile of scores. Medium risk of automation is the third quartile of scores. Low risk is the bottom two quartile of scores.

Note: The projections in the analysis of what FutureWorks has called the "Core Demand Index" and throughout the report are dependent on the forecast for job creation and real-time demand in each occupational group. The forecasts and measures of demand are from EMSI's model of U.S. Bureau of Labor Statistics data and Burning Glass Labor Insight real-time job postings. These projections should be supplemented by locally available analyses of the occupations when appropriate.

SECTION 2

JOB DEMAND

KEY OCCUPATIONS TIED TO WEALTH CLUSTERS USING CORE DEMAND INDEX

OCCUPATIONAL GROUP (3 DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	FAMILY-SUSTAINING WAGE*	TOTAL JOBS 2021 BY THIRDS	PROJECTED GROWTH 2016-2021	RISK OF AUTOMATION
Health Diagnosing and Treating Practitioners	22,388	12,801	Above	Top	High	Low
Computer Occupations	12,227	6,908	Above	Top	High	Low
Information and Record Clerks	10,088	6,891	Below	Top	Moderate	High
Business Operations Specialists	8,259	5,605	Above	Top	Moderate	Medium
Other Management Occupations	7,637	4,602	Above	Top	Moderate	Low
Health Technologists and Technicians	7,275	4,457	Below	Top	High	Medium
Sales Representatives, Wholesale and Manufacturing	7,091	3,689	Above	Top	Moderate	Medium
Financial Clerks	6,187	4,535	Below	Top	Low	High
Secretaries and Administrative Assistants	5,748	4,738	Below	Top	Moderate	High
Financial Specialists	5,646	3,882	Above	Top	High	Medium
Nursing, Psychiatric, and Home Health Aides	5,438	4,164	Below	Top	High	Low
Other Production Occupations	5,355	4,106	Below	Top	Low	High
Metal Workers and Plastic Workers	5,295	4,511	Below	Top	Low	High
Other Installation, Maintenance, and Repair Occupations	5,233	3,604	Below	Top	High	Medium
Other Office and Administrative Support Workers	4,955	4,015	Below	Top	Moderate	High
Construction Trades Workers	4,324	3,770	Meets	Top	Moderate	Medium
Engineers	3,835	2,246	Above	Middle	Moderate	Low
Operations Specialties Managers	3,770	2,319	Above	Top	Moderate	Medium
Preschool, Primary, Secondary, and Special Education School Teachers	3,613	2,828	Above	Top	Low	Low
Assemblers and Fabricators	2,721	2,335	Below	Top	Low	High
Advertising, Marketing, Promotions, Public Relations, and Sales Managers	2,663	1,513	Above	Middle	High	Low
Other Healthcare Support Occupations	2,568	1,784	Below	Middle	High	Medium
Top Executives	2,116	1,563	Above	Top	Moderate	Low

*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult. Additional detail can be found on page 14.

JOB DEMAND (continued)

KEY OCCUPATIONS TIED TO WEALTH CLUSTERS USING CORE DEMAND INDEX

OCCUPATIONAL GROUP (3 DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	FAMILY-SUSTAINING WAGE*	TOTAL JOBS 2021 BY THIRDS	PROJECTED GROWTH 2016-2021	RISK OF AUTOMATION
Art and Design Workers	1,936	941	Below	Middle	Low	Low
Supervisors of Office and Administrative Support Workers	1,720	1,308	Meets	Middle	Moderate	Low
Postsecondary Teachers	1,445	1,098	Above	Middle	High	Low
Supervisors of Production Workers	1,276	993	Above	Middle	Low	Low
Other Education, Training, and Library Occupations	1,217	938	Below	Middle	Moderate	Low
Drafters, Engineering Technicians, and Mapping Technicians	1,204	746	Meets	Middle	Low	Medium
Other Teachers and Instructors	1,001	743	Below	Middle	High	Low
Media and Communication Workers	867	610	Meets	Middle	Low	Medium
Supervisors of Installation, Maintenance, and Repair Workers	769	540	Above	Middle	Moderate	Low
Electrical and Electronic Equipment Mechanics, Installers, and Repairers	765	565	Meets	Middle	Low	Medium
Occupational Therapy and Physical Therapist Assistants and Aides	597	395	Above	Bottom	High	Medium
Life, Physical, and Social Science Technicians	597	434	Meets	Bottom	Moderate	Medium
Physical Scientists	499	375	Above	Bottom	Moderate	Low
Life Scientists	412	316	Above	Bottom	Moderate	Low
Social Scientists and Related Workers	390	158	Above	Bottom	High	Low
Mathematical Science Occupations	365	256	Above	Bottom	High	Low
Supervisors of Construction and Extraction Workers	341	307	Above	Middle	High	Low
Plant and System Operators	321	249	Above	Bottom	Moderate	Medium
Librarians, Curators, and Archivists	267	247	Below	Bottom	Moderate	Medium
Media and Communication Equipment Workers	240	157	Below	Bottom	Low	Medium
Architects, Surveyors, and Cartographers	238	171	Above	Bottom	Moderate	Low
Other Healthcare Practitioners and Technical Occupations	230	158	Above	Bottom	High	Low
Extraction Workers	162	144	Meets	Bottom	High	Medium

*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult. Additional detail can be found on page 14.

SECTION 2

JOB DEMAND

We have identified 19 professional and technical occupations from these clusters that show substantial demand, many offering family-sustaining wages, and hold promise for future employment and income for Northeast Ohio residents (some combine related key occupations from the previous tables into a single occupation). Almost all require some type of professional and technical training or postsecondary credential.

1. Architects and Engineering Technicians
2. Computer and IT Workers
3. Construction Trade Workers*
4. Education (combines several key occupations)
5. Engineers
6. Financial Clerks
7. Financial Specialists
8. Health Diagnosing and Treating Practitioners
9. Health Technologists and Technicians
10. Health Therapist Aides and Support Workers (combines several key occupations)
11. Information and Record Clerks
12. Installation, Maintenance, and Repair Workers
13. Life Science Workers (combines several key occupations)
14. Managers, Professional and Health
15. Metal and Plastic Workers
16. Nursing and Home Health Aides
17. Secretaries and Administrative Assistants
18. Skilled Production Workers (combines several key occupations)
19. Supervisors of Skilled Workers (combines several key occupations)

*Note: Other location analyses should be used to supplement our analysis and help characterize the type and scale of demand for each occupational group. One such analysis is the "Demand Study for Construction Employees" prepared by Mohr Partners Cleveland, W.E. Upjohn Institute for Employment Research, and Weber Murphy Fox for The Construction Diversity Committee, Commission on Economic Inclusion, Greater Cleveland Partnership.

Details regarding the 3-digit SOC key occupations that comprise each of the 19 professional and technical occupations can be found in the Appendix.

SECTION 3

TALENT SUPPLY

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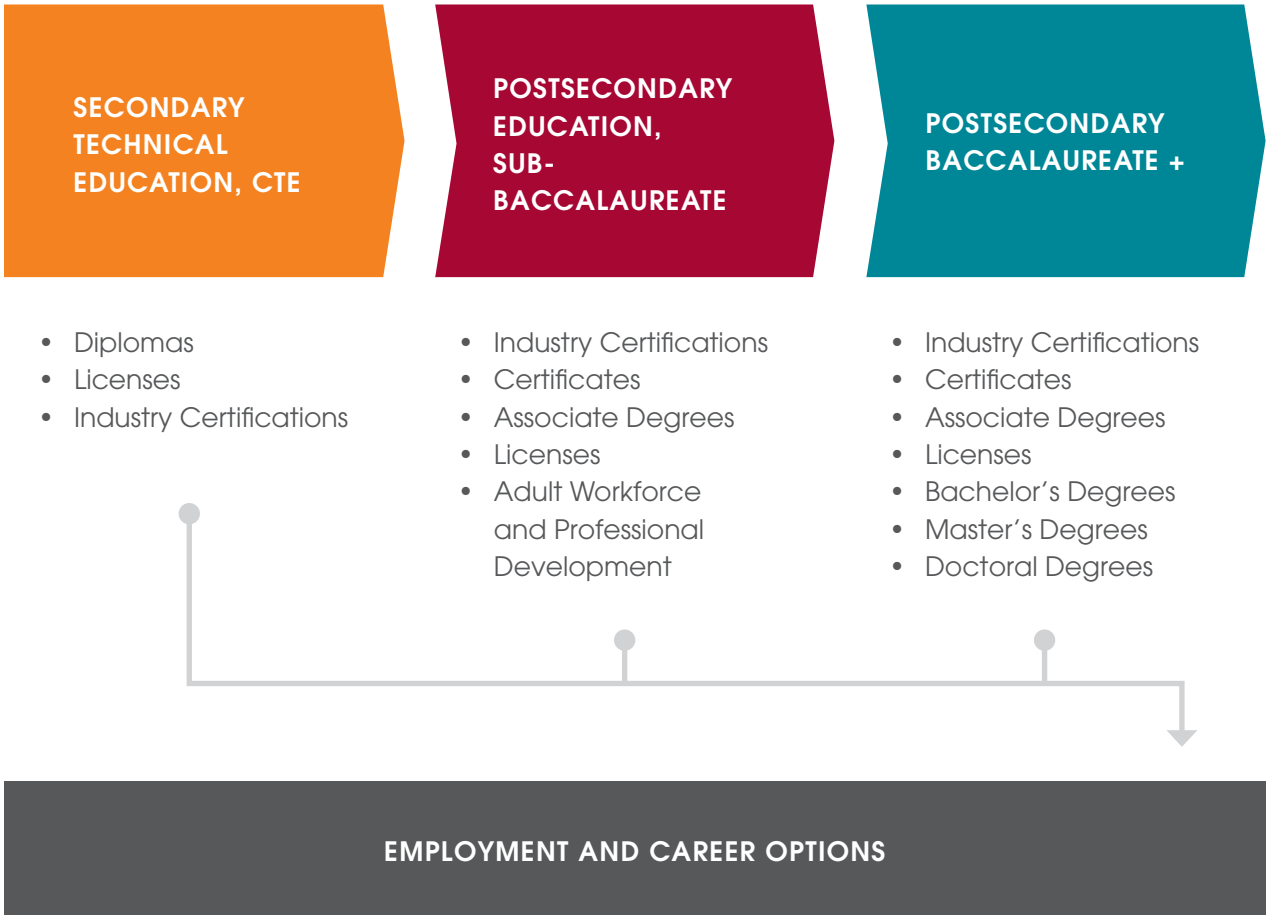
TALENT SUPPLY

The most significant sources of technically skilled talent are educational institutions at the secondary level (grades 9-12 career and technical education (CTE)) and postsecondary level (sub-baccalaureate, baccalaureate and graduate). While other sources of talent (e.g., workforce training and education programs and in-migration to the area by skilled individuals) may also be important, the educational institutions that serve area residents and educate large numbers of new and experienced workers comprise, by far, the largest component of a talent supply system.



SECTION 3

TALENT SUPPLY — POSTSECONDARY LEVEL (SUB-BACCALAUREATE)

More than 100,000 students are currently enrolled in area institutions that offer sub-baccalaureate programs leading to potential associate degrees or academic certificates. The following tables and charts present field-of-study and 2015 completion data from the federal Integrated Postsecondary Education Data System for institutions within the 18-counties in Northeast Ohio. Our key observations:

- Completions in programs offered by private, for-profit institutions have declined in the region over recent years, and with additional closures of some of these institutions, we expect this trend to continue.

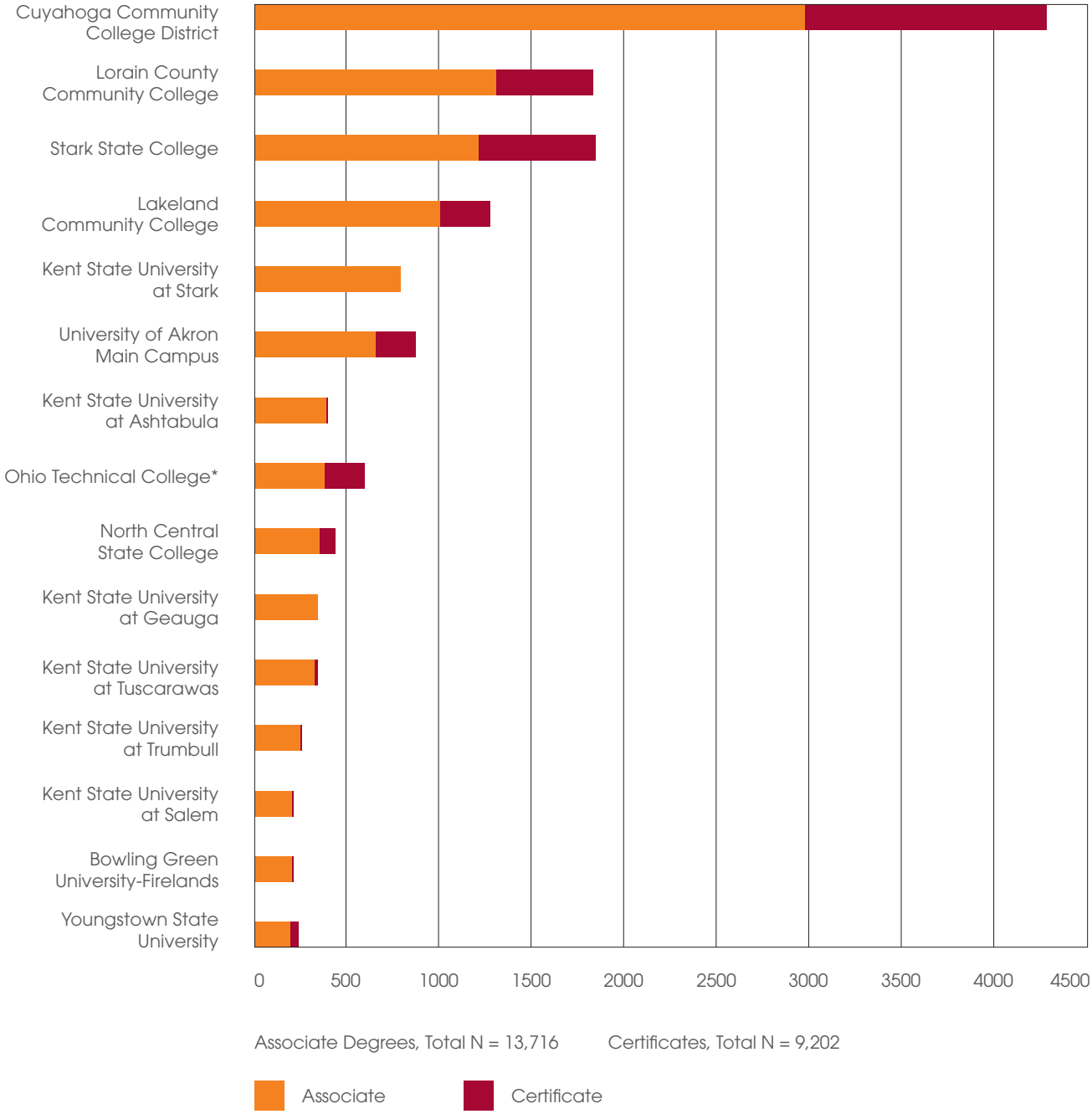
- Students at sub-baccalaureate institutions in Northeast Ohio focus on just a few program areas — liberal arts and sciences, health programs, and business and management. Over 80 percent of all associate degrees from sub-baccalaureate institutions in the region were awarded in just five program areas in 2015.

Source: Integrated Postsecondary Data System (IPEDS).

SECTION 3

TALENT SUPPLY — POSTSECONDARY LEVEL (SUB-BACCALAUREATE)

ASSOCIATE DEGREE AND CERTIFICATE PRODUCTION BY INSTITUTION (2015)

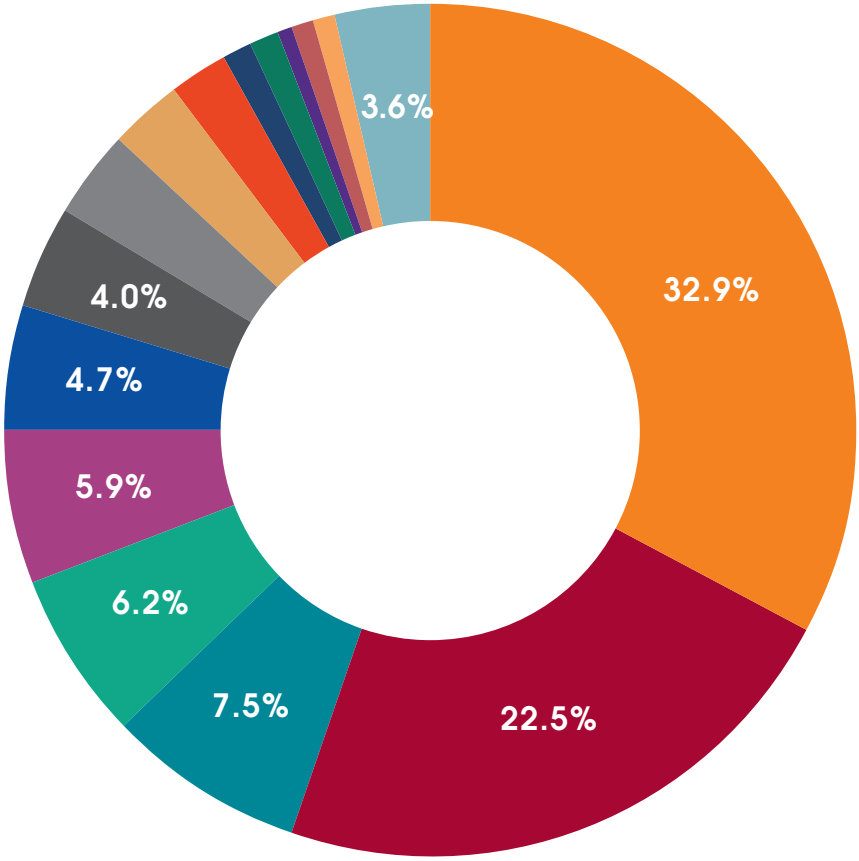


Source: IPEDS completions for 2014-2015 academic year.
*Private, for-profit.

SECTION 3

TALENT SUPPLY — POSTSECONDARY LEVEL (SUB-BACCALAUREATE)

ASSOCIATE DEGREES AND CERTIFICATES BY FIELD



Associate Degrees, Total N = 13,716 Certificates, Total N = 9,202

- Health Professions & Clinical Sciences
- Liberal Arts & Sciences
- Business, Management, & Marketing
- Personal & Culinary Services
- Engineering Technologies & Related
- Mechanic & Repair Technologies
- Security & Protective Services
- Computer & Information Sciences
- Transportation & Materials Moving
- Precision Production
- Education
- Legal Professions
- Public Administration, Social Services
- Visual & Performing Arts
- Construction Trades
- Other

Source: IPEDS completions for the 2014-2015 academic year.

SECTION 3

TALENT SUPPLY — POSTSECONDARY LEVEL (BACCALAUREATE AND GRADUATE)

Over 180,000 students are currently enrolled in area institutions that offer baccalaureate or graduate degree programs across a wide variety of fields. The following tables and charts present field-of-study and completion data for colleges and universities in Northeast Ohio. Data were drawn from the federal Integrated Postsecondary Education Data System (IPEDS). Our key observations:

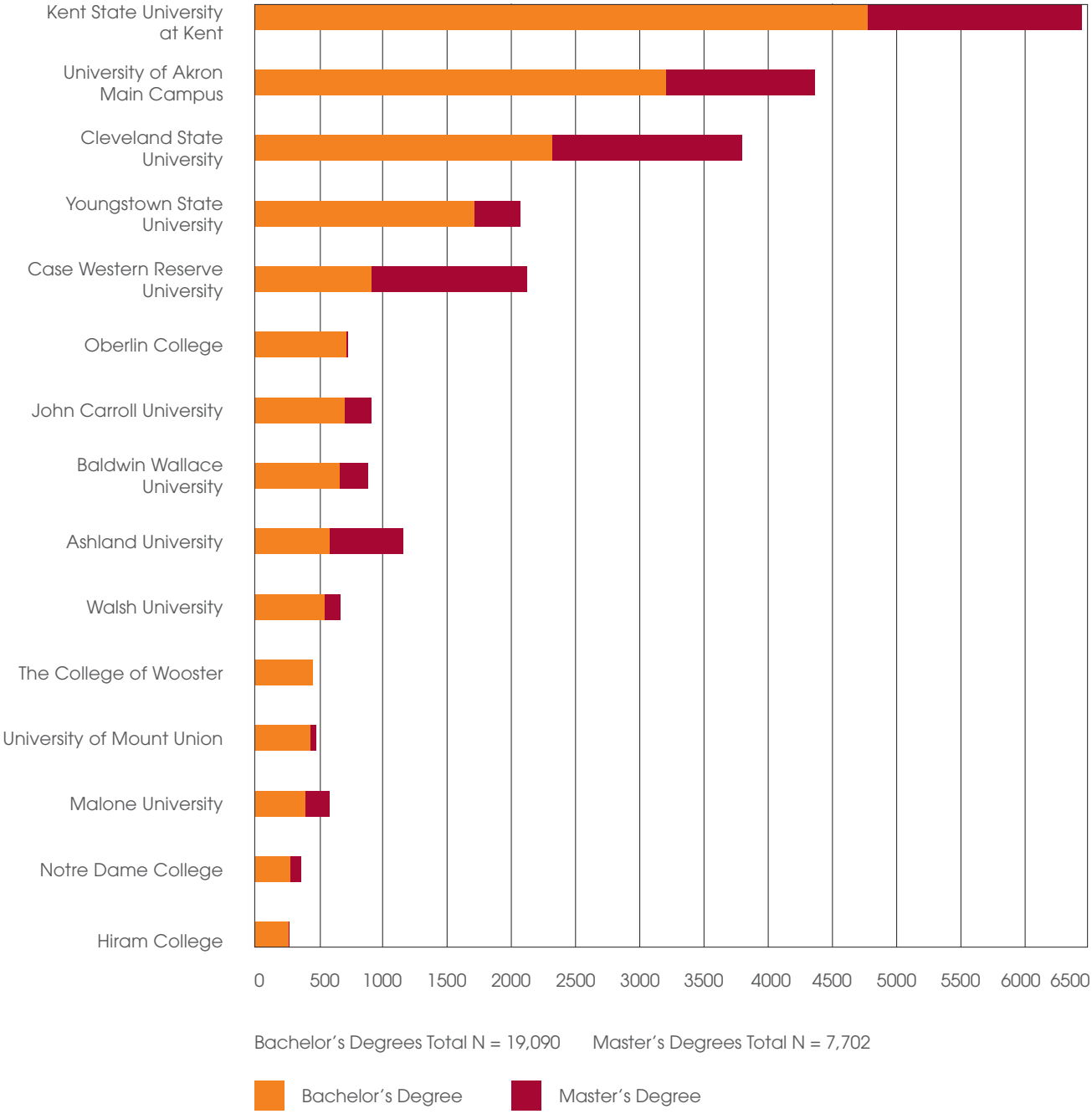
- Northeast Ohio baccalaureate and graduate degree graduates attend a diverse range of private and public institutions; however, public institutions produce the most graduates.
- Many of the more technical fields, such as Information Technology and Engineering, produce very small numbers of bachelor's and master's degrees compared to those in Health, Business, and Education.
- For the four-year institutions in Northeast Ohio, 57 percent of bachelor's and master's degree awards are in five fields: Business, Management and Marketing; Health Professions and Clinical Sciences; Education; Engineering; and Visual and Performing Arts.

Source: IPEDS completions for the 2014-2015 academic year.

SECTION 3

TALENT SUPPLY — POSTSECONDARY LEVEL (BACCALAUREATE AND GRADUATE)

BACHELOR'S AND MASTER'S DEGREE PRODUCTION BY INSTITUTION (2015)

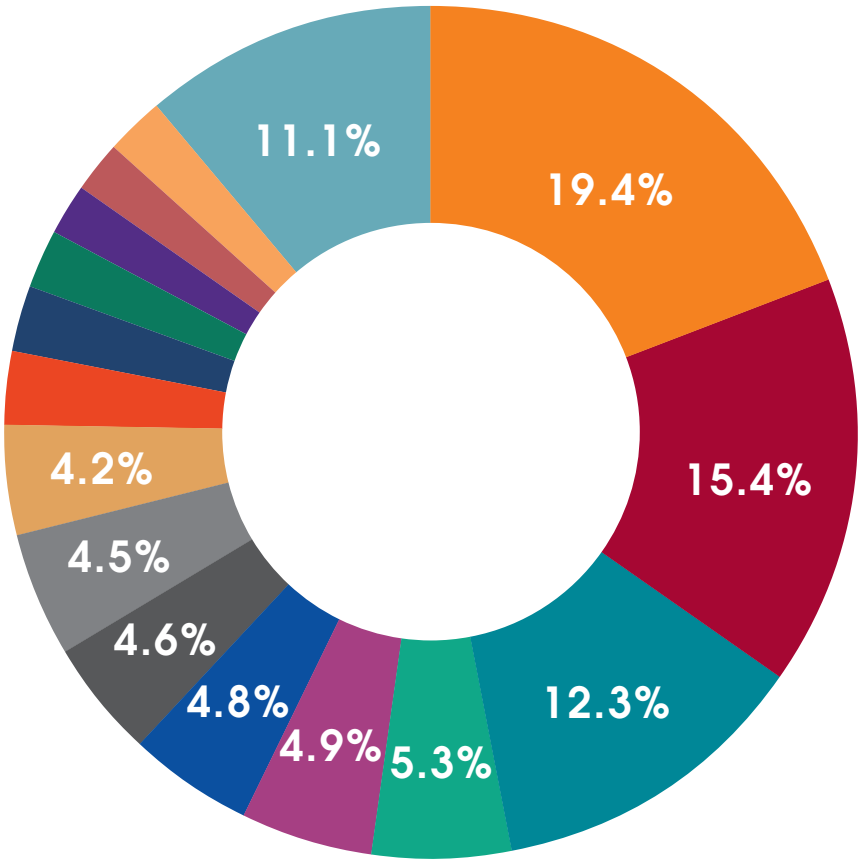


Source: Integrated Postsecondary Data System (IPEDS).

SECTION 3

TALENT SUPPLY — POSTSECONDARY LEVEL (BACCALAUREATE AND GRADUATE)

BACHELOR'S AND MASTER'S DEGREES BY FIELD



Bachelor's Degrees, Total N = 19,090 Master's Degrees, Total N = 7,702

- Business, Management & Marketing
- Health Professions & Clinical Sciences
- Education
- Engineering
- Visual & Performing Arts
- Psychology
- Biological & Biomedical Sciences
- Social Sciences
- Communication & Journalism
- Public Administration, Social Services
- Computer & Information Sciences
- English Language & Literature/Letters
- Parks, Recreation, Fitness
- Security & Protective Services
- Physical Sciences
- Other

Source: IPEDS completions for the 2014-2015 academic year.

SECTION 4

DEMAND SUPPLY ALIGNMENT

SECTION 4

DEMAND SUPPLY ALIGNMENT

Our analysis of demand-supply alignment took the data produced on demand across key occupational areas and aligned them with data on credential output from postsecondary institutions in the region. We present a "Summary Chart of Alignment" of our analysis of demand-supply alignment in this section. Major observations from this analysis of demand-supply alignment:

ALIGNMENT

- In all but three occupations areas, there is substantial misalignment between all job demand for key occupations and supply of appropriately credentialed workers. In some cases there are hundreds of job openings above what is being produced in relevant fields from area educational institutions.
- The biggest misalignment between demand and supply is for Health Diagnosing and Treating Practitioners (such as nurses and nurse practitioners). There appears to be far more employer demand for workers in this occupational field than there is supply of matching credentials.
- The annual demand for Skilled Production Workers, and Computer and IT Workers is also more than the supply of credentials produced by area educational institutions, but Supervisors of Skilled Workers appears to be aligned.
- Many occupations in healthcare are misaligned, but the demand and supply for Health Technologists and Technicians (such as pharmacy technicians and health information technicians) appear to be aligned regionally. On the other hand, there is a greater supply of credentialed Healthcare Therapist Aides and Support workers (such as physical therapist aides and athletic trainers) than there is demand from employers.
- There appears to be alignment between the demand and supply of credentialed workers for Architects and Engineering Technicians, but there is still substantial misalignment for the demand and supply of Engineers as well as Education occupations.
- Finance and business services occupations seem to be consistently misaligned, but especially Information and Record Clerks (such as customer service representatives and loan interviewers). However, this occupation has a high risk of automation.

ENTRY ALIGNMENT

- The misalignment gap closes substantially for many occupations when comparing entry demand with supply, especially for Computer and IT workers and Health Diagnosing and Treating Practitioners.
- Engineers emerge as an aligned occupation when comparing entry-level demand with supply.
- There is an oversupply of Supervisors of Skilled Workers, and Health Technologists and Technicians when looking at entry alignment.
- A substantial gap exists between the supply of Skilled Production Workers with less than five years' experience and job postings for entry-level positions.

SECTION 4

DEMAND SUPPLY ALIGNMENT

The summary chart on the next page shows a high-level picture of demand supply alignment across several key occupational areas and is a useful starting point for discussion with residents, institutions, and philanthropic and civic leaders in Northeast Ohio.

The data included in the chart come from multiple sources:

- The first area is annual demand. Demand data are for 2016, based on Team NEO's calculations of EMSI's projected job openings from the U.S. Bureau of Labor Statistics in 2016 and Burning Glass Labor Insight's 2016 real-time job postings. All demand data are for the 18-county Northeast Ohio region.

- The second area is credentials awarded from regional postsecondary institutions, which include all institutions within the region. All data on credentials are from the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics and Integrated Postsecondary Education Data System (IPEDS) for 2015.

- This report utilizes the same CTE completion data from the 2017 edition of the report. These data are from 2015.

Our demand supply model does not capture every pathway to employment — i.e., apprenticeships, temp agencies, etc. The academic pathway has been our focus. The connection to some jobs we have selected, like construction, include many non-academic pathways. This is changing, in part, because community colleges are now attempting to link apprenticeships to degrees. Additional information on construction can be found in the "Demand Study for Construction Employees" prepared by Mohr Partners Cleveland, W.E. Upjohn Institute for Employment Research, and Weber Murphy Fox for The Construction Diversity Committee, Commission on Economic Inclusion, Greater Cleveland Partnership.

SECTION 4

DEMAND SUPPLY ALIGNMENT

SUMMARY CHART OF ALIGNMENT

		DEMAND 2016	ENTRY DEMAND 2016	CREDENTIALS AWARDED 2015	ALIGNMENT	ENTRY ALIGNMENT
IT	Computer & IT Workers	12,227	6,908	5,639	(6,588)	(1,269)
MANUFACTURING & CONSTRUCTION	Metal & Plastic Workers	5,295	4,511	962	(4,333)	(3,549)
	Installation, Maintenance & Repair Occupations	5,233	3,604	1,671	(3,562)	(1,933)
	Skilled Production Workers	9,162	7,256	3,064	(6,098)	(4,192)
	Construction Trade Workers	4,324	3,770	2,177	(2,147)	(1,593)
HEALTH	Health Diagnosing & Treating Practitioners	22,388	12,801	10,124	(12,264)	(2,677)
	Health Technologists & Technicians	7,275	4,457	7,116	(159)	2,659
	Healthcare Therapist Aides & Support Workers	827	553	4,220	3,393	3,667
	Nursing, Psychiatric & Home Health Aides	5,438	4,164	1,637	(3,801)	(2,527)
LIFE SCIENCES / EDUCATION / ENGINEERING	Architects & Engineering Technicians	1,442	917	1,774	332	857
	Education	7,544	5,854	3,349	(4,195)	(2,505)
	Engineers	3,835	2,246	1,898	(1,937)	(348)
	Life Science Workers	1,897	1,282	10,154	8,257	8,872
FINANCE & BUSINESS SERVICES	Financial Clerks	6,187	4,535	1,820	(4,367)	(2,715)
	Financial Specialists	5,646	3,882	2,898	(2,748)	(984)
	Information & Record Clerks	10,088	6,891	1,848	(8,240)	(5,043)
	Secretaries & Administrative Assistants	5,748	4,738	2,141	(3,607)	(2,597)
MANAGE-MENT	Managers, Professional & Health	7,637	4,602	21,772	14,135	17,170
	Supervisors of Skilled Workers	4,105	3,148	4,921	816	1,773

There is more demand than supply of credentials

Demand and supply appear in relative balance

There is more supply of credentials than demand

SECTION 4

DEMAND SUPPLY ALIGNMENT

SUMMARY CHART OF ALIGNMENT

		DEMAND 2016		CREDENTIALS AWARDED 2015							
		DEMAND	ENTRY DEMAND	CTE	CERTI-FICATE	ASSO-CIATE	BACHE-LOR'S	GRAD-UATE	TOTAL	ALIGN-MENT	ENTRY ALIGN-MENT
IT	Computer & IT Workers	12,227	6,908	923	929	1,539	1,587	661	5,639	(6,588)	(1,269)
MANUFACTURING & CONSTRUCTION	Metal & Plastic Workers	5,295	4,511	327	587	39	9	-	962	(4,333)	(3,549)
	Installation, Maintenance & Repair Occupations	5,233	3,604	1,085	472	114	-	-	1,671	(3,562)	(1,933)
	Skilled Production Workers	9,162	7,256	145	1,679	759	301	180	3,064	(6,098)	(4,192)
	Construction Trade Workers	4,324	3,770	694	1,385	98	-	-	2,177	(2,147)	(1,593)
HEALTH	Health Diagnosing & Treating Practitioners	22,388	12,801	1,229	2,140	2,216	2,749	1,790	10,124	(12,264)	(2,677)
	Health Technologists & Technicians	7,275	4,457	51	3,877	1,776	882	530	7,116	(159)	2,659
	Healthcare Therapist Aides & Support Workers	827	553	-	1,461	1,276	1,010	473	4,220	3,393	3,667
	Nursing, Psychiatric & Home Health Aides	5,438	4,164	66	1,415	35	-	121	1,637	(3,801)	(2,527)
LIFE SCIENCES / EDUCATION / ENGINEERING	Architects & Engineering Technicians	1,442	917	-	642	736	292	104	1,774	332	857
	Education	7,544	5,854	601	55	163	1,608	922	3,349	(4,195)	(2,505)
	Engineers	3,835	2,246	339	33	55	903	568	1,898	(1,937)	(348)
	Life Science Workers	1,897	1,282	816	836	1,261	5,594	1,647	10,154	8,257	8,872
FINANCE & BUSINESS SERVICES	Financial Clerks	6,187	4,535	-	146	312	1,023	339	1,820	(4,367)	(2,715)
	Financial Specialists	5,646	3,882	-	225	354	1,916	403	2,898	(2,748)	(984)
	Information & Record Clerks	10,088	6,891	-	146	324	1,023	355	1,848	(8,240)	(5,043)
	Secretaries & Administrative Assistants	5,748	4,738	793	630	567	106	45	2,141	(3,607)	(2,597)
MAANGE-MENT	Managers, Professional & Health	7,637	4,602	-	2,399	4,429	10,053	4,891	21,772	14,135	17,170
	Supervisors of Skilled Workers	4,105	3,148	-	1,111	1,332	1,192	1,286	4,921	816	1,773

There is more demand than supply of credentials

Demand and supply appear in relative balance

There is more supply of credentials than demand

SECTION 5

INDUSTRY DEEP DIVE

SECTION 5

INDUSTRY DEEP DIVE

As part of the analysis, we took a deep dive into a few occupations in key industry groups to research top requested skills and their growth rate, risk of automation, wage and projected job growth information. We have focused on three key industry groups and the occupation groups that comprise these industries:

- Computer and IT
- Healthcare
- Manufacturing

Each of these analyses consists of a broad overview, a "numbers at a glance" section, and a data breakdown of key occupations with the greatest demand in each occupation group.

Data from this section is sourced from Burning Glass Labor Insight/Jobs, EMSI 2018, and Team Northeast Ohio calculations utilizing FutureWorks methodology. Detailed definitions of all variables can be found in Section 2, Job Demand, on page 14.

Note: Risk of automation is a Burning Glass variable describing the probability of computerization for an occupation within the next 20 years. It is based on the seminal Oxford University study on automation. High risk of automation is the top quartiles of scores. Medium risk of automation is the third quartile of scores. Low risk is the bottom two quartile of scores.

SECTION 5

COMPUTER AND IT WORKERS — OVERVIEW

Computer and IT workers span sectors and fulfill critical roles in many of the employment and wealth-generating economic sectors (biosciences and healthcare, advanced manufacturing, information technology, and financial, business services and back-office support).

Workers in this occupation provide technical assistance to computer users; analyze data-processing problems to implement and improve computer systems or develop IT solutions; create, modify and test the code, forms and script that allow computer applications to run; monitor and ensure network security; and perform maintenance to support network availability.

Automation risk for Computer and IT workers is very low. Occupations in this sector provide a wage that is above the Family-Sustaining Wage for a family of four (two adults and two children) with only one working adult. By 2021, the Computer and IT sector's share of total jobs will be in the top third of total jobs in all Northeast Ohio. From 2016-2021, Computer and IT jobs are projected to have high growth.

KNOWLEDGE NEEDED

- Engineering and Technology: computers and electronics
- Math and Science: arithmetic, algebra, geometry, calculus or statistics
- Product and Service Development

SECTION 5

COMPUTER AND IT WORKERS — OVERVIEW

TOP 5 REQUESTED SPECIALIZED SKILLS

SKILL	GROWTH RATE*
SQL	Faster
Project Management	Much Faster
Software Development	Similar
Oracle	Similar
Microsoft C#	Similar

TOP 5 SOFTWARE AND PROGRAMMING SKILLS

SKILL	GROWTH RATE*
SQL	Faster
Oracle	Similar
Microsoft C#	Similar
JAVA	Similar
Microsoft Office	Similar

TOP 5 BASELINE SKILLS

Communication, Troubleshooting, Writing, Problem Solving, Planning

TOP 5 REQUESTED CERTIFICATES

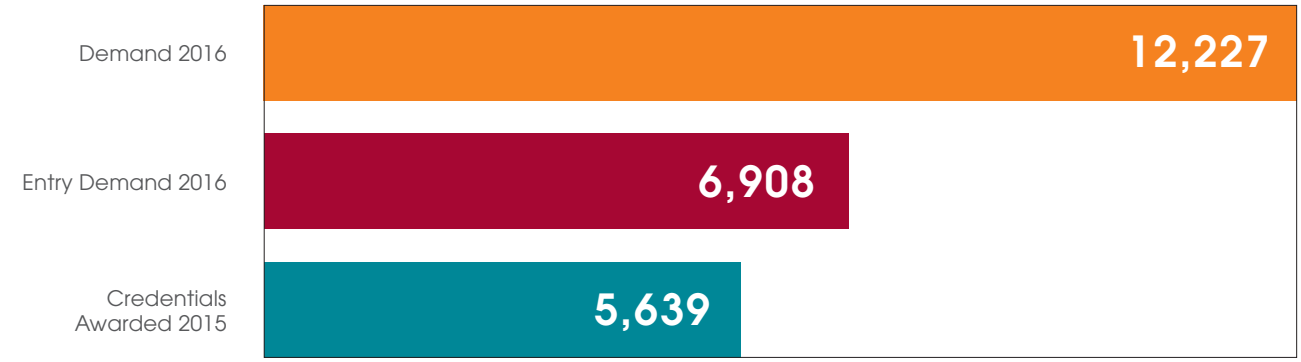
Project Management Certification (PMP), Certified Information Systems Security Professional (CISSP), Cisco Certified Network Associate, Cisco Certified Network Professional (CCNP), Certified Information Systems Auditor (CISA)

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Growth relative to other skills in the same skill cluster.

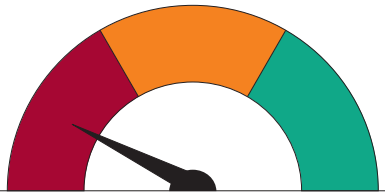
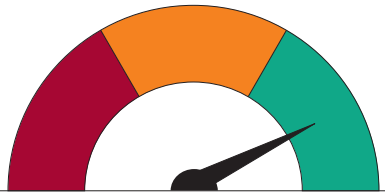
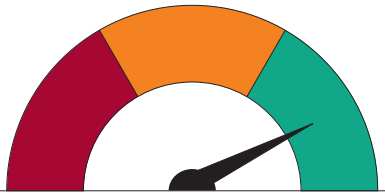
SECTION 5

COMPUTER AND IT WORKERS — NUMBERS AT A GLANCE

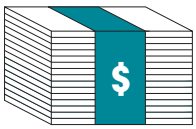
DEMAND & SUPPLY



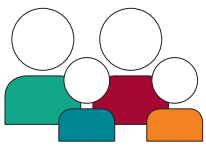
INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
LOW	TOP	HIGH

INDUSTRY WAGES



MEDIAN ANNUAL SALARY
$68,349



FAMILY-SUSTAINING WAGE*
ABOVE

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

COMPUTER AND IT OCCUPATIONS — DATA BREAKDOWN

KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTOMATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Software Developers, Applications	3,357	1,896	Low	$84,743	Above	Middle	High	28%	28%
Computer Occupations, All Other	2,889	1,343	Low	$70,194	Above	Bottom	High	27%	24%
Computer User Support Specialists	1,219	832	Low	$42,421	Below	Middle	High	9%	10%
Computer Systems Analysts	1,114	736	Low	$77,090	Above	Middle	High	8%	9%
Network and Computer Systems Administrators	745	472	Low	$71,260	Above	Bottom	High	6%	6%
Web Developers	627	345	Low	$55,743	Above	Bottom	High	5%	6%
Database Administrators	567	318	Low	$67,370	Above	Bottom	High	5%	5%
Computer Network Architects	510	230	Low	$89,637	Above	Bottom	High	4%	3%
Information Security Analysts	439	245	Low	$81,982	Above	Bottom	High	4%	4%
Computer Programmers	358	192	Low	$68,385	Above	Bottom	Low	3%	2%

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

HEALTHCARE — OVERVIEW

Healthcare is one of the strongest sectors in Northeast Ohio's economy, and it employs individuals with a diverse level of education and certification. This deep dive focuses on Health Diagnosing and Treating Practitioners, Health Technologists and Technicians, Healthcare Therapist Aides and Support Workers, and Nursing, Psychiatric and Home Health Aides.

Workers in the healthcare industry diagnose and treat acute, episodic or chronic illness, independently or as part of a healthcare team; order, perform or interpret the results of diagnostic tests; prescribe medication; assist patients and work closely with other healthcare professionals. The industry is highly regulated, which sets up established educational pathways and credentials needed.

KNOWLEDGE NEEDED

- Health: medicine, therapy and counseling
- Math and Science: psychology and biology
- Business: customer service

SECTION 5

HEALTHCARE — OVERVIEW

TOP 5 REQUESTED SPECIALIZED SKILLS

SKILL	GROWTH RATE*
Patient Care	N/A
Treatment Planning	Similar
Advanced Cardiac Life Support (ACLS)	Similar
Cardiopulmonary Resuscitation (CPR)	Similar
Supervisory Skills	Similar

TOP 5 SOFTWARE AND PROGRAMMING SKILLS

SKILL	GROWTH RATE*
Microsoft Office	N/A
Microsoft Excel	N/A
Microsoft Word	N/A
ICD-9-CM Coding	Much Slower
Word Processing	N/A

TOP 5 BASELINE SKILLS

Communication Skills, Physical Demand, Team Work/Collaboration, Critical Thinking, Organizational Skills

TOP 5 REQUESTED CERTIFICATES

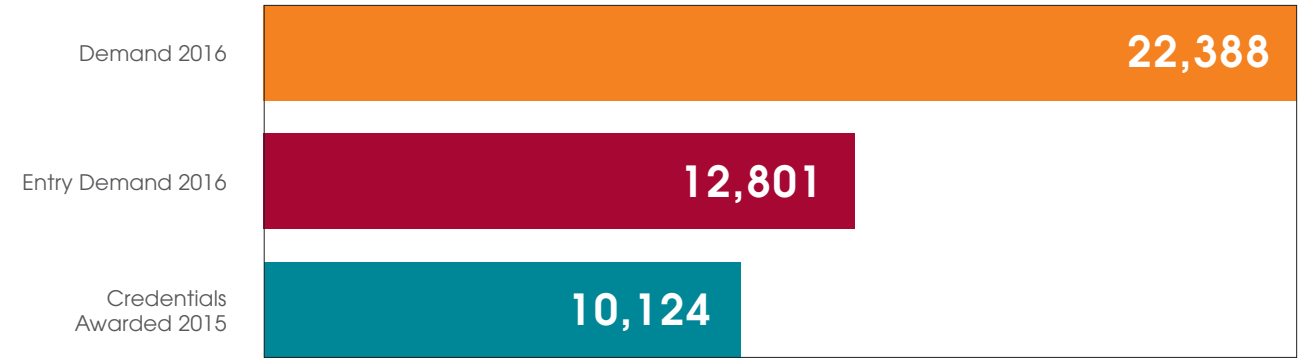
Registered Nurse, Advanced Cardiac Life Support (ACLS), First Aid CPR AED, Nursing Specialty, Critical Care Registered Nurse

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Growth relative to other skills in the same skill cluster.

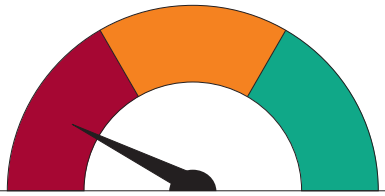
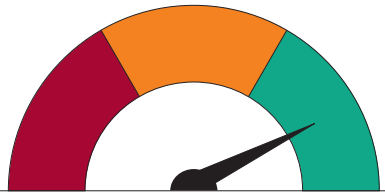
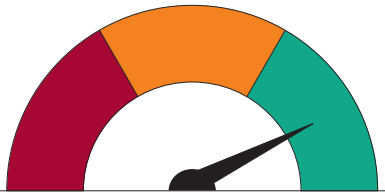
SECTION 5

HEALTH DIAGNOSING & TREATING PRACTITIONERS — NUMBERS AT A GLANCE

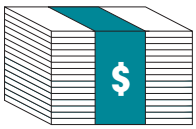
DEMAND & SUPPLY



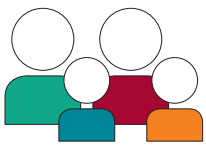
INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
LOW	TOP	HIGH

INDUSTRY WAGES



MEDIAN ANNUAL SALARY
$69,160



FAMILY-SUSTAINING WAGE*
ABOVE

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

HEALTH DIAGNOSING & TREATING PRACTITIONERS — DATA BREAKDOWN

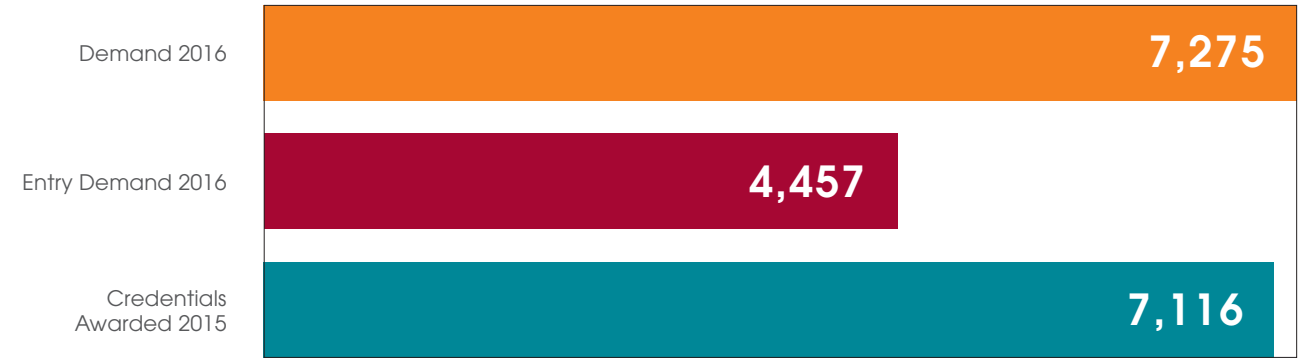
KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTOMATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Registered Nurses	13,445	10,303	Low	$64,821	Above	Top	High	60%	85%
Physicians and Surgeons, All Other	1,987	267	Low	$202,765	Above	Middle	High	9%	1%
Nurse Practitioners	1,110	527	Low	$97,532	Above	Bottom	High	5%	4%
Physical Therapists	807	251	Low	$86,720	Above	Bottom	High	4%	2%
Internists, General	770	64	Low	$165,433	Above	Bottom	Low	4%	1%
Occupational Therapists	534	170	Low	$83,701	Above	Bottom	High	2%	1%
Pharmacists	507	261	Low	$121,709	Above	Bottom	Low	2%	1%
Physician Assistants	504	156	Low	$104,129	Above	Bottom	High	2%	1%
Family and General Practitioners	468	68	Low	$186,841	Above	Bottom	Low	2%	<1%
Speech-Language Pathologists	415	123	Low	$73,874	Above	Bottom	High	2%	1%

*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.
Note: Key occupations listed are selected to show those 6-digit occupations within the group with the greatest demand and do not include all occupations within the group.

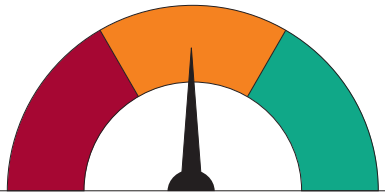
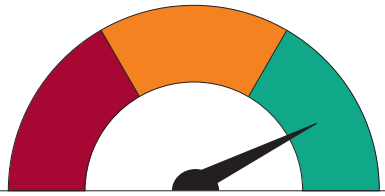
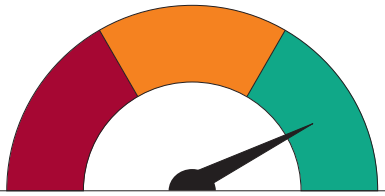
SECTION 5

HEALTH TECHNOLOGISTS & TECHNICIANS — NUMBERS AT A GLANCE

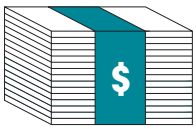
DEMAND & SUPPLY



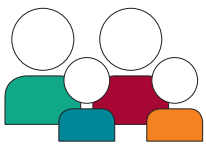
INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
MEDIUM	TOP	HIGH

INDUSTRY WAGES



MEDIAN ANNUAL SALARY
$41,454



FAMILY-SUSTAINING WAGE*
BELOW

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

HEALTH TECHNOLOGISTS & TECHNICIANS — DATA BREAKDOWN

KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTOMATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Licensed Practical and Licensed Vocational Nurses	2,067	1,420	Low	$41,253	Below	Middle	Moderate	28%	34%
Medical Records and Health Information Technicians	819	503	High	$35,301	Below	Bottom	High	14%	17%
Medical and Clinical Laboratory Technicians	816	377	Low	$43,923	Meets	Bottom	High	14%	12%
Pharmacy Technicians	754	432	High	$28,150	Below	Middle	Moderate	9%	7%
Emergency Medical Technicians and Paramedics	709	311	Low	$29,222	Below	Bottom	Moderate	10%	5%
Medical and Clinical Laboratory Technologists	371	225	High	$60,077	Above	Bottom	High	5%	4%
Health Technologists and Technicians, All Other	342	206	Low	$39,460	Below	Bottom	High	5%	6%
Radiologic Technologists	261	199	Low	$53,866	Above	Bottom	Moderate	3%	4%
Surgical Technologists	225	131	Low	$41,152	Below	Bottom	High	3%	2%
Cardiovascular Technologists and Technicians	177	132	Low	$56,245	Above	Bottom	High	3%	4%

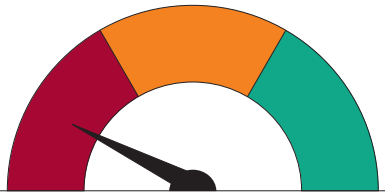
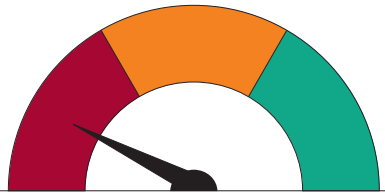
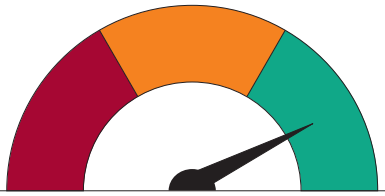
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.
Note: Key occupations listed are selected to show those 6-digit occupations within the group with the greatest demand and do not include all occupations within the group.

SECTION 5

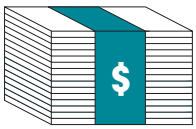
HEALTH THERAPIST AIDES & SUPPORT WORKERS — NUMBERS AT A GLANCE

DEMAND & SUPPLY

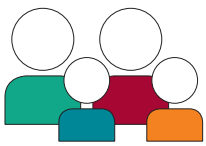
INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
LOW	BOTTOM	HIGH

INDUSTRY WAGES



MEDIAN ANNUAL SALARY
$56,534



FAMILY-SUSTAINING WAGE*
ABOVE

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

HEALTH THERAPIST AIDES & SUPPORT WORKERS — DATA BREAKDOWN

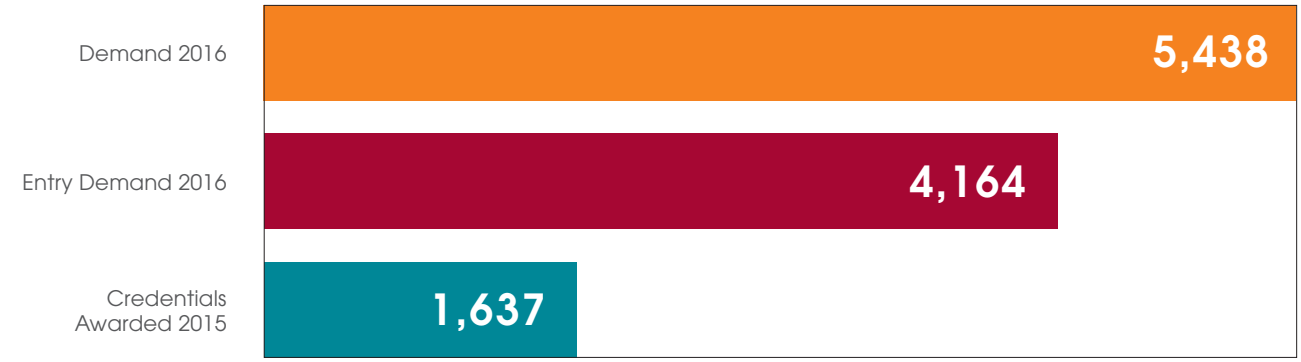
KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTOMATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Physical Therapist Assistants	302	206	Low	$57,674	Above	Bottom	High	29%	21%
Occupational Therapy Assistants	234	156	Low	$57,728	Above	Bottom	High	29%	30%
Occupational Health and Safety Specialists	158	101	Low	$69,828	Above	Bottom	Moderate	26%	34%
Occupational Therapy Aides	33	7	Low	$30,094	Below	Bottom	High	6%	2%
Athletic Trainers	31	22	Low	$44,783	Meets	Bottom	High	4%	5%
Physical Therapist Aides	29	26	Medium	$26,182	Below	Bottom	High	1%	<1%
Occupational Health and Safety Technicians	22	17	Low	$49,420	Meets	Bottom	Moderate	3%	5%
Healthcare Practitioners and Technical Workers, All Other	14	13	Low	$38,072	Below	Bottom	High	1%	2%
Genetic Counselors	5	4	Low	$65,363	Above	Bottom	High	1%	2%

*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.
Note: Key occupations listed are selected to show those 6-digit occupations within the group with the greatest demand and do not include all occupations within the group.

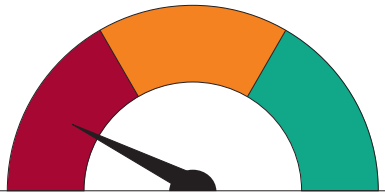
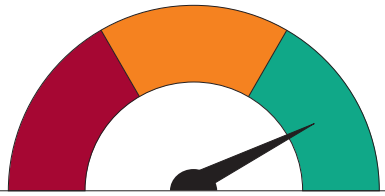
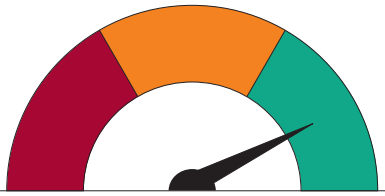
SECTION 5

NURSING, PSYCHIATRIC & HOME HEALTH AIDES — NUMBERS AT A GLANCE

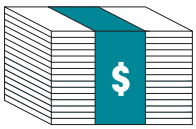
DEMAND & SUPPLY



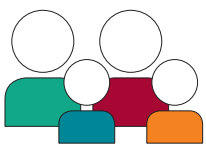
INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
LOW	TOP	HIGH

INDUSTRY WAGES



MEDIAN ANNUAL SALARY
$22,485



FAMILY-SUSTAINING WAGE*
BELOW

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

NURSING, PSYCHIATRIC & HOME HEALTH AIDES — DATA BREAKDOWN

KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTOMATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Nursing Assistants	2,914	2,093	Low	$24,761	Below	Top	High	67%	70%
Home Health Aides	2,317	1,949	Low	$20,655	Below	Top	High	28%	27%
Orderlies	172	88	Low	$24,561	Below	Bottom	High	5%	2%
Psychiatric Aides	36	34	Low	$29,427	Below	Bottom	High	<1%	<1%

*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.
Note: Key occupations listed are selected to show those 6-digit occupations within the group with the greatest demand and do not include all occupations within the group.

SECTION 5

MANUFACTURING — OVERVIEW

Manufacturing in Northeast Ohio has been rebounding since the Great Recession of 2007, nearly matching pre-recession output levels, and outpacing the nation in productivity gains. The Manufacturing deep dive will focus on occupations within the following groups: Installation, Maintenance and Repair Occupations; Metal and Plastic Workers; Skilled Production Workers; and Supervisors of Skilled Workers.

Workers in these occupations fix and maintain machines, mechanical equipment, and buildings; set up and operate a variety of machine tools to produce precision parts and instruments; lay out, machine, fit, and assemble castings and parts to metal or plastic foundry patterns, core boxes or match plates; develop programs to control machining or processing of metal or plastic; use hand-held equipment to join or cut metal or plastic components; accomplish staff job results; and interact with customers. There is good career mobility within the industry with entry points that require a postsecondary credential less than a bachelor's degree.

KNOWLEDGE NEEDED

- Engineering and Technology: mechanical, design
- Math and Science: arithmetic, algebra, geometry, calculus, or statistics, physics
- Manufactured Goods: manufacture and distribution of products
- Business: customer service, employee management

SECTION 5

MANUFACTURING — OVERVIEW

TOP 5 REQUESTED SPECIALIZED SKILLS

SKILL	GROWTH RATE*
Repair	N/A
Inspection	N/A
Supervisory Skills	Similar
Scheduling	N/A
Machinery	Similar

TOP 5 SOFTWARE AND PROGRAMMING SKILLS

SKILL	GROWTH RATE*
Microsoft Office	N/A
Microsoft Excel	N/A
Microsoft Word	N/A
Microsoft PowerPoint	N/A
SAP	Faster

TOP 5 BASELINE SKILLS

Communication Skills, Troubleshooting, Physical Demand, Preventive Maintenance, Computer Skills

TOP 5 REQUESTED CERTIFICATES

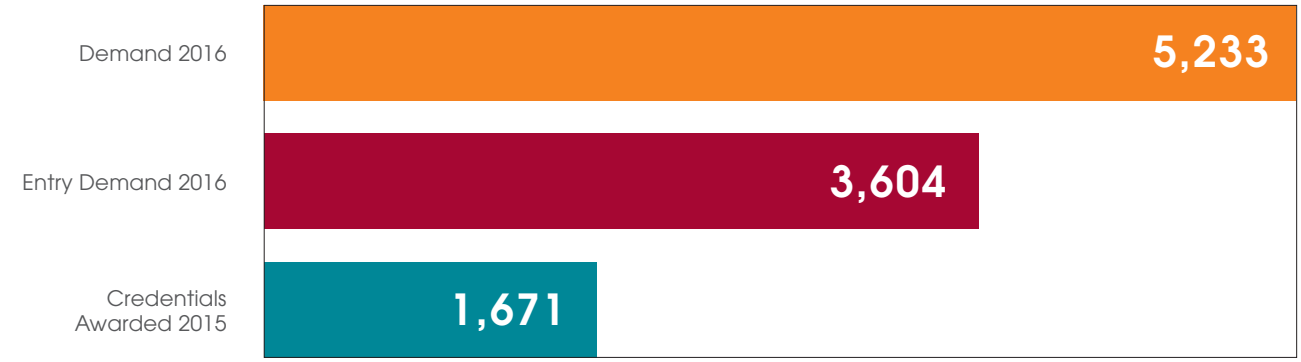
Commercial Driver's License, HVAC Technician Certification (E.G. EPA 608), Refrigeration Technician Certification (E.G. CFC Type 2), Forklift Operator Certification, Automotive Service Excellence (ASE) Certification

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Growth relative to other skills in the same skill cluster.

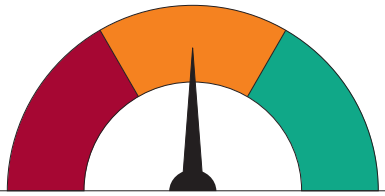
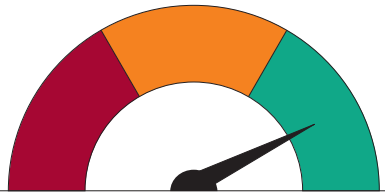
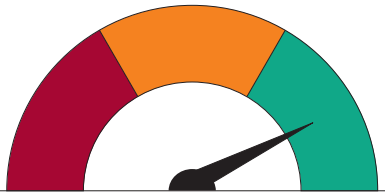
SECTION 5

INSTALLATION, MAINTENANCE & REPAIR OPERATIONS — NUMBERS AT A GLANCE

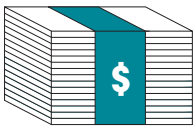
DEMAND & SUPPLY



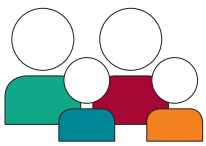
INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
MEDIUM	TOP	HIGH

INDUSTRY WAGES



MEDIAN ANNUAL SALARY
$40,768



FAMILY-SUSTAINING WAGE*
BELOW

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

INSTALLATION, MAINTENANCE & REPAIR OPERATIONS — DATA BREAKDOWN

KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTO-MATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Maintenance and Repair Workers, General	3,240	2,057	Medium	$38,271	Below	Middle	Moderate	73%	74%
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	478	339	Medium	$45,897	Meets	Bottom	High	9%	10%
Industrial Machinery Mechanics	439	366	Medium	$45,261	Meets	Middle	High	4%	3%
Installation, Maintenance, and Repair Workers, All Other	143	127	Medium	$37,351	Below	Bottom	Moderate	2%	2%
Electrical Power-Line Installers and Repairers	135	85	Low	$69,827	Above	Bottom	High	2%	<1%
Helpers—Installation, Maintenance, and Repair Workers	134	91	Medium	$30,347	Below	Bottom	High	3%	3%
Coin, Vending, and Amusement Machine Servicers and Repairers	125	112	High	$30,858	Below	Bottom	Low	<1%	<1%
Telecommunications Line Installers and Repairers	87	63	Low	$44,400	Meets	Bottom	Low	1%	1%
Millwrights	80	70	Medium	$65,897	Above	Bottom	Moderate	1%	2%
Maintenance Workers, Machinery	78	54	High	$42,048	Below	Bottom	High	1%	<1%

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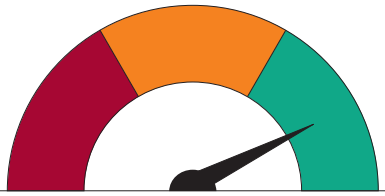
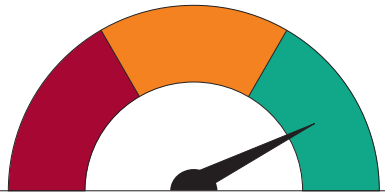
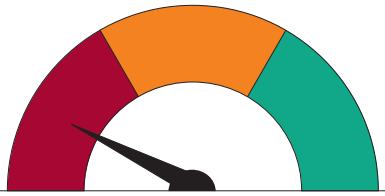
SECTION 5

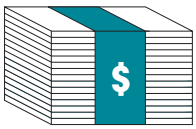
METAL & PLASTIC WORKERS — NUMBERS AT A GLANCE

DEMAND & SUPPLY

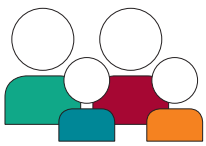
INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
HIGH	TOP	LOW

INDUSTRY WAGES



MEDIAN ANNUAL SALARY
$36,192



FAMILY-SUSTAINING WAGE*
BELOW

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
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SECTION 5

METAL & PLASTIC WORKERS — DATA BREAKDOWN

KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTO-MATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Machinists	945	779	Medium	$38,615	Below	Middle	Moderate	24%	29%
Welders, Cutters, Solderers, and Brazers	697	542	High	$37,258	Below	Middle	Low	20%	20%
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	644	546	Medium	$31,993	Below	Middle	Low	11%	9%
Computer-Controlled Machine Tool Operators, Metal and Plastic	544	450	High	$38,503	Below	Middle	High	12%	13%
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	439	407	High	$29,827	Below	Middle	Low	3%	1%
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	326	323	High	$34,163	Below	Bottom	Low	<1%	<1%
Tool and Die Makers	309	249	Medium	$52,262	Meets	Bottom	Low	8%	9%
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	248	215	High	$33,429	Below	Bottom	Low	4%	3%
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	247	228	High	$32,592	Below	Bottom	Low	3%	4%
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	157	98	Low	$45,579	Meets	Bottom	High	7%	6%

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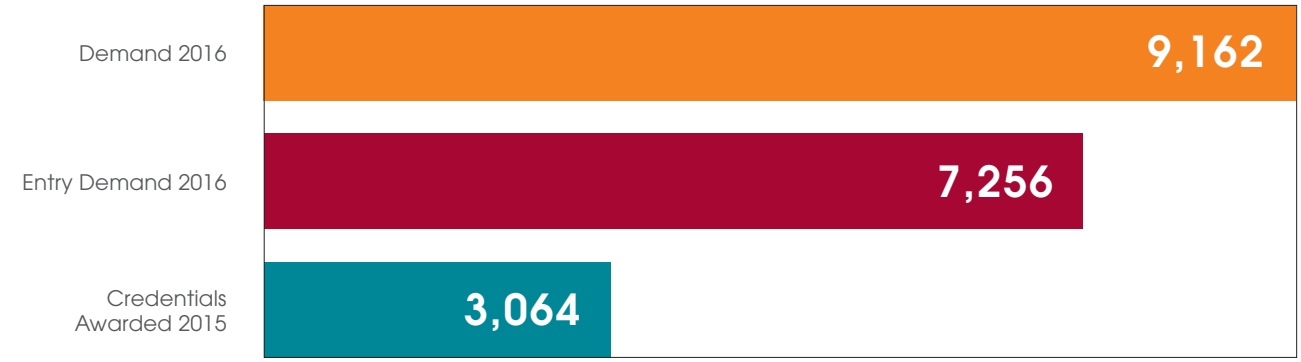
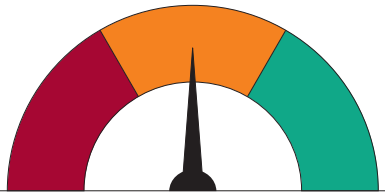
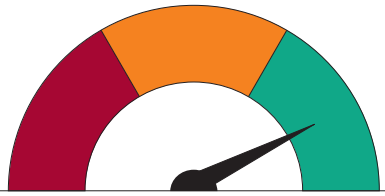
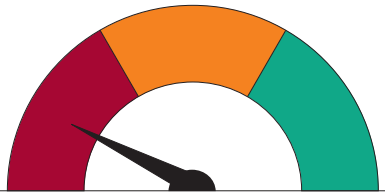
SECTION 5

SKILLED PRODUCTION WORKERS — NUMBERS AT A GLANCE

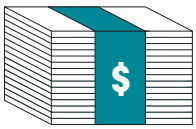
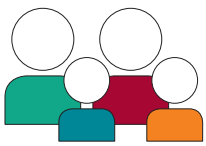
DEMAND & SUPPLY



INDUSTRY PROJECTIONS

RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
MEDIUM	TOP	LOW

INDUSTRY WAGES

MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*
 $32,240	 BELOW

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

SKILLED PRODUCTION WORKERS — DATA BREAKDOWN

KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTO-MATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
Production Workers, All Other	1,326	701	High	$25,064	Below	Middle	Low	30%	24%
Team Assemblers	1,239	1,049	High	$28,207	Below	Middle	Moderate	9%	8%
Inspectors, Testers, Sorters, Samplers, and Weighers	1,212	954	High	$37,139	Below	Middle	Low	16%	20%
Assemblers and Fabricators, All Other	653	641	High	$27,001	Below	Middle	Low	1%	<1%
Helpers—Production Workers	643	539	Medium	$26,901	Below	Middle	Low	6%	6%
Packaging and Filling Machine Operators and Tenders	388	358	High	$26,163	Below	Middle	High	2%	2%
Electrical and Electronic Equipment Assemblers	383	299	High	$29,518	Below	Bottom	High	5%	5%
Telecommunications Equipment Installers and Repairers, Except Line Installers	318	241	Low	$52,610	Meets	Bottom	Low	4%	3%
Mixing and Blending Machine Setters, Operators, and Tenders	241	227	Medium	$33,419	Below	Bottom	Low	1%	1%
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	208	195	High	$28,599	Below	Bottom	Low	1%	1%

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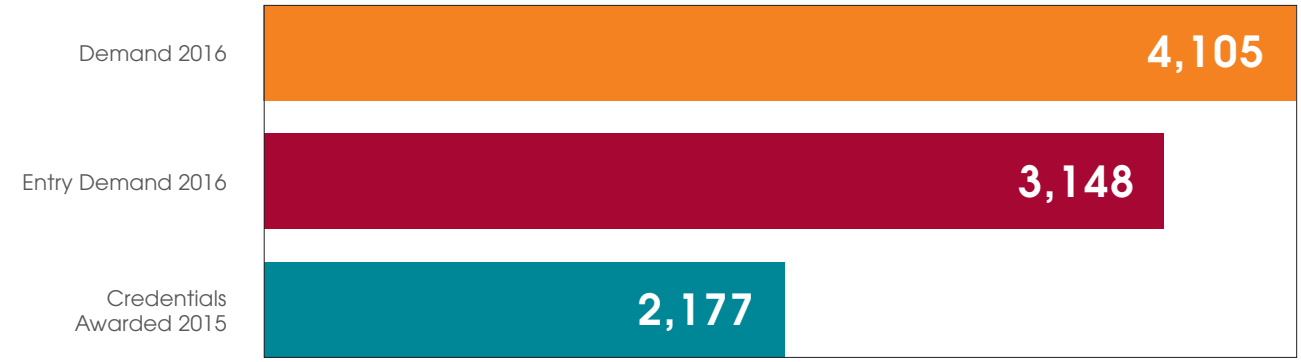
Note: Key occupations listed are selected to show those 6-digit occupations within the group with the greatest demand and do not include all occupations within the group.

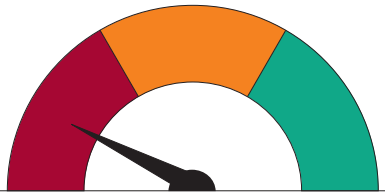
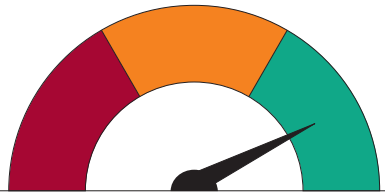
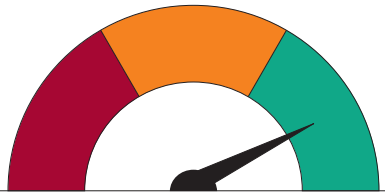
SECTION 5

SUPERVISOR OF SKILLED WORKERS — NUMBERS AT A GLANCE

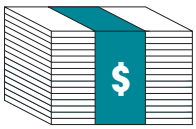
DEMAND & SUPPLY



INDUSTRY PROJECTIONS

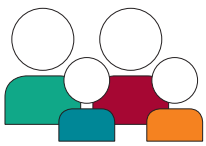
RISK OF AUTOMATION	TOTAL JOBS 2021 BY THIRDS	PROJECTED JOB GROWTH 2016-2021
		
LOW	TOP	HIGH

INDUSTRY WAGES



MEDIAN ANNUAL SALARY

$55,557



FAMILY-SUSTAINING WAGE*

ABOVE

Source: Burning Glass Labor Insights/Jobs, EMSI 2018, Team Northeast Ohio Calculations.
*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.

SECTION 5

SKILLED PRODUCTION WORKERS — DATA BREAKDOWN

KEY OCCUPATIONS (6-DIGIT SOC)	DEMAND 2016	ENTRY DEMAND 2016	RISK OF AUTO-MATION	MEDIAN ANNUAL SALARY	FAMILY-SUSTAINING WAGE*	TOTAL 2021 JOBS BY THIRDS	PROJECTED JOB GROWTH 2016-2021	PERCENT OF ALL JOB POSTINGS	PERCENT OF ENTRY LEVEL JOB POSTINGS
First-Line Supervisors of Office and Administrative Support Workers	1,720	1,308	Low	$51,435	Meets	Middle	Moderate	43%	43%
First-Line Supervisors of Production and Operating Workers	1,276	993	Low	$56,170	Above	Middle	Low	30%	30%
First-Line Supervisors of Mechanics, Installers, and Repairers	769	540	Low	$61,849	Above	Middle	Moderate	24%	25%
First-Line Supervisors of Construction Trades and Extraction Workers	341	307	Low	$61,400	Above	Middle	High	3%	2%

*Family-Sustaining Wage is based on a wage calculation of a family of four (two adults and two children) with only one working adult.
Note: Key occupations listed are selected to show those 6-digit occupations within the group with the greatest demand and do not include all occupations within the group.

SECTION 6

IMPLICATIONS

SECTION 6

IMPLICATIONS

The purpose of our research and analysis is to inform and help accelerate talent development policy in the region. That policy should provide skilled talent critical to growing key wealth-generating sectors in the economy and, at the same time, provide opportunities for good careers and incomes for the residents in Northeast Ohio.

Our research and analysis lead to many high-level implications for talent development policy in the region:

- There is significant demand in some sectors of the economy in Northeast Ohio that present opportunity for residents. Channels need to be opened into these opportunities, especially those with family-sustaining wages.

- Overall, residents of Northeast Ohio need better awareness of quality career education and training that will help them fill these jobs.

- Given the high levels of regional integration in Northeast Ohio, with people commuting across county lines for jobs, it is clear that a shared strategy is important. At the same time, local context and expertise will be vital for making changes.

- Employers need assistance finding better ways to access the talent they need. Capturing the latent talent pool in the regional labor force will help grow the economy.

- Younger students, secondary and postsecondary students, and adults should have better and more accurate information about the possible choices to enter professional and technical fields of study within the region.

- The region should understand why so few students complete technical programs (at the secondary and postsecondary levels), and then shore up and improve the education pipeline to increase the flow of local talent into regional employment.

- The current low levels of output in some programs offer an opportunity to reshape the delivery and organization of technical education in the region; this could be through rapid adoption of innovative models and practices, such as developing exemplar schools for Career and Technical Education focused on key economic sectors or adopting innovations such as work-based learning and deep, sustained employer engagement across the system.

SECTION 5

IMPLICATIONS

- Education at the secondary and postsecondary level needs to increase the output of students with credentials in high-demand sectors with family-sustaining wages. In particular, local districts and postsecondary institutions need to define ways to improve and offer programs in technical fields of study that attract students and get them to complete their degrees.

- Deeper employer engagement in postsecondary education is critical to improving the quality and relevancy of educational programs.

- The sharp misalignment between demand and supply in some fields is an indicator that educational institutions — at both the leadership and faculty levels — may not have full information to understand nearby and future opportunities.

- Educators and civic leadership could use better labor market information to drive programming investments in and identify employer partnerships with educational institutions.

- The workforce development system can benefit from understanding automation potential of occupations moving forward as well as the soft skills that are in demand.

- Higher education, government and industry, need to develop flexible, cost-effective educational programs that are academically accredited and developed in conjunction with industry best practices.

SECTION 7

APPENDIX

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FutureWorks developed a weighted "Core Demand Index" to identify key professional and technical occupational groups tied to these five wealth clusters.

CORE DEMAND INDEX

There are 96 occupational groups that categorize all workers and professionals in the economy.	
Within this universe, we use a "core demand index" to identify 46 professional and technical occupations tied to growing wealth clusters in the regional economy. These occupations also show substantial demand, offer family-sustaining wages and hold promise for future employment and income for city residents. Almost all of these occupations require some type of professional and technical training or postsecondary credential.	
We combine some related key occupations, select those that are more closely aligned to core functions in the wealth clusters, and select those most relevant to professional and technical training and education to arrive at 19 wealth-creating occupations to be part of our analysis of demand supply alignment.	

SECTION 7

APPENDIX

NORTHEAST OHIO POSTSECONDARY INSITUTIONS

Akron School of Practical Nursing

Allegheny Wesleyan College

Allstate Hairstyling & Barber College

American National University-Canton

American National University-Stow

American National University-Willoughby Hills

American National University-Youngstown

Ashland County-West Holmes Career Center

Ashland University

Ashtabula County Technical and Career Campus

ATS Institute of Technology

Auburn Career Center

Aultman College of Nursing and Health Sciences

Baldwin Wallace University

Bowling Green State University-Firelands

Brown Aveda Institute-Mentor

Brown Aveda Institute-Rocky River

Brown Mackie College-Akron

Brown Mackie College-North Canton

Bryant & Stratton College-Akron

Bryant & Stratton College-Cleveland

Bryant & Stratton College-Eastlake

Bryant & Stratton College-Parma

Buckeye Joint Vocational School

Canton City Schools Adult Career and Technical Education

Casal Aveda Institute

Case Western Reserve University

Central School of Practical Nursing

Choffin Career and Technical Center

Cleveland Clinic Health System-School of Diagnostic Imaging

Cleveland Institute of Art

Cleveland Institute of Dental-Medical Assistants-Cleveland

Cleveland Institute of Dental-Medical Assistants-Lyndhurst

Cleveland Institute of Dental-Medical Assistants-Mentor

Cleveland Institute of Music

Cleveland State University

Columbiana County Career and Technical Center

Community Services Division-Alliance City

Community Technology Learning Center of Portage

Cuyahoga Community College District

Cuyahoga Valley Career Center

EHOVE Career Center

Elite School of Cosmetology

ETI Technical College

Fairview Beauty Academy

Firelands Regional Medical Center School of Nursing

Fortis College-Cuyahoga Falls

Fortis College-Ravenna

Gerber Akron Beauty School

Hamrick School

Hannah E. Mullins School of Practical Nursing

Harmony Path School of Massage Therapy

Heritage College-Cleveland

Herzing University-Akron

Hiram College

Inner State Beauty School

International Culinary Arts and Sciences Institute

ITT Technical Institute-Akron

ITT Technical Institute-Strongsville

ITT Technical Institute-Warrensville Heights

ITT Technical Institute-Youngstown

John Carroll University

Kent State University at Ashtabula

Kent State University at East Liverpool

Kent State University at Geauga

Kent State University at Kent

Kent State University at Salem

Kent State University at Stark

Kent State University at Trumbull

Kent State University at Tuscarawas

LaBarberia Institute of Hair

Lake Erie College

Lakeland Community College

Lorain County Community College

Lorain County Joint Vocational School District

Madison Adult Career Center

Mahoning County Career and Technical Center

Malone University

Medina County Career Center

Merrillville Beauty College-Flawless Barber Academy

Miami-Jacobs Career College-Independence

National Beauty College

National Institute of Massotherapy

North Central State College

Northcoast Medical Training Academy

Northeast Ohio Medical University

Northern Institute of Cosmetology

Notre Dame College

Oberlin College

Ohio Business College-Sandusky

Ohio Business College-Sheffield

Ohio College of Massotherapy Inc.

Ohio Media School-Valley View

Ohio State University Agricultural Technical Institute

Ohio State University-Mansfield Campus

Ohio Technical College

Ohio Technical College-PowerSport Institute

Ohio Valley College of Technology

Paul Mitchell the School-Cleveland

Pioneer Career and Technology Center

Polaris Career Center

Portage Lakes Career Center

Rabbinical College Telshe

Raphael's School of Beauty Culture Inc.-Alliance

Raphael's School of Beauty Culture Inc.-Boardman

Raphael's School of Beauty Culture Inc.-Brunswick

Raphael's School of Beauty Culture Inc.-Niles

Regency Beauty Institute-Akron

Regency Beauty Institute-Canton

Regency Beauty Institute-Cleveland

Regency Beauty Institute-North Olmsted

Remington College-Cleveland Campus

Ross Medical Education Center-Niles

Ross Medical Education Center-Ontario

Sandusky Career Center

South University-Cleveland

Stark State College

Stautzenberger College-Brecksville

TDDS Technical Institute

The College of Wooster

Trumbull Business College

Trumbull Career & Technical Center

University of Akron Main Campus

University of Akron Wayne College

University of Mount Union

University of Phoenix-Ohio

Ursuline College

Vanity School of Cosmetology

Vatterott College-Cleveland

Virginia Marti College of Art and Design

Walsh University

Wayne County Schools Career Center

Willoughby-Eastlake School of Practical Nursing

Youngstown State University

SECTION 7

APPENDIX

FIVE ECONOMIC CLUSTERS OF OPPORTUNITY	
OCCUPATION GROUPS	**3-DIGIT SOC**
Architects and Engineering Technicians	Architects, Surveyors, and Cartographers; Drafters, Engineering Technicians, and Mapping Technicians
Computer Occupations	Computer Occupations
Construction Trade Workers	Construction Trade Workers
Education	Postsecondary Teachers; Preschool, Primary, Secondary, and Special Education School Teachers; Other Teachers and Instructors; Librarians, Curators, and Archivists; Other Education, Training and Library Occupations
Engineers	Engineers
Financial Clerks	Financial Clerks
Financial Specialists	Financial Specialists
Health Diagnosing and Treating Practictioners	Health Diagnosing and Treating Practictioners
Health Technologists and Technicians	Health Technologists and Technicians
Healthcare Therapist Aides and Support Workers	Other Healthcare Practitioners and Technical Occupations; Occupational Therapy and Physical Therapist Assistants and Aides
Information and Record Clerks	Information and Record Clerks
Installation, Maintenance, and Repair Occupations	Other Installation, Maintenance, and Repair Occupations
Life Science Workers	Life Scientists; Physical Scientists; Social Scientists and Related Workers; Life, Physical, and Social Science Technicians
Managers, Professional and Health	Other Management Occupations
Metal and Plastic Workers	Metal Workers and Plastic Workers
Nursing, Psychiatric, and Home Health Aides	Nursing, Psychiatric, and Home Health Aides
Secretaries and Administrative Assistants	Secretaries and Administrative Assistants
Skilled Production Workers	Electrical and Electronic Equipment Mechanics, Installers, and Repairers; Assemblers and Fabricators; Plant and System Operators; Other Production Occupations
Supervisors of Skilled Workers	Supervisors of Office and Administrative Support Workers; Supervisors of Construction and Extraction Workers; Supervisors of Installation, Maintenance, and Repair Workers; Supervisors of Production Workers

Three-digit SOC codes that comprise the Occupation Groups used in the Demand Supply Alignment Analysis

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