



PROUD PARTNER

Labor Market Analysis for the Uplands Region
A Report on Talent Demand and Supply

August 2019



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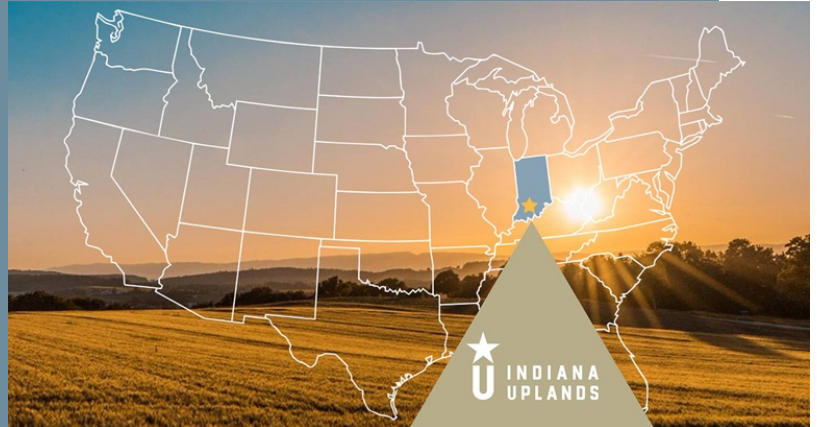
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INTRODUCTION

Across the Indiana Uplands economy, and in the key growth sectors identified by ROI and its partner organizations, talent fuels both existing firms in the region and potential growth opportunities. Talent can be simply understood as the numbers of people who can fill *open* or *new* jobs in the economy; talent is also the sum characteristics of the skill sets people need in order to successfully carry out job tasks and, in the end, build careers. Increasingly, meeting the demand for talent is of critical importance to a regional economy and its firms. This is particularly true for the Uplands. A growing number of Uplands companies are devoting more resources to identifying the talent they need, recruiting and hiring the right people, and retaining and developing the skills and talents in their existing workforce. For many employers, this focus on talent is integral to their business strategy, and they believe the success of their organizations depend on the skills and quality of the workforce.



In the Indiana Uplands, the demand for talent is set within a physical and economic environment of considerable variation. These diverse factors include differing levels of development, the concentration of population around Monroe County, the impact of Indiana University, the influence of NSWC Crane and its talent needs and opportunities, the existence of several other large private employers that generate considerable demand for talent, and variable population and labor force.

We believe the Uplands region is undergoing an *economic and socioeconomic transformation* toward a more integrated and modernized economy in which key sectors—advanced manufacturing, life sciences, and national security and defense—can drive robust new growth. In doing so, these key sectors have a significant impact on socioeconomic characteristics of the region. An important element of this transformation revolves around the dynamics of the *demand* for talent by employers and the *supply* of talent, largely created by educational institutions that serve the region. Public policy and civic leadership can also have a considerable impact on the realization of the Uplands transformation through strategies to deepen and strengthen the qualitative and quantitative alignment of talent demand and supply.

This report explores the demand and supply of talent in the Indiana Uplands and is organized in sections that explore 1) the regional economy and demand for talent, 2) demographic characteristics of the populations that shape the overall supply of talent, and 3) the major components of talent supply from educational institutions at the secondary and postsecondary levels.

I. TALENT DEMAND IN THE UPLANDS ECONOMY

We begin by examining the broad characteristics of the demand for talent in the regional economy and the specific needs within three key growth sectors: advanced manufacturing, life sciences, and national security and defense. We describe talent demand using both quantitative and qualitative measures, to assess both levels of demand and the skill sets, knowledge, and experience required to meet that demand. Throughout our analysis, we exercise a little caution. Many variables underlay the demand for talent, and most of these are dynamic; in the Uplands, small variations can have an outsized impact. Therefore, it is prudent, when interpreting data, to avoid drawing statistical conclusions associated with much larger populations. What we can do with confidence, however, is identify trends and characteristics in the Uplands demand for talent that may help policymakers offer targeted support with accuracy and effectiveness.

Summary Observations

First, employment growth is modest but steady over the regional economy. The current demand for talent, however, is outpacing population increases and workforce growth. Demographic characteristics in the Uplands (addressed in a later section) show a slow-growing and aging total population, declining population in several counties, declining high school enrollments, and lower college enrollments at most institutions serving the region. By itself, this creates a widening quantitative gap between the rates of job growth and population increase, as well as a widening gap between demand for and supply of critical skills.

Second, there is considerable job growth within the three key growth sectors of advanced manufacturing, life sciences, and national security and defense. These sectors grew by 14 percent over the last several years and are on a planned path to grow robustly over the next decade. The demand for talent in these sectors is highly concentrated in technical, professional, and scientific fields. Projections of growth and anticipated new projects at larger employers in these sectors mean that the demand for new talent will intensify. At NSWC Crane, for example, planners expect a 40 percent increase in Crane employees and contractors over the next decade, raising the total workforce from around 6,000 today to 10,000¹. Sixty percent of that increase is expected to be in the areas of engineering, computer sciences, scientific fields, and applied technology fields. This growth, along with anticipated expansion of firms in the life sciences sector—whose talent needs are also concentrated in technical and scientific fields—will raise demand for talent sharply.

Third, although the region contains three important, distinct growth sectors—advanced manufacturing, life sciences, and national security and defense—there is considerable overlap in their demand for technical talent and common (employability) skill sets. While some technical skill sets (such as radio frequency

¹ Some military employment-related NAICS codes that identify both military and civilian personnel employed on military facilities are not collected by the best available data source; and some data may be suppressed. However, this is the most accurate data available and can be interpreted not as precise measures but as relative scale and for comparison purposes.

engineering or chemical engineering) are unique to a sector, the most important single characteristic in demand, even at technician levels, is for a highly skilled and highly educated workforce. Common skills (i.e., employability and social skills) in demand in those sectors are also broadly similar. Employers in all sectors are seeking talented people who have similar sets of attributes like perseverance, communication skills, and problem-solving capacities. The sectors thus have a collective interest in the kinds of policies and programs that would focus on increasing these skills across the region. The implication for addressing talent demand is that employers in these sectors can collaborate and leverage their combined numbers in efforts around recruitment and talent development.

This demand profile also creates a group of high-demand and higher wage jobs across the Uplands economy. Later in this report, we identify a group of what we call “high-opportunity” jobs and occupations that are in demand in all three growth sectors. These jobs generally require postsecondary education; they are relatively highly paid; and they are often identified by employers as hard to fill. A programmatic focus on these high-opportunity jobs and occupations could meet talent needs of a broad swath of the region’s employers and create significant opportunities for Upland residents.

Finally, as demand and competition for talent increase in the three growth sectors, our interviews suggest that employers within those sectors are increasingly focused on more accurately identifying the talent they need, implementing strategies for more effective recruitment, and rethinking ways to better access and develop talent in their existing workforce. Employers are responding to the current labor market by becoming better at identifying, recruiting, and hiring the talent they need. We believe this is very significant and has implications for public policy.

Leadership in nearly every firm we interviewed for this research described actions they are taking to become more deliberate and strategic in finding talent. For example, a small injection-molding firm of about 100 employees reported spending more time to carefully define both the specific technical skills that are needed among their skilled technicians and the behavioral and cultural attributes necessary for a good fit between job candidates and the organization’s core values. On the other end of the scale, at NSWC Crane, educational liaison programs aim to engage students along their educational path from elementary school through college, with the intention of attracting individuals into high-demand fields and employment at Crane. Both examples highlight how employers are responding to the perception that it is becoming harder to find and hire the right talent at a time when finding and hiring the right talent is becoming even more critical to their success.

This kind of deliberate and strategic action is increasingly necessary in talent recruitment and development in the Uplands, and suggests that civic leadership and policy focused on helping firms raise their capacity to identify and recruit talent will ultimately enable more firms to grow.

In the following sections, we describe the overarching economic trends in the region; explore the demand for talent across and within the three high-growth sectors, define the most in-demand skills; and summarize employer perceptions of talent demand and their strategies for recruiting and hiring, as shared in our interviews.

The State of the Uplands Economy

Economic recovery from the recession of 2008–2009 began in earnest in 2010 in the Uplands, and growth has continued since then. Between 2010 and 2018, the estimated number of jobs in the region grew by 4.5 percent. While that growth is slower than the statewide average of 11 percent, regional job growth still outpaced the overall modest 1.2 percent increase in its working-age population (see Table 1). However, this overall increase does not reflect a consistent trend across all Uplands counties. In fact, from 2010 to 2018, the working-age population (ages 20–69) *declined* in most Uplands counties. If it were not for the substantial growth in the working-age population in Monroe County, much of which can be attributed to increases in enrollment at Indiana University², the Uplands would show a modest decline in overall population.

Table 1. Uplands working-age population (ages 20–69) by county and region, 2010–2018

County	2010 Population	2018 Population	Change	% Change
Brown	10,094	9,658	(436)	(4%)
Crawford	6,905	6,698	(207)	(3%)
Daviess	18,577	19,329	752	4%
Dubois	25,922	26,350	428	2%
Greene	20,917	20,040	(877)	(4%)
Lawrence	29,069	28,477	(592)	(2%)
Martin	6,541	6,359	(182)	(3%)
Monroe	94,905	100,188	5,283	6%
Orange	12,305	11,998	(307)	(2%)
Owen	13,959	13,304	(655)	(5%)
Washington	17,863	17,700	(163)	(1%)
Region	257,058	260,102	3,044	1.2%

Source: US Census, EMSI Population Estimates, 2019.

As noted earlier, overall job growth in the Uplands since the recession has been modest; it also varies considerably by county (see Table 2).

Job growth is concentrated in about half the region's counties and in Monroe County, in particular. Monroe accounts for 42 percent of all jobs in the Uplands; just four counties (Monroe, Dubois, Lawrence, and

² The undergraduate enrollment gain at Indiana University was 5,375 students, an increase of 15 percent between 2010 and 2018.

Daviess) account for 76 percent of the jobs in the region. This distribution reflects the historic heterogeneity of a region that includes the state's largest public university, an agricultural geography, and industries distributed across sparsely populated areas. Although Monroe County had the largest population gain in the region in working-age groups, its job growth was relatively modest; again, an indication that much of the population growth was among students.

Table 2. Uplands job growth by county and region, 2010–2018

County	2010 Jobs	2018 Jobs	Change	% Change
Brown	2,338	2,236	(102)	(4%)
Crawford	3,691	3,695	3	0%
Daviess	5,562	5,602	41	1%
Dubois	6,396	7,173	777	12%
Greene	7,936	7,786	(150)	(2%)
Lawrence	8,066	7,585	(481)	(6%)
Martin	8,239	8,134	(105)	(1%)
Monroe	11,903	13,536	1,633	14%
Orange	14,014	15,254	1,240	9%
Owen	28,193	30,832	2,639	9%
Washington	71,819	74,300	2,481	3%
Region	168,157	176,132	7,975	5%

Source: Indiana Department of Workforce Development, EMSI Industry and Occupation Estimates, 2019.

Job Growth in Key Sectors

Post-recession job growth across the three sectors that ROI identified as high impact on employment, wages, and economic growth has been much more robust than in the regional Uplands economy overall. Compared to the 4.5 percent overall growth in employment, the key sectors together accounted for 14 percent growth over nearly a decade since the recession (see Table 3). Even in this group, however, there is considerable unevenness. Advanced manufacturing, accounting for over half the employment across the three sectors, grew by 26 percent, while the defense sector declined somewhat during a period of variability in national defense spending. Growth in advanced manufacturing may reflect recovery (returning employment to pre-recession levels) as much as new growth. The national security and defense sector, which includes both public and private employment and is largely centered around NSWC Crane in Martin

County, reported a 6 percent decline. That figure, however, may be partly an artifact of the data sources³ and how government employment is counted. Administrators at NSWC Crane report that employment has been flat over the last several years; new hiring has largely focused on replacement. Scheduled growth at the facility over the next several years, however, will increase the number of jobs considerably, in both government employment and private contractors.

Table 3. Total job growth across the Uplands' three key industry sectors, 2010–2018

Sector	2010 Jobs	2018 Jobs	Change	% Change
Advanced manufacturing	12,038	15,172	3,134	26%
Life sciences	5,476	6,197	721	13%
National security and defense	7,425	6,992	(433)	(6%)
All key sectors	24,939	28,361	3,422	14%
Region	167,363	175,022	7,659	4.5%

Source: EMSI, Industry and Occupation Estimates, 2019. Using a different data source (see Appendix), employment totals for each sector show minor differences, and national security employment shows a modest increase.

Job Growth by Firm Size

An important question in any economic development strategy lies in identifying and supporting sources of job growth. Delivery of economic and workforce development programs will vary depending on what sizes of establishments are contributing to growth and the types of needs they have in relation to finding and hiring talent. In Figures 1a, b, and c, for each of the three key sectors, we show the direction of employment growth by size of firms, indexed to 2010. (See Appendix for additional data on firm size and employment, as well as change in the number of establishments by size.)

³ The industry NAICS codes, on which these employment data are based, do not finely distinguish different categories of government employment, especially in a geographic region where there will be multiple, diverse, types of employment (e.g. courts, laboratories, and military personnel). Our data sources uses NAICS coding that distinguishes civilian federal employment from military employment (901199 Federal Government, Civilian, excluding Postal Service; and 90120: Federal Government, Military). These NAICS codes produce the figures for National Security and Defense shown in Table 3 along with other private sector employment associated with industry related to that sector (see Appendix for full definition). However, the government employment is an approximation and should be considered in relation to the direct reports from NSWC Crane.

Figure 1a. In advanced manufacturing, employment growth is coming from mid-sized establishments.

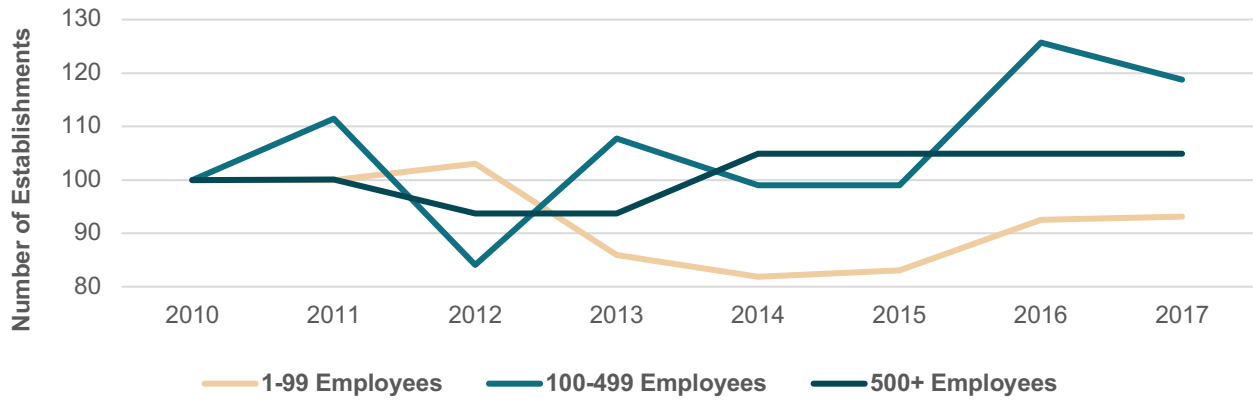


Figure 1b. In life sciences, employment growth is coming from mid-sized and large establishments.

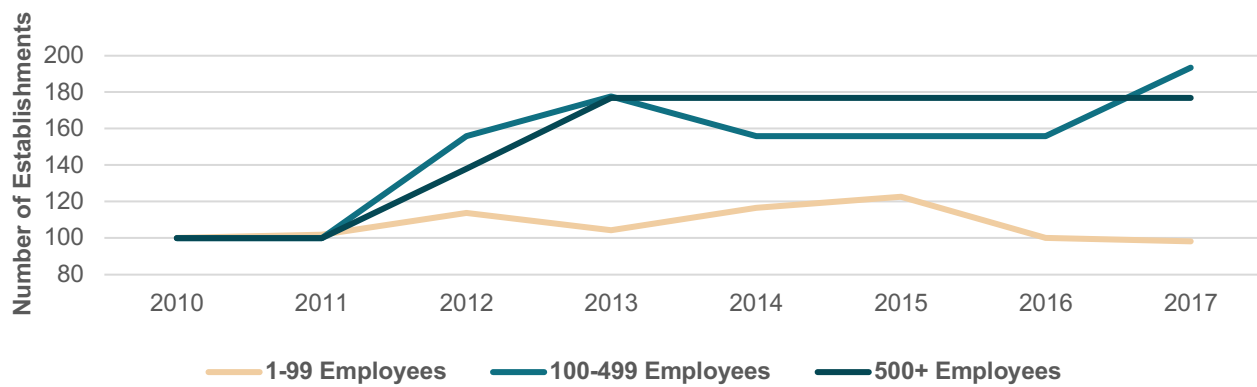
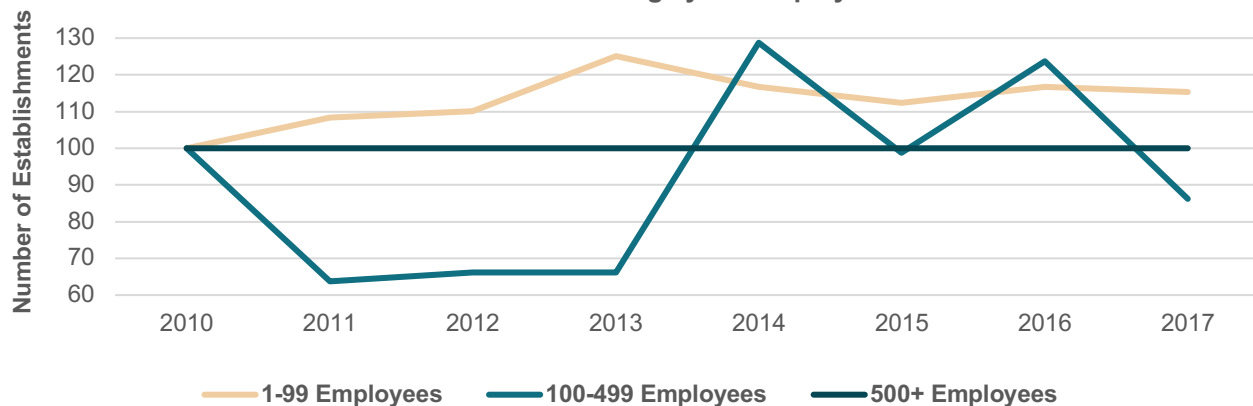


Figure 1c. In national security and defense, employment growth is coming from smaller establishments and with largely flat employment elsewhere.



Source: Your Time Series Data, Business Development Resource Center, University of Wisconsin, 2019.

Here, the central implication is that each sector follows a unique growth pattern. In manufacturing, medium-sized firms of less than 500 workers have grown rapidly in the last few years. In life sciences, large and medium-sized firms alike show robust growth. The national security and defense sector's flat growth among large firms reflects government employment at NSWC Crane, which has been largely focused on replacing workers until recently. Growth at NSWC Crane is now projected to increase considerably through 2028.

Talent Demand by Sector and Occupations

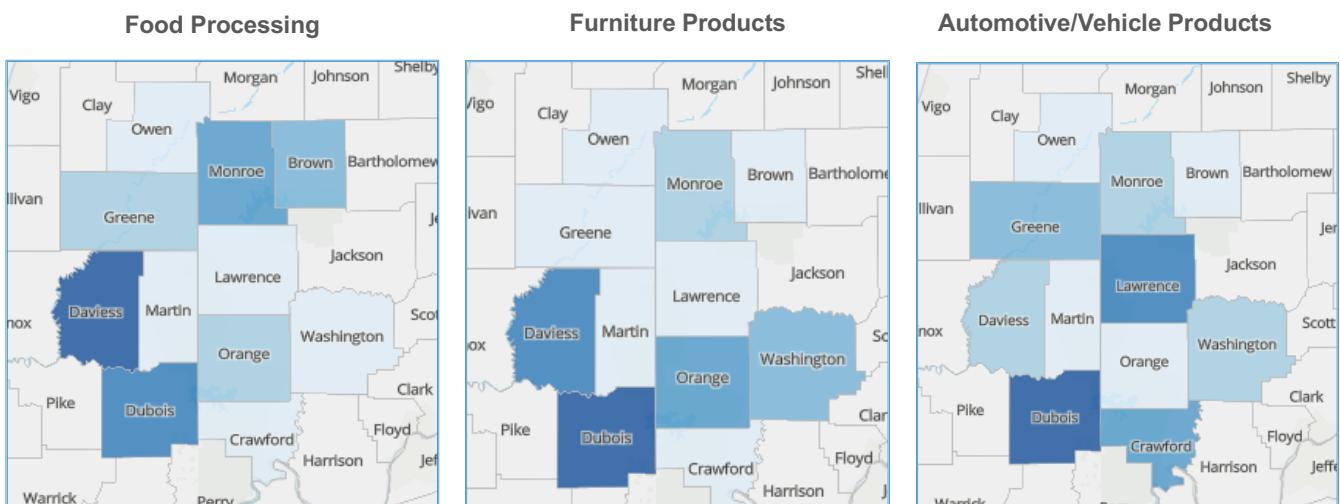
Having examined the Uplands economy and its planned growth, we turn now to the implications for talent. The demand for talent in each of the Uplands key industry sectors has a unique configuration; workforce varies by scale of employer, range of fields and occupations, education and experience requirements, and, of course, wages. Policymakers, educational institutions, and economic development organizations must make sense of this economic and occupational variety, and its commonalities, to identify strategies for economic and community growth.

In the following discussion, we define the Uplands' major occupational groups, address frequent job openings, and consider the educational and skill requirements for those jobs. We will examine each sector individually, then look across the sectors, and finally summarize the analysis into a single framework that describes the key occupations suitable for policymaking and strategic focus: those high-opportunity jobs that are generally present and in demand in all three sectors, pay a living wage, and require some level of postsecondary education.

Advanced Manufacturing

The Uplands' advanced manufacturing sector includes three principal subsectors: automotive and heavy equipment manufacturing, food processing, and furniture manufacturing. These have a long presence in the region and have been undergoing significant change since the recession. Our discussion of the

Figure 2. Employment distribution in advanced manufacturing subsectors, 2018



characteristics of demand in advanced manufacturing will look at the subsectors in aggregate, though we will note differences among them where appropriate and significant. The most evident difference among the subsectors is their geographic distribution across Uplands counties (see Figure 1; the darkest colors show the most concentrated employment).

The advanced manufacturing subsectors are broadly similar in terms of their demand for talent and their occupations. Table 4 shows the distribution of occupational groups comprising more than one percent of the advanced manufacturing workforce. Notably, assembly and production operations dominate this sector, at about 80 percent of its total workforce. Occupations in skilled trades, technical specialties, and administration make up much smaller percentages of the workforce and are accordingly less in demand.

Table 4. Uplands staffing levels in advanced manufacturing (vehicle, food, and wood products), 2018

Occupational Group	Employees	% of Total
Woodworkers	2,344	15.8%
Assemblers and Fabricators	1,932	13.0%
Other Production Occupations	1,666	11.2%
Food Processing Workers	1,265	8.5%
Metal Workers and Plastic Workers	1,230	8.3%
Material Moving Workers	1,200	8.1%
Supervisors of Production Workers	907	6.1%
Other Installation, Maintenance, and Repair Occupations	408	2.7%
Top Executives	360	2.4%
Material Recording, Scheduling, Dispatching, and Distributing	339	2.3%
Engineers	292	2.0%
Textile, Apparel, and Furnishings Workers	281	1.9%
Operations Specialties Managers	265	1.8%
Construction Trades Workers	260	1.8%
Business Operations Specialists	244	1.6%
Sales Representatives, Wholesale and Manufacturing	222	1.5%
Motor Vehicle Operators	180	1.2%
Information and Record Clerks	177	1.2%
Other Office and Administrative Support Workers	171	1.2%
Drafters, Engineering Technicians, and Mapping Technicians	152	1.0%
Total	13,895	93.60%
Source: EMSI Industry Staffing Patterns. Author's calculations of 3-Digit SOC staffing. Postings at least 1 percent of total. For full list, see Appendix.		

Table 5 shows job postings in the advanced manufacturing sector for 2017 and 2018. While assembly and production workers dominate staffing levels, they do not dominate job postings to the same degree. This could indicate that those positions are not difficult to fill or that they are filled locally without a great deal of recruiting through published sources. Both the numbers of postings and proportion of postings increase substantially for technical, professional, administrative, and managerial positions compared to their percentage in the advanced manufacturing workforce. In short, job postings in advanced manufacturing reflect an emphasis on operations, sales, and supervision. The distribution and the frequency of postings, compared to their proportions in the staffing pattern, gives an indication of those specific technical positions that are in high demand and are harder to fill.

Table 5. Uplands advanced manufacturing job postings by occupational group, January 2017–December 2018

Occupational Group	Unique Postings	% of Total
Motor Vehicle Operators	373	15.4%
Other Production Occupations	157	6.5%
Computer Occupations	154	6.4%
Material Scheduling, Dispatching, and Distributing	138	5.7%
Advertising, Marketing, and Sales Managers	137	5.7%
Engineers	136	5.6%
Material Moving Workers	125	5.2%
Supervisors of Production Workers	124	5.1%
Business Operations Specialists	108	4.5%
Operations Specialties Managers	105	4.3%
Other Installation, Maintenance, and Repair Occupations	86	3.6%
Sales Representatives, Wholesale and Manufacturing	68	2.8%
Financial Specialists	60	2.5%
Metal Workers and Plastic Workers	54	2.2%
Information and Record Clerks	50	2.1%
Supervisors of Office and Administrative Support	47	1.9%
Sales Representatives, Services	44	1.8%
Assemblers and Fabricators	41	1.7%
Textile, Apparel, and Furnishings Workers	36	1.5%
Other Management Occupations	35	1.4%
Construction Trades Workers	29	1.2%

Supervisors of Installation, Maintenance, and Repair Workers	29	1.2%
Art and Design Workers	28	1.2%
Drafters, Engineering Technicians, and Mapping Technicians	23	1.0%
	2187	90.50%

Source: EMSI Job Posting Analytics. Author's calculations of 3-Digit SOC postings. Postings at least 1 percent of total. For full list, see Appendix.

Life Sciences

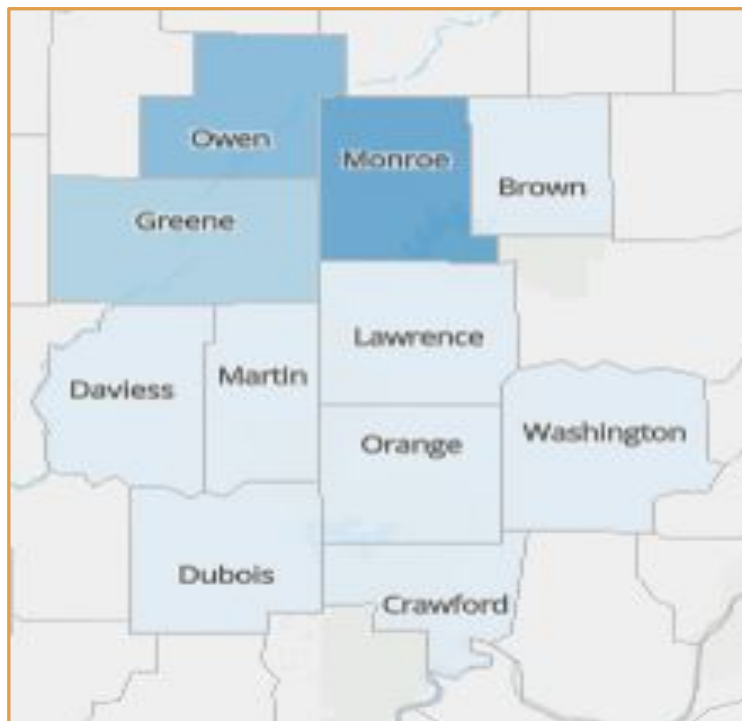


Figure 3. Employment distribution in life sciences, 2018

As the employment distribution map for life sciences in Figure 3 shows, employment is clustered tightly around the northern counties in the region and concentrated in Monroe County. At first glance, this might suggest that the industry is tethered to Indiana University, but in fact the concentration of employment is driven largely by Cook Group, the pharmaceutical and medical device manufacturer that employs about 4,000 people in Monroe County and several hundred more in Owen County. Other, smaller independent firms and divisions of larger global life sciences companies are also located within these counties.

Table 6 shows a much different array of occupations employed in the life sciences sector compared to advanced manufacturing. While production-related occupations still

make up a significant portion of the total workforce at about 45 percent, technical, professional, and scientific occupations (such as engineers, life scientists, and related technicians) form another 30 percent. This distribution reminds us that the Uplands' life sciences industry contains a subset that is essentially advanced manufacturing (of pharmaceuticals, medical products, and medical devices)—but with a strong emphasis on knowledge-intensive tasks in research and development. This occupational distribution also reflects personnel (for compliance, process and data control, and documentation) needed to meet the pharmaceutical and medical device regulatory requirements specific to the life sciences industry.

Table 6. Uplands staffing levels in life sciences, 2018

Occupational Group	Employees	% of Total
Assemblers and Fabricators	1248	21.8%
Production Occupations	755	13.2%
Metal Workers and Plastic Workers	537	9.4%
Engineers	440	7.7%
Material Scheduling, Dispatching, and Distributing Workers	257	4.5%
Business Operations Specialists	214	3.7%
Material Moving Workers	205	3.6%
Life Scientists	205	3.6%
Supervisors of Production Workers	179	3.1%
Operations Specialties Managers	174	3.0%
Physical Scientists	159	2.8%
Sales Representatives, Wholesale and Manufacturing	157	2.7%
Installation, Maintenance, and Repair Occupations	130	2.3%
Drafters, Engineering Technicians, and Mapping Technicians	116	2.0%
Top Executives	115	2.0%
Information and Record Clerks	110	1.9%
Computer Occupations	89	1.6%
Management Occupations	87	1.5%
Office and Administrative Support Workers	84	1.5%
Motor Vehicle Operators	68	1.2%
Financial Clerks	59	1.0%
Life, Physical, and Social Science Technicians	55	1.0%
Total	5443	95.10%
Source: EMSI Industry Staffing Patterns. Author's calculations of 3-Digit SOC staffing. Occupational groups of at least 1 percent of total. For full list, see Appendix.		

Job postings in life sciences also present a contrasting picture of talent demand and recruitment intensity compared to advanced manufacturing. The frequencies of job postings over 2017 and 2018, shown in Table 7, quantify what employers in the life sciences sector reported often during our interviews: engineering and technically oriented positions are hard to fill. In fact, over 40 percent of the job postings in the life sciences sector focused on recruiting technical talent. Life sciences employment grew significantly over the last 8 years and is expected to continue to grow; the sector will need to find ways of obtaining more talent in these

scientific and technical fields. Given the demographic trends in the region, and, as we will show later, the shared demand for engineering talent across industries, the competition for these skills—and the need to recruit for them outside the region—will only increase.

Table 7. Uplands life sciences job postings by occupational group, January 2017–December 2018

Occupational Group	Unique Postings	% of Total
Engineers	185	23.3%
Health Diagnosing and Treating Practitioners	65	8.2%
Drafters, Engineering Technicians, and Mapping Technicians	56	7.1%
Supervisors of Production Workers	56	7.1%
Sales Representatives, Services	47	5.9%
Management Occupations	40	5.0%
Computer Occupations	40	5.0%
Sales Representatives, Wholesale and Manufacturing	37	4.7%
Business Operations Specialists	33	4.2%
Healthcare Support Occupations	30	3.8%
Production Occupations	28	3.5%
Operations Specialties Managers	24	3.0%
Health Technologists and Technicians	18	2.3%
Material Scheduling, Dispatching, and Distributing Workers	17	2.1%
Advertising, Marketing, Public Relations, and Sales Managers	13	1.6%
Information and Record Clerks	13	1.6%
Financial Specialists	11	1.4%
Physical Scientists	10	1.3%
Life, Physical, and Social Science Technicians	10	1.3%
Mathematical Science Occupations	9	1.1%
Media and Communication Workers	8	1.0%
Total	750	94.50%

Source: EMSI Job Posting Analytics. Author's calculations of 3-Digit SOC postings. Postings at least 1 percent of total. For full list, see Appendix.

National Security and Defense

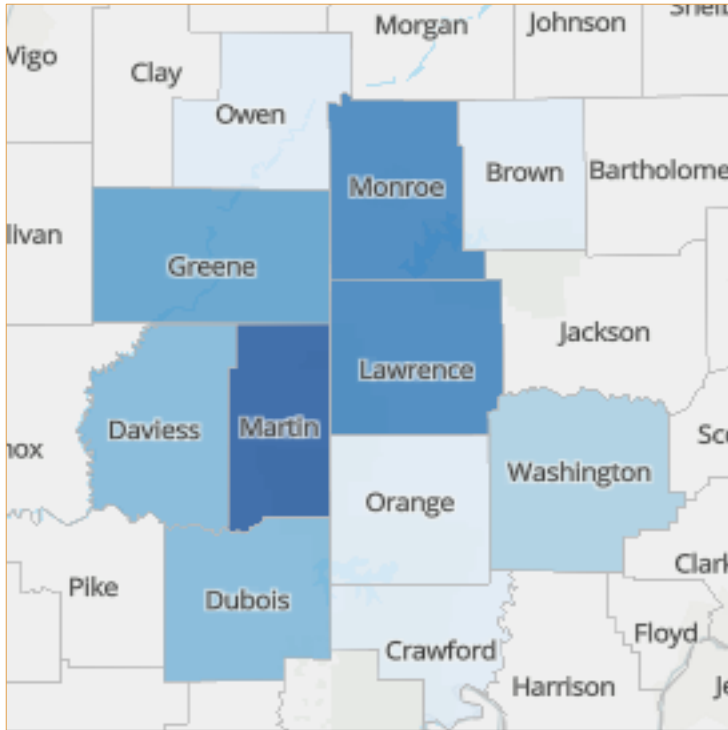


Figure 4. Employment distribution in national security and defense, 2018

The national security and defense sector in the Uplands is largely built around NSWC Crane in Martin County; another significant concentration of jobs also exists in Lawrence County and in Monroe County, more specifically around Bloomington and Indiana University (see Figure 4). The darkest color on the map represents 4,700 jobs in Martin County, with an additional 700 jobs each in Monroe and Lawrence Counties.

As Table 8 suggests, employment opportunities and demand for talent in this sector include traditional production jobs as well as those in advanced research and development for projects related to national defense and warfare. Despite some ambiguities in the data itself,⁴ staffing patterns clearly emphasize the occupations found in project- or contract-driven environments; over 50 percent of the workforce in this sector are in technical, scientific, or managerial occupations.

Table 8. Uplands staffing levels in national security and defense, 2018

Occupational Group	Employees	% of Total
Business Operations Specialists	1001	16.4%
Engineers	725	11.9%
Military-only occupations	632	10.4%
Drafters, Engineering Technicians, and Mapping Technicians	339	5.6%
Other Management Occupations	264	4.3%
Information and Record Clerks	222	3.7%

⁴ Some military employment-related NAICS codes that identify both military and civilian personnel employed on military facilities are not collected by the best available data source; and some data may be suppressed. However, this is the most accurate data available and can be interpreted not as precise measures but as relative scale and for comparison purposes.

Office and Administrative Support Workers	217	3.6%
Financial Specialists	206	3.4%
Law Enforcement Workers	166	2.7%
Other Installation, Maintenance, and Repair Occupations	124	2.0%
Computer Occupations	123	2.0%
Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	118	1.9%
Top Executives	112	1.8%
Operations Specialties Managers	112	1.8%
Extraction Workers	91	1.5%
Financial Clerks	81	1.3%
Physical Scientists	77	1.3%
Life Scientists	70	1.2%
Material Recording, Scheduling, Dispatching, and Distributing Workers	67	1.1%
Lawyers, Judges, and Related Workers	64	1.1%
Construction Trades Workers	62	1.0%
Total	4873	80.00%

Source: EMSI Industry Staffing Patterns. Author's calculations of 3-Digit SOC staffing. Occupational groups of at least 1 percent of total. For full list, see Appendix. Some occupations related to other government employment (healthcare) were excluded.

Table 9, showing job postings for the sector, is also limited by the data source limitations (and recruiting and hiring procedures in government employment); nonetheless, the data strongly suggest an emphasis on recruiting technical, scientific, and operations talent. Almost 70 percent of job postings collected by the data source (see footnote 3) are focused on professional and technical talent. In our interviews with program leadership and administrative leadership at NSWC Crane Naval Base, a theme emerged: the difficulty in recruiting technical talent in engineering (such as electrical, electronics, computer systems, and software engineering), particularly in very narrow specialties, as well as in scientific fields (such as computer science, artificial intelligence, mathematics, and physics). Virtually all of these require bachelor's or master's degrees, and many require PhD degrees. NSWC Crane and the private contractors surrounding the base are on a planning track to increase the workforce by a little over 4,000 employees by 2028; 60 percent of those new positions will be in professional and technical fields.

Table 9. Uplands national security and defense job postings by occupational group, January 2017–December 2018

Occupational Group	Unique Postings	% of Total
Computer Occupations	523	25.9%
Engineers	250	12.4%
Business Operations Specialists	205	10.2%
Drafters, Engineering Technicians, and Mapping Technicians	140	6.9%
Other Installation, Maintenance, and Repair Occupations	65	3.2%
Media and Communication Workers	56	2.8%
Law Enforcement Workers	49	2.4%
Other Management Occupations	44	2.2%
Supervisors of Transportation and Material Moving Workers	38	1.9%
Operations Specialties Managers	37	1.8%
Information and Record Clerks	27	1.3%
Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	25	1.2%
Financial Specialists	24	1.2%
Counselors, Social Workers, and Other Community and Social Service Specialists	23	1.1%
Material Scheduling, Dispatching, and Distributing Workers	22	1.1%
Secretaries and Administrative Assistants	21	1.0%
Total	1549	76.60%

Source: EMSI Job Posting Analytics. Author's calculations of 3-Digit SOC postings. Postings at least 1 percent of total. For full list, see Appendix.

High-Opportunity Occupations

The industry and occupation data describing job growth and demand remind policymakers, educators, and those charged with implementing economic development strategies that the labor market contains many components. It is not a single entity with uniform characteristics of demand and talent development. Accordingly, policy priorities in the labor market may drive very different development strategies. For example, the priority of addressing hard-to-fill talent demand may be critical to business success but impact a relatively small number of jobs. In contrast, a second priority (more common to workforce programs) targets filling broader demand in larger occupational groups, thus impacting many more jobs and offering the volume of employment opportunities critical to communities.

ROI has identified high-priority strategic growth sectors as a focus of its policy and program priorities. As we have outlined, however, each of those sectors has distinct labor market needs, a broad set of occupations (varying by subsector), and differing relative scale of employment needs. Targeted attention can help meet industry sector and business development needs, but policymakers quickly encounter dilemmas around how to focus development and programs to meet the broader needs of the labor market itself.

Accordingly, our approach in this report employs a simple multivariate parsing technique to identify a group of *high-opportunity occupations* that cut across the sectors but are built on the characteristics of the employment and talent demand structure within each sector. *High-opportunity occupations* in the Uplands economy are those that:

- are relatively common across the sectors;
- have high demand, as indicated by job growth at or above the average growth (14 percent), or that are identified as hard to fill;
- earn hourly compensation at or above a living wage (\$18.65);
- and finally, require postsecondary training, credentials, or education.

Based on our calculations, we identified 79 specific occupations, spanning over 6,300 jobs in the region, which meet these criteria. Table 10 shows these high-opportunity occupations clustered into 22 groups (see Appendix for a full listing of all the occupations and their titles and characteristics). The occupations in Table 10 are concentrated in technical and managerial fields that carry high hourly earnings; a majority (60 percent) require a bachelor's degree or higher. Another 20 percent require a high school diploma or equivalent as an entry into a position. Those jobs tend to be skilled technical or production jobs that often require some training after high school short of a degree, such as an apprenticeship or certification; they do carry a wage that is at least \$18.65 an hour.

Table 10. High-opportunity and hard-to-fill occupational groups in Uplands key sectors, 2018

Occupational Group	Employed in 2018
Engineers	1,324
Business Operations Specialists	1,230
Top Executives	477
Metal Workers and Plastic Workers	468
Drafters, Engineering Technicians, and Mapping Technicians	463
Operations Specialties Managers	420
Sales Representatives, Wholesale and Manufacturing	378
Management Occupations	351
Life Scientists	274
Computer Occupations	249

Physical Scientists	215
Supervisors of Installation, Maintenance, and Repair Workers	108
Extraction Workers	91
Lawyers, Judges, and Related Workers	77
Advertising, Marketing, Promotions, Public Relations, and Sales Managers	43
Counselors, Social Workers, and Other Community and Social Service Specialists	36
Social Scientists and Related Workers	32
Mathematical Science Occupations	28
Art and Design Workers	16
Electrical and Electronic Equipment Mechanics, Installers, and Repairers	16
Media and Communication Workers	12
Total Employment	6,308
<i>Source: EMSI Industry Staffing Patterns; author's calculations of 3-digit SOC staffing across sectors. For full list using 6-digit SOC, see Appendix.</i>	

These high-opportunity occupations suggest there is broad employment opportunity across the sectors for residents from a variety of educational backgrounds. A programmatic focus on these occupations serves both the talent needs of each sector and the broader needs of communities for good jobs and careers.

In-demand skills and attributes in the Uplands' key strategic growth sectors.

The workforce in each of the three strategic sectors targeted by ROI exhibits its own configuration of various occupations, as shown earlier. We have described these occupations both separately and collectively in identifying high-demand occupations within each sector and high-opportunity occupations across the sectors; both offer attractive pathways for employees looking to work in the region in terms of demand, wages, and relevant pathways for career preparation. They also provide guideposts for those providing education and training for those preparing for or pursuing related careers in the region.

The technical skill requirements in demand for each occupation are so myriad and diverse that they are difficult to present concisely in an informative and useful way; instead, we can simply observe that jobs across the three key sectors have relatively specific technical requirements. Despite that, as we have also described, several occupational groups are common to all three key growth sectors.

Further, some skill requirements are also readily transferable or comparable across occupations and occupational groups; these are known as common skills, foundation skills, or employability skills. Table 11 shows the top twenty common skills that appeared in Uplands job postings in 2017 and 2018, for high-

opportunity occupations associated with three broad occupational groups: production and skilled manufacturing, information technology and engineering, and leadership and administration.

Table 11. Common skills across occupational groups in Uplands job postings, January 2017–December 2018

	Production and Skilled Manufacturing Workers	Information Technology and Engineering	Leadership and Administration
Common Skill	Frequency in Job Postings		
Communications	23%	26%	33%
Management	22%	36%	57%
Operations	15%	22%	24%
Leadership	15%	13%	23%
Problem Solving	12%	19%	18%
Troubleshooting (Problem Solving)	9%	13%	-
Innovation	9%	13%	17%
Computer Literacy	7%	2%	5%
Interpersonal Skills	5%	9%	10%
Written Communication	5%	11%	12%
Valid Driver's License	5%	4%	-
Microsoft Outlook	4%	6%	6%
Team Building	4%	-	3%
Verbal Communication Skills	4%	5%	5%
Decision Making	4%	4%	3%
Mentorship	3%	3%	7%
Sales	2%	3%	25%
Presentations	2%	6%	17%
Trustworthiness	2%	2%	4%
Microsoft Excel	2%	7%	13%

Source: EMSI, Job Posting Analytics, 2019. For full list of skills, see the Appendix.

The frequency in job postings demonstrates each skill's relative importance within the occupational groups. These are the skills that employers describe as important in successful performance as well as important in

functioning productively in a work environment. Also important are personal attributes like trustworthiness, honesty, perseverance, respect, and others that align with a company's core values. Together, technical skills, common skills, and personal attributes comprise the qualifications and characteristics applicants must have to secure jobs and perform successfully in them. Identifying these combinations of skills is increasingly important in talent acquisition.

A relatively small number of common skills appear frequently in Uplands job postings: about ten of the top skills in Table 11 cross all three functional groups. Two implications of this are: first, including common skills in recruitment strategies for specific jobs is less complex than it might first appear and can be readily implemented by employers; and second, adding components to curricula to develop these skills in students is not especially onerous. Because there are a small number of common skills that are found across many fields and jobs, it is not a complex task to include these common skills in programs of study, or to develop assessment metrics for them.

Interviews with Uplands Employers: Talent Needs and Perceptions

For this research, we conducted in-depth interviews with 18 employers in the region representing the three strategic sectors: advanced manufacturing, life sciences, and national security and defense. Firms represented a range of sizes, from less than 20 to over 4,000 employees working in the immediate region. (See Appendix for a complete list of companies interviewed.) These interviews followed on a larger collection of interviews and meetings with employers in 2017, and we include notes from those interviews to address some topics here. As in the 2017 interviews, we asked a series of questions about occupational needs and the demand for talent in the region, but this time we also asked how employers themselves were responding to these needs and how their practices in recruiting and hiring may have recently changed.

Our interviews were set against the backdrop of historic low unemployment rates for Indiana and for the Uplands. Even though regional unemployment (4.0 percent) was slightly higher than the state's (3.3 percent) for March 2019, both are at their lowest point in four decades—and in some Uplands counties, unemployment fell below the state average (see Table 12).

Employer perspectives on the labor force and their own talent strategies are influenced by these historically low unemployment rates. Almost all the employers interviewed are growing and seeking new workers over and above attrition and replacement. Some, like programs at NWSC Crane, are growing significantly. Most report more difficulty in both recruiting qualified candidates for open positions and hiring enough qualified people than in their past experience.

Table 12. Uplands unemployment rates by county, March 2019

County	Rate
Brown	3.7%
Crawford	5.1%
Daviess	2.9%
Dubois	2.8%
Greene	5.3%
Lawrence	4.3%
Martin	3.3%
Monroe	3.7%
Orange	4.0%
Owen	5.1%
Washington	3.8%
Region	4.0%
State	3.3%
Source: US Census, BLS, CES, 2019.	

The low unemployment rate and the specter of a shrinking talent pool have focused employers' attention on the effectiveness of their strategies for recruiting and hiring, and raised the question of what they can do to increase their success. With limited talent available in the labor market, hiring mistakes have become more expensive; when a new hire does not work out, the old solution of simply hiring the next person in line is not viable. Employers we interviewed felt they need first to become more precise in how they identify talent, and then to invest in strategies that will increase the yield of qualified hires. All are examining their hiring processes to make the process more efficient (for example, by shortening the time from initial contact to decision) and more accurate (through more targeted assessments, strategic deliberation on how hiring relates to achieving company goals, and finer-grained definitions of the skills and characteristics required).

Throughout our interviews, employers shared current practices and important observations and perceptions regarding workforce supply, recruitment challenges, the impact of automation, their hiring plans, recruiting relationships with postsecondary institutions, and more about recruitment and talent development.

Workforce Supply

Most employers reported that they find the Uplands workforce to be adequately talented and in possession of a good work ethic. Employers often mentioned the importance of loyalty, willingness to work hard, and good attitudes in relation to job performance and ethics. However, turnover does occur, and they indicated that the causes of turnover are often due to detrimental employee behaviors: absenteeism, failure to meet expectations, lack of interest or effort, and drug-related issues.

In response to questions about the local workforce and the fit of area residents to meet talent requirements, a significant number of manufacturing firms reported a perception that too few Uplands residents simply do not know enough about businesses like theirs or the opportunities they offer. They reported feeling invisible compared to other employers (such as those in retail sectors or healthcare) with more prominent locations or with far more resources to market their employment opportunities. Several observed that companies in industrial parks or in isolated rural areas are like black boxes: few residents know what goes on inside or how interesting the work can be. Word of mouth about opportunity is important, but a limited resource when companies need skilled people and too few people know of the opportunities that exist within their organizations.

Employers often mentioned an interest or intent in developing closer relationships with communities, especially secondary schools. When discussing high school graduates who are not pursuing a college degree, employers spoke of wanting more ways to inform graduates about job opportunities directly or through deeper relationships with their schools, who could in turn better inform students. Only the larger employers in our sample, however, maintained active relationships with high schools. and even those reported wanting to deepen relationships with secondary schools both as a vehicle for filling jobs and to provide information, education, and experiences that prepare students for work in the region.

Recruitment Challenges

A large majority of companies in our sample engage in regular state and national recruiting efforts, generally depending on skill levels of positions. Demand for specialty skills means that often a company has to recruit from a specific educational program, wherever that may be.

Generally, employers reported a great deal of personal satisfaction about being located in the Uplands region and appreciated the quality of life there. However, they also noted that these same qualities, rural life and limited urban amenities, made talent recruitment challenging.

Demographic Trends

Some companies with larger production focused workforce needs and greater human resources functional capacity follow demographic trends closely and are aware of declining population cohorts. This has an impact on how they plan for employee retention and development; with a lower population to recruit from, keeping and developing the existing workforce becomes more important.

In discussions of recruitment, employers reported a lack of racial diversity and challenges recruiting a diverse workforce. They added that retention of non-white new hires is also a challenge.

Low Unemployment Rate

Employers in manufacturing felt that low unemployment affected production and skilled trades in particular. Hourly workers can easily move to new jobs for higher pay. This leads to higher turnover in production areas and is a constant concern about adequate sources of new or replacement workers. Maintenance and skill positions, including machinists and tool and die technicians, are hard-to-fill positions primarily because the bench of qualified applicants is not deep. Competition is stiff as a result and these employees are often lured away, leaving positions that cannot be re-filled. In professional positions, employees are being recruited away to other firms either locally or out of the region.

Quality of Place

In discussions of recruitment and attraction to the area, employers also raised issues of adequate housing, schools, and quality of life.

Adequate Housing

Several employers stated that the housing stock available is not adequate and presents a challenge in both recruitment and retention of new employees, especially those coming from outside the region with expectations of maintaining or improving their quality of life. In particular, there is not enough quality housing stock in the area's suburban communities. The shortage of housing in Monroe County, considered an attractive area to live, is extreme; the rental market around Indiana University focuses on lucrative student housing rather than workforce housing. Outlying areas have more housing stock at much lower prices, but the rural environment does not appeal to urban dwellers moving to the area, who often see the housing as substandard and lacking in amenities. These perceptions directly contribute to the challenges of developing a sufficient talent pool in very rural counties and across the Uplands in general.

Increased Competition

Employers stated that competition has increased for talented students and graduates from the colleges and universities from which they have traditionally recruited (a challenge not unique to Uplands employers). Large national and international firms now have a bigger presence at a broader range of schools, and Uplands employers said they could not effectively compete with these firms or offer the same amenities. As

a result, a few employers have decided to establish new recruiting efforts at regional and local colleges—and have found excellent quality in the student talent there. Moreover, they have found that students at regional schools are generally more interested in remaining in the area after graduation than those at larger state or national institutions.

Impact of Automation

Uplands employers perceive automation and its impact on the workforce as relatively distant but also inevitable. For several employers, automation has limited application for their smaller batch operations. However, at more production-oriented settings, as in furniture manufacturing or food processing, new technology is expected to change in skill requirements, in hiring, and in future workforce growth. Moreover, in hard-to-fill positions in engineering and computer sciences, new applications of artificial intelligence, digital engineering, and machine learning are rapidly changing knowledge requirements for applicants—and thus recruiting criteria. This also presents issues for re-skilling existing engineers and some scientific workers.

Hiring Plans

Although we don't have comprehensive estimates for future hiring from all the firms we interviewed, there appears to be considerable hiring planned in the region over the next ten years. NSWC Crane and its subcontractors alone are scheduled to add about 4,000 new employees, with an emphasis on scientific and engineering specialties. Both a pharmaceutical manufacturing company and a medical device manufacturer will add hundreds of employees in new Monroe County facilities. Some of the larger manufacturing companies in automotive and wood products manufacturing report planned growth by around 10 percent, which translates in hundreds of new employees over a decade. A few smaller manufacturing companies did not report plans for significant expansion but are replacing workers due to attrition and turnover. Some hiring, especially among the Crane contractors, is done nationally (or is otherwise centralized), and the local leadership has little engagement in it other than to define the needs relative to contract specifications.

Hard-to-Fill Positions

Most employers emphasized the difficulties of attracting and retaining talent with niche or specialty skills. They cited the lack of a large enough pool of talent to draw upon in several fields. In manufacturing and life sciences, hard-to-fill positions span both skilled technical positions as well as engineering and administrative positions. These technicians and technically skilled employees may not have or need a bachelor's degree, but extensive technical training, certification, and experience are still required.

Virtually all fields of engineering are hard to fill: electrical, computer, polymer, chemical, software, and other engineering specialties. Larger employers, like each of the programs in NSWC Crane, have a range of hard-to-fill positions because of the broad spread of projects and esoteric technologies in use. Several employers, but most significantly those around NSWC Crane, noted the strong demand for scientific and engineering talent who can operate in environments moving toward digital processing, artificial intelligence, and complex systems integration, such as Model-Based Systems Engineering. Digital engineering is growing rapidly, but for Uplands employers, it is very challenging to find recruitment sources and to attract new hires to the area.

Table 13 summarizes employer responses to our questions about their workforces and hard-to-fill positions.

Table 13. Interview summaries, hard-to-fill positions and employment contexts

SECTOR/Category	Scale and Hiring Plans	Talent Recruitment Process	Labor Force Mix	Hardest Positions to Fill
ADVANCED MANUFACTURING Automotive Manufacturer	800+/- current employees. Added only about 40 positions last year.	Uses third party manpower source for production employee hiring. Almost all positions are now filled internally through movement from other facilities. Some local people hired temporarily/part-time positions. Recruits at specific universities for engineering and technical talent at traditional job fairs and recruiting events.	60% production employees 25% skilled trades/engineering 15% administrative/support functions	Skilled trades in areas such as diemakers, maintenance and engineering technologies.
ADVANCED MANUFACTURING Automotive Manufacturer	1,000 employees. Hiring to cover attrition. Expects to hire for growth soon.		Production and assembly mainly.	Machinists and skilled maintenance.
ADVANCED MANUFACTURING Furniture Manufacturer	2,500 in Dubois County, two thirds in production positions.		Hiring over 100 new workers above attrition.	Production positions are in high demand; hardest to fill are in shipping, shipping clerks.
ADVANCED MANUFACTURING Injection Molding	175 people in Bloomington facility. Not many jobs open now. Turnover is low.	Generally, recruits out of the region for technical, skilled and engineering talent. Employees are being recruited away by other local companies.	50% in administrative and engineering 50% in production and warehousing	Process engineers, mold design, and a range of technically skilled people and managers. Finding reliable people for production is a big issue. Also, hard to find good problem solvers.
ADVANCED MANUFACTURING Life Sciences Manufacturing	430 employees in Indiana, 380 people in Bloomington; no new hiring now, but replacing for attrition.	Uses a temporary service for new hires; then hires into workforce after 6 months.	Production, technical, and administrative.	Extrusion and mold specialists (design and repair). Technicians (set up and maintenance).

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				Need more polymer engineers.
LIFE SCIENCES Medical Device Company	<p>4,000 employees in Indiana with most in Uplands region.</p> <p>Production hiring 130 in January/February; high turnover with 40% staying less than one year.</p>	<p>Uses social media, WorkONE and online applications. Also recruits with universities. Promotes Achieve Your Degree with social media to increase interest. Tuition assistance is paid upfront, not reimbursed. This eliminates financial barriers to educating the workforce.</p>	<p>50% in production</p> <p>50% in support, professional, and scientific positions.</p>	<p>Production has high turnover with about 40% staying less than a year.</p> <p>Many people cannot pass the screening exam.</p> <p>Engineering, finance, compliance,</p> <p>Those with knowledge of federal regulatory procedures are also hard to fill.</p>
LIFE SCIENCES Pharmaceutical Company	<p>60 employees in Bloomington, hiring 6-7 people a year as business is added.</p>	<p>Uses online job search recruiting. Also posts positions at specific universities.</p>	<p>50 percent are in technical positions requiring bachelor's degree or greater.</p> <p>50% are in production or technician positions requiring up to an associate's degree.</p>	<p>Hard to compete with larger pharma employers for project or scientific talent; need people in sales and management who know regulated environments.</p>
NATIONAL SECURITY & DEFENSE Human Resources	<p>Hiring 350 people this year. Also adding significant numbers of scientists and engineers by 2028.</p>	<p>Developing coordinated hiring plans and educational relationships and coordination with high schools, colleges, universities. Developing both research and talent development programs. Continuing to work on population diversity goals.</p>	<p>60% scientists and engineers</p> <p>20% administrative</p> <p>20% services workers (manual)</p>	<p>Electrical engineering and engineering specialties (such as microelectronics and computer engineering)</p> <p>Mechanical engineering has sufficient candidates and is not a hard to fill position at this time.</p>

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NATIONAL SECURITY & DEFENSE Army Ammunitions Activity	<p>Currently, 720 at Crane Army Ammunitions program. Hiring about 50 new people per year in production and materials moving; also hiring technical personnel and engineers. Target is to hire 900 by 2028. Many will not require a college degree.</p>	<p>Talent is coming from previous coal mine experience and manufacturing sector. Most move to CAAA due to higher entry level starting wage, which is approximately \$18/hr.</p>	<p>80% services, technicians, and explosives handlers</p> <p>20% professional and engineering.</p>	<p>Skilled trades positions, pipefitters, welders, CNC</p> <p>Engineering and administrative positions.</p>
NATIONAL SECURITY & DEFENSE Electronic Warfare Center	<p>Has 1,100 civilian base employees and 500 contractors. Wants to increase contractor employees to about 50% of total group--about 500 new contractor employees.</p>	<p>See <i>NATIONAL SECURITY & DEFENSE Human Resources</i> above.</p>	<p>55% engineers</p> <p>45% technicians</p>	<p>Was electrical engineering, but now is physicists, electromagnetics, physicists and radio frequency engineers.</p> <p>Any position related to data processing or data analysis</p>
NATIONAL SECURITY & DEFENSE Strategic Missions Center	<p>Moving toward 950. Hiring 200+/- in Navy program by 2028 and 950 more contractor employees.</p> <p>Less than 1/3 of employees are outside of the Uplands region.</p>	<p>See <i>NATIONAL SECURITY & DEFENSE Human Resources</i> above.</p>	<p>75% professional, scientists and logisticians.</p>	<p>Engineers: computer engineering, electrical, software programming, aeronautical, and physics (rocketry).</p> <p>Experienced hires in system engineering.</p>
NATIONAL SECURITY & DEFENSE Expeditionary Warfare Center	<p>Approximately 1,100 employees on base. Expecting 200 employee growth per year. Some groups have 1:1 ratio of government to contractor personnel.</p>	<p>See <i>NATIONAL SECURITY & DEFENSE Human Resources</i> above.</p>	<p>75% will need to have bachelor's degree in the next 5 years.</p>	<p>Greatest demand: computer science, scientists. Areas of artificial intelligence/machine learning, big data, autonomous systems, sensor fusion, human systems integration, cybersecurity, augmented reality/virtual reality,</p>

				and model based system engineering.
NATIONAL SECURITY & DEFENSE Contractor	Employment is project and contract dependent; each has variety. 200 people now includes technicians, engineering, logisticians and tech writers. Moving to 700.	Uses job boards, corporate recruiters, college recruiting and career fairs.	Hiring is aggressive because of increased contracts, hiring 150-200 per year through 2022.	Jobs with security clearance requirements; logisticians, technical drafting, and engineering specialties.
NATIONAL SECURITY & DEFENSE Contractor	25 in company. Plans on staying small but having a high level of expertise.	Hires one at a time, depending on contracts and project needs. Also uses employee referrals, which includes bonus to referring employee. Recruits locally at Ivy Tech and Vincennes University for mechanical drafting and CAD.	Mostly PhD scientists and engineers.	Chemical engineers, computer scientists, electrical engineers, physicists and mathematicians.
NATIONAL SECURITY & DEFENSE Contractor	Approximately 600 employees on base, at WestGate and EastGate. Need to fill technician attrition at 4 per week. Moving towards 700 employees.	Technical degrees through universities and recruiters. Technicians through regional postings and word of mouth.	65% technicians/logisticians 25% engineering 10% administrative	Model based systems engineers, radio frequency engineers, specialists in microelectronics, batteries, and hypersonics, logisticians and acquisition specialists. Technicians require some certifications, welding, CNC, etc.

Evolving Partnerships with Postsecondary Education

As mentioned earlier, almost all the companies in our sample reported efforts to change recruiting practices and recruiting relationships in response to perceptions of a more limited talent supply. Pointed among these efforts were relationships with postsecondary institutions. *All* the companies we interviewed either have active programs or are developing programs for building out or refining strategic relationships with local (and national) postsecondary institutions to gain access to students and graduates in high-demand technical fields. Some employers already have built long-term relationships, while others are developing new strategic relationships in colleges and universities that offer important or specific technical programs directly related to their key talent needs.

While most of the larger firms, especially those in the life sciences and national security and defense sectors, maintained ongoing relationships with regional, state, and national colleges and universities, most also reported that these relationships are changing to reflect greater concern with identifying and recruiting talent to the region. An additional concern, frequently expressed, was that these partnerships with post-secondary need to place a greater emphasis on attracting a diverse workforce.

Companies reported that typically, relationships with colleges and universities develop organically: personal relationships or common research projects also drive recruiting. Interaction with faculty and departments around research often leads to recommendations that students or graduates consider working for companies located in the region. Moreover, company personnel use those relationships to build a good working knowledge of faculty or department interests and quality, and about the students they might recruit. This pattern tends to focus recruitment on the schools with whom employers are already familiar.

On the other end of the recruiting spectrum, some companies recruit very widely, often at multiple career events at both regional, statewide, and national campuses. Generally, only larger companies can afford to field recruiters or personnel to attend multiple recruiting events; NSWC Crane in particular reported attending numerous career fairs and recruiting events, including those at historically black and minority colleges and universities.

Both of these types of talent recruitment are now being reconsidered. Workforce needs and the competition in recruitment are pushing employers to examine their recruitment practices. Employers frequently expressed interest in increasing their effectiveness and obtaining the best returns possible for their (considerable) investment in recruiting. In general, this examination and change is taking place along the following lines.

Fewer, deeper relationships. Companies that have historically attended many career events said that they can no longer afford to spread their recruiting resources thinly and want to focus more on sources of talent, including local sources, that provide good results. Some human resources personnel we spoke with told us of the frustrations of going to several events and finding themselves competing with well-known companies like Google or Microsoft. They expressed an interest in developing deeper, closer relationships with more regional, near proximity schools like University of Southern Indiana, Indiana State University, and Indiana University-Purdue University at Indianapolis (IUPUI). They expect these relationships to produce better results through deeper, more focused, relationships with educational institutions and their students.

Multifaceted research-recruitment partnerships. Some companies in the interview group found themselves maintaining a recruitment program and a research program in parallel at the same leading research universities. They are now beginning to explore the complementarity between recruitment and research. Some are restructuring funded research projects to include elements such as internships and faculty exchanges in order to familiarize students and faculty with the region's opportunities for career-building employment upon graduation. Moreover, as some noted, this reduces the costs of recruiting by shifting some of that cost into the research design. Using cutting-edge research projects to engage future talent, employers felt, will build connections and interest in the region and in the types of work being done in the area.

More strategic relationships. Companies in our sample also wanted to develop better strategic relationships with college and universities, particularly with regional colleges in or near Indiana. Some of this strategy is being developed internally as employers refine their talent acquisition strategies. This includes clearer objectives in recruiting relationships, defining the depth and extent of relationships over time, and setting an appropriate level for the relationship and goals. Some employers reported they wanted more clarity in their objectives: focusing on skills, diversity, and programs that align the technical focus of the relationship and develop the common skills the company feels are important.

Better relationships with local colleges. Our sample reported relationships with virtually every college in the region and in Indiana: Rose-Hulman Institute of Technology, Purdue University (including the Purdue Polytechnic campuses), Indiana University, Indiana State University, University of Southern Indiana, IUPUI, Ivy Tech, Vincennes University, and others, including some traditional liberal arts colleges. Companies gravitate to institutions where they feel successful in gaining access to talented students and developing strong relationships in specific departments. Some companies expressed frustration that each institution is a little different in terms of procedures, characteristics, and culture; recruiting in different environments and sustaining the relationships takes considerable time.

Budding Relationships with Secondary Schools

Although several companies, including NSWC Crane, reported building recruiting and talent development relationships with high schools, these were less defined and organized than relationships with postsecondary institutions. Some companies maintain high school internship programs, but most relationships focus on simply providing information about an industry, its technologies, and its careers. Some employers hosted events either at their company or at high schools (or elementary schools, too). Several employers described efforts to become more involved in high schools and career centers, out of both a need to recruit new employees and a community-based concern that local students should know more about opportunities for good jobs and careers at home in the Uplands. Part of the difficulty in working with high schools or investing in those relationships, some employers reported, is the dispersion and frequency of high schools across the region. Most school districts have one or more high schools, some are very small, and it is not often clear to employers how to develop relationships that have significant impact for the company or communities.

NSWC Crane, however, is developing an exemplary relationship with local high schools (and middle schools) that offers a long-term perspective on talent development and community relationships. Crane is now developing a contact system (database) that will allow ongoing communication with the students as they move along their educational pathways. This contact begins when middle school students first visit NSWC Crane and extends through college; it includes internships and potential projects with programs at the naval base. The hope is to help younger students understand what Crane is and that it can be a good place to start and build a career. As more of the naval base's hiring comes under direct hiring authority rather than relying on a centralized federal hiring procedure and sourcing, these types of relationships with schools can become an important source of talent.

Hiring Practices and The Talent Supply

We asked employers if they have recently changed their approach to hiring people. Nearly every company answered affirmatively and similarly. Companies in our sample are:

- refining their hiring processes to more carefully define and then target the skills needed for a position,
- working to more accurately identify those skills in candidates, and
- aligning technical skills, employability skills, and attributes required for positions with the cultures or core values of their organization.

Several companies in our sample described how their hiring process has changed over a two- to three-year period of planning, implementation, assessment and refinement. The shift is significant. Some companies are incrementally changing elements of hiring, while others, notably some of the larger employers in the region, are taking a more comprehensive approach. All approaches are becoming more accurate in defining the full range of talents needed in a position, identifying candidates with those talents, and implementing the actual hiring process more efficiently. As a result, they are making better decisions more quickly. Table 14 summarizes how Uplands companies are defining and hiring talent.

Table 14. Steps to develop a talent acquisition strategy and plan

Integrate planning for talent acquisition into core business planning.	
	Include human resource planning in development and implementation of business strategy and growth
	Identify employment growth targets by role in organization.
	Assess roles and jobs within organization in relation to contributions to business strategy, growth plans, and core values.
	Identify roles within the organization and in relation to the organizational goals.
	Allocate resources to reshape hiring process.
	Develop business-related metrics for human resource functions.
Focus on jobs and roles in relation to organization.	
	Identify core technical skills and attributes required in each job.
	Validate with current workforce, teams, and management.
	Identify required qualifications, credentials, and attributes for job candidates.
	Define measurement and assessment tools for job characteristics such both tools and process steps.
Design recruitment strategies; create clear hiring procedures and decision-making.	
	Identify goals and metrics for hiring.
	Communicate requirements to sources of talent; use as platform for building relationships.

	Apply assessments (including screening, testing, and formal feedback from interviews).
	Assess and evaluate hiring outcomes against goals.
	<i>Source: Author's analysis; interviews with employers on recruiting and hiring practices.</i>

Talent Development and Retention Strategies

Finally, a majority of the firms we interviewed have created talent development plans for their workforce. Talent development is both a strategy for achieving business performance goals and for increasing the retention of employees, who emerge better prepared to grow into new roles in the organization or adapt to change within existing jobs. Talent development includes the training required for job performance, career development, and employee engagement. Employers take different approaches in this area, from encouraging their workforce to take advantage of certifications or educational programs and tuition reimbursement, to implementing more highly structured programs that link career advances and pay incentives to education and training. Several of our interviewees told us that their programs around talent development were a response to perceived talent shortages; their policies needed to grow the talent that was not available in the labor force.

2. DEMOGRAPHICS AND THE REGIONAL LABOR FORCE

Population Data

Between 2010 and 2017, the population of the Uplands grew more slowly than the rest of the state, as shown in Table 15, and grew unevenly across counties. Daviess and Monroe added population at about twice the rate of increase for the state as a whole and were—along with Dubois County, with a 1.4 percent increase—the only growing counties in the region.

Table 15. Uplands population change, all ages, 2010–2017

County	2010	2017	Change	% Change
Brown	15,271	15,007	-274	-1.7%
Crawford	10,825	10,598	-227	-2.1%
Daviess	31,045	32,777	1,732	5.6%
Dubois	41,809	42,379	570	1.4%
Greene	33,084	32,431	-653	-2.0%
Lawrence	46,192	45,669	-523	-1.1%
Martin	10,324	10,219	-105	-1.0%
Monroe	134,442	144,436	9,994	7.4%
Orange	19,820	19,623	-197	-1.0%
Owen	21,737	20,957	-780	-3.6%
Washington	28,226	27,807	-419	-1.5%
Region	392,775	401,903	9,128	2.3%
Region w/o Monroe	258,333	257,467	-866	-0.34%
State	6,417,398	6,614,418	197,020	3.1%

Source: American Community Survey (2010–2017).

Owen County experienced the largest decline in population while population losses in the other eight counties were modest, about 3,100 people. This compares to a gain of 12,300 across Daviess, Dubois, and Monroe Counties.

The population increase in Monroe County accounts for about 80 percent of the total population increase among the three growing counties. In fact, Monroe County's gain of nearly 10,000 people between 2010 and 2017, is almost exactly the net growth for the region as a whole. As the *Strategic Plan for Economic and Community Prosperity in Southwest Central Indiana* pointed out in its 2014 report, almost half the growth in population in Monroe County between 2000 and 2012 came from increases in the undergraduate and graduate student population at Indiana University. Our data suggest that this trend continues. While we address this later in the section on postsecondary education, between 2010 and 2018, Indiana University's undergraduate enrollment grew by some 5,375 students, an increase of 15 percent. As student population is concentrated in the 20–29 age group, that increase accounted for a little more than half of the entire population growth in Monroe County, consistent with the increased presence of students.

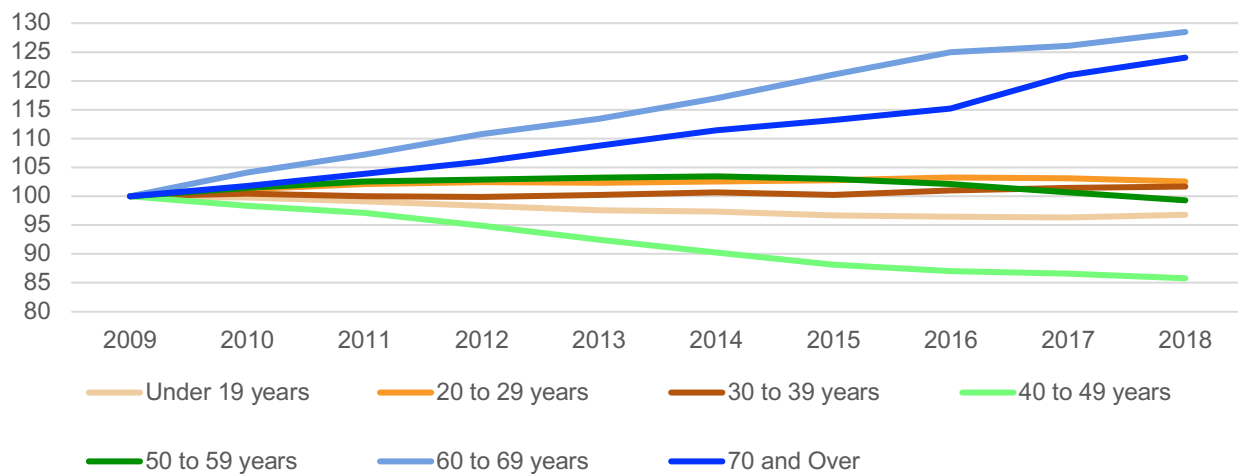
However, that student-led growth is more complicated than a socioeconomic distortion in an otherwise low-to-no-growth region. Even without the undergraduate increase's influence on population growth, Monroe County would still show the largest population increase in the Uplands. The region as a whole would find its overall growth rate reduced from 2.3 to around 1.1 percent. Additionally, while a substantial proportion of

that student enrollment group will leave the region upon graduation, some will join the local labor force as young adults. This population segment represents a unique opportunity not enjoyed by other areas that lack a significant attraction for young adults. The challenge is to retain more of that talent for the region's growth.

Growth and Age Cohorts

Another important trend shaping the labor force in the region is shifting growth among age cohorts. Simply put, the region's population is getting older, and the numbers of people in the younger and working-age cohorts are declining relative to older cohorts. Figure 5 shows the direction of these changes among different age cohorts between 2009 and 2018, with the growth indexed to 2009. The two lines with the steepest rise represent those over 60 years old, while the other lines are all relatively flat or sloping downward, indicating population declines. In the younger cohorts, population declines are sharpest among experienced members of the workforce between 40 and 60 years old and among the youngest cohorts of 5 to 19, a cohort that helps define future population growth in key workforce sectors. Finally, without the contributions of the student-age population, the 20–29 cohort's very slight increase would turn negative. The flat or downward lines in the figure both place pressure on the talent pool in the near term for declines in experienced workers and longer term as smaller cohorts of younger people enter postsecondary education or the workforce.

Figure 5. Uplands population change by age cohorts, indexed to 2009, 2009-2018



Source: EMSI, Population and Age, 2019

Race and Ethnicity

The racial and ethnic population of the region is largely white, with little change over the last decade. In other regions around the country, in both urban and many rural areas, a typical pattern in population growth is that virtually all population increases come non-white groups and foreign-born people; increases in ethnic diversity, through birthrate or immigration, overcome decline in the traditionally white population. In the Uplands as a whole, as Table 16 suggests, there were no significant increases in non-white or ethnic

populations. Of the three counties that experienced general population growth, only Daviess and Dubois show increases in Black/African-American or Hispanic/Latino populations, albeit relatively small. Those small shifts account for about a third of the total increase in their populations from 2010 to 2017.

Table 16. Proportion of Uplands county by race or ethnicity, 2010–2017

County	Population 2010	Population 2017	% White 2010	% White 2017	% Black or African American 2010	% Black or African American 2017	% Hispanic or Latino 2010	% Hispanic or Latino 2017
Brown	15,271	15,007	97%	97%	0%	1%	1%	2%
Crawford	10,825	10,598	98%	97%	1%	0%	1%	1%
Daviess	31,045	32,777	97%	95%	0%	2%	4%	5%
Dubois	41,809	42,379	97%	94%	1%	1%	6%	7%
Greene	33,084	32,431	98%	98%	0%	0%	1%	1%
Lawrence	46,192	45,669	98%	97%	0%	0%	1%	2%
Martin	10,324	10,219	98%	98%	0%	1%	1%	0%
Monroe	134,442	144,436	88%	87%	3%	3%	3%	3%
Orange	19,820	19,623	97%	97%	1%	1%	1%	1%
Owen	21,737	20,957	98%	97%	0%	1%	1%	1%
Washington	28,226	27,807	98%	98%	0%	0%	1%	1%
Region	392,775	401,903	94%	93%	2%	2%	2%	3%
State	6,417,398	6,614,418	85%	84%	9%	9%	6%	7%

Source: American Community Survey Estimates 2006–2010, 2013–2017.

Educational Attainment

In the eight years between 2010 and 2017, Uplands counties experienced significant upward shifts in educational attainment, as well as a reduction in the proportion of county residents who hold a high school diploma or less. In 2014, the *Strategic Plan for Economic and Community Prosperity in Southwest Central Indiana* noted the unevenness of educational attainment in the region across counties. This unevenness continued through 2017, as shown in Table 17, becoming more concentrated at the upper ends of attainment (bachelor's and master's degrees). In particular, Monroe County, one of the most highly educated populations in the state, stands out. However, in nearly every other county, the proportions of population having some college attainment (including associate degrees) and above also show consistent increases from 2010 to 2017.

Table 17. Uplands educational attainment by share of county population, ages 25 and older, 2010–2017

	Less than high school		High school graduate (or equivalency)		Some college		Bachelor's degree		Master's degree	
County	2010	2017	2010	2017	2010	2017	2010	2017	2010	2017
Brown	13%	10%	40%	35%	26%	30%	12%	13%	7%	10%
Crawford	18%	18%	50%	47%	20%	24%	6%	7%	4%	3%
Daviess	25%	26%	37%	34%	25%	26%	7%	9%	4%	4%
Dubois	15%	12%	41%	39%	24%	28%	13%	15%	6%	5%
Greene	17%	13%	44%	41%	28%	32%	7%	9%	4%	4%
Lawrence	19%	11%	44%	42%	24%	31%	8%	10%	3%	5%
Martin	19%	16%	43%	43%	30%	30%	5%	6%	3%	3%
Monroe	9%	8%	24%	22%	24%	24%	22%	24%	14%	15%
Orange	21%	17%	45%	46%	21%	26%	7%	7%	4%	4%
Owen	18%	15%	50%	43%	24%	30%	5%	7%	3%	4%
Washington	20%	15%	46%	45%	23%	28%	5%	7%	4%	4%
Region	16%	13%	38%	35%	24%	27%	12%	14%	7%	8%
State	14%	12%	36%	34%	28%	29%	14%	16%	6%	7%

Source: American Community Survey (2006–2010, 2013–2017).

Population with less than a high school diploma has declined significantly in most counties, excepting Davies and Crawford. Although individual counties and the region as a whole still lag behind the attainment levels of the state—many counties considerably so, in proportions of those holding a bachelor's degree or higher—most counties made significant progress in reducing the numbers who have not completed high school or stopped formal education after high school. For percentage of population with less than a high school diploma, the Uplands has narrowed the gap between county and state averages. However, in all counties except Monroe and Daviess, the group that has completed only high school remains significantly larger than that for Indiana.

Finally, the unevenness of educational attainment in the talent supply across the region is revealed by the geographic concentration of those holding bachelor's degrees or greater. As shown in Table 18, while 22 percent of the *total* Uplands working-age population hold a bachelor's degree or higher, in only three counties—Dubois, Brown, and Monroe—does that proportion rise above 20 percent of the *local* population. Unsurprisingly, due to the location of Indiana University in Bloomington, Brown and Monroe County together account for 60 percent of all these degree holders in the region. This has held almost constant over the last eight years.

Table 18. Share of county population ages 25 and older with bachelor's degree or higher, 2010–2017*

County	2010	2017
Brown	19.9%	24.3%
Crawford	10.8%	9.7%
Daviess	11.3%	13.0%
Dubois	19.2%	20.0%
Greene	10.8%	13.5%
Lawrence	11.4%	15.3%
Martin	8.3%	10.7%
Monroe	40.1%	35.5%
Orange	11.4%	10.8%
Owen	8.0%	12.1%
Washington	9.3%	11.3%
Region	20.6%	23.9%

*Source: 2013–2017 American Community Survey 5-Year Estimates (2018). *Includes bachelor's, master's, professional, and doctorate degrees.*

Income

Between 2010 and 2017, as recovery from the recession of 2008–2009 got underway, household incomes in the region began to increase, particularly in two income brackets: the lowest income and highest income households (see Table 19). The proportion of people in households with incomes of less than \$25,000 annually declined substantially, from 30 percent of all households in the region to 25 percent, although the percentage level in 2017 is still greater than that for the state.

At the same time, the proportion of households reporting incomes of over \$100,000 per year increased from 11 to 17 percent across the region. Most individual Uplands counties experienced similar significant changes in these income brackets as well. The end of the recession and increases in demand for talent had a strong and beneficial effect on both ends of the income spectrum in almost every county. The middle-income groups, those households between \$25,000 and \$99,999 of income, did not show such consistent changes; in general, incomes in those groups were flat. Individual households may have moved in and out of these income ranges, but their total proportions within county income distributions did not change much, paralleling the distribution of the state as a whole.

Labor Market Analysis for the Uplands Region

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Table 19. Uplands household income by county (in 2017 inflation-adjusted dollars), 2010–2017

	Households		<\$25,000		\$25,000– \$49,999		\$50,000– \$99,999		\$100,000 or more	
County	2010	2017	2010	2017	2010	2017	2010	2017	2010	2017
Brown	5,913	6,011	23%	20%	27%	21%	36%	36%	14%	23%
Crawford	4,344	4,007	32%	33%	30%	26%	33%	33%	5%	8%
Daviess	11,016	11,482	23%	24%	34%	27%	32%	31%	11%	18%
Dubois	15,900	16,524	21%	19%	25%	23%	38%	37%	15%	21%
Greene	13,137	12,653	31%	24%	29%	26%	30%	36%	11%	14%
Lawrence	18,679	18,432	30%	23%	30%	27%	31%	37%	9%	13%
Martin	4,113	4,251	24%	24%	32%	27%	33%	34%	10%	15%
Monroe	51,388	55,014	35%	30%	24%	23%	27%	27%	13%	20%
Orange	7,866	7,830	33%	28%	31%	28%	27%	31%	8%	12%
Owen	8,371	8,551	24%	21%	33%	31%	34%	33%	9%	15%
Washington	10,810	10,570	28%	23%	34%	30%	30%	34%	7%	13%
Region	151,537	155,325	30%	25%	28%	26%	31%	32%	11%	17%
State	2,465,402	2,537,189	24%	22%	28%	25%	33%	32%	15%	20%

Source: American Community Survey (2013–2017).

Table 20. Median household income by county, 2010–2017

County	2010	2017	% Change
Brown	\$50,139	\$59,292	18%
Crawford	\$37,988	\$40,067	5%
Daviess	\$44,592	\$48,355	8%
Dubois	\$52,871	\$57,307	8%
Greene	\$41,103	\$49,648	21%
Lawrence	\$40,380	\$49,985	24%
Martin	\$43,406	\$49,372	14%
Monroe	\$38,137	\$45,689	20%
Orange	\$37,120	\$42,803	15%

Owen	\$44,285	\$48,315	9%
Washington	\$39,722	\$46,861	18%
State	\$47,697	\$52,182	9.4%

Source: 2013–2017 American Community Survey 5-Year Estimates (2019).

Table 20 helps illuminate income distribution a little further. Median household incomes in the region increased substantially between 2010 and 2017, at much higher rates than the state level of 9.4 percent. Only four counties were at or below the state-level increase (9.4 percent); the rest experienced double-digit increases in household income over eight years. Once again, the greatest impact of this increase was felt in Monroe County because of its higher population and large number of households; while Lawrence County had the highest *percentage* increase in household income, it has about one-third the number of households as Monroe.

Rural Poverty Indicators

The percentage of Uplands residents living below the poverty line in 2017 hovered around the state average. Poverty rates in the Uplands vary considerably by county, but in many counties, poverty rates declined slightly from 2010 (see Table 21). Dubois had the lowest poverty rate at 10.0 percent. In five of the 11 counties, the poverty rate in 2017 was above 15 percent. Monroe County's poverty rate of 24.7 percent is likely influenced by the concentration of full-time students in Bloomington. Except for Owen County, which reported an increase of people in poverty of 3.2 percent, all of the county *increases* in poverty in the region were less than 1 percent.

Table 21. Proportion of annual incomes below the poverty line by county, 2010–2017*

County	2010	2017	Change
Brown	10.8%	10.6%	-0.2%
Crawford	18.7%	17.8%	-0.9%
Daviess	12.3%	13.0%	0.7%
Dubois	9.6%	10.0%	0.4%
Greene	14.4%	12.9%	-1.5%
Lawrence	15.8%	11.5%	-4.3%
Martin	13.0%	13.3%	0.3%
Monroe	25.5%	24.7%	-0.8%
Orange	20.2%	15.0%	-5.2%
Owen	12.4%	15.6%	3.2%
Washington	16.9%	13.3%	-3.6%
State	13.5%	14.6%	1.1%

*Source: 2013–2017 American Community Survey 5-Year Estimates, 2019. *In 2017 dollars.*

Labor Force Participation

Since the recession of 2008–2009, economists and policymakers have noted declining labor force participation rates across the country. In fact, labor force participation in the United States has declined to historically low rates. This suggests that adults who would otherwise be working or looking for work may have become discouraged during or immediately after the recession and left the workforce. This decline has affected age groups, regions, and gender groups differently. For example, many men over 55 who were laid off in the recession have left the workforce after having difficulty finding new work in other than low-wage jobs.

In the Uplands, declines in labor force participation mean that the supply of talent is declining. Only in Lawrence, Martin, and Monroe Counties did the labor force participation rate remain flat or increase in the last 8 years (see Table 22). All other Uplands counties exhibited declines in labor force participation (as did the state). Labor economists predict that in times of low unemployment, the labor force participation rates should *increase*; as competition for scarce human resources increases, wages rise— and draw people back into the workforce. In the Uplands, despite lower unemployment labor force participation continues to decline in some counties. Moreover, because the growth in the working-age population is flat (again, except for in Monroe County, a declining participation rate means that the numbers of people active in the labor force are declining in real numbers, not just in proportion. This reduces the supply of talent available and active in the region.

Table 22. Labor force participation by county, ages 16 years and older, 2010–2017

	Population	Population	% Participation	% Participation
County	2010	2017	2010	2017
Brown	12,367	12,645	62.6%	56.8%
Crawford	8,580	8,559	59.3%	51.9%
Daviess	23,149	24,213	65.8%	62%
Dubois	32,318	33,167	68.9%	68.1%
Greene	25,918	26,096	61%	58.3%
Lawrence	36,358	36,757	59.6%	59.1%
Martin	8,117	8,176	62.9%	62.7%
Monroe	114,616	124,110	59.6%	61.8%
Orange	15,613	15,574	59.8%	56.8%
Owen	17,231	16,971	61.8%	59.5%
Washington	21,658	21,964	63%	58.6%
State	4,996,762	5,216,340	65.6%	63.8%

Source: American Community Survey (2006–2010, 2013–2017).

3. THE REGIONAL TALENT SUPPLY: SECONDARY AND POSTSECONDARY EDUCATION

Talent supply—that is, the flow of individuals who possess skills and knowledge and who will seek employment within the region—comes from two sources. First, the largest source of talent by far in most areas is that which is locally developed in K–12 school districts and postsecondary institutions. A related but much smaller local source of talent is publicly funded workforce development and adult training programs. While training programs are important in enabling people to gain the skills they need in order to enter or improve their position in the labor market, the total number of program participants is very low; for that reason, workforce development training programs are not discussed in our research here. Second, another source of talent is that which is recruited from outside the region to fill specific opportunities. This external talent supply often depends on the recruiting activities of individual firms and, sometimes, to the attraction efforts of economic development organizations or industry associations. Like workforce training programs, public policy and programs around recruitment and attraction also tend to produce small results. Our emphasis, then, is on how the locally developed K-12 and postsecondary educational systems contribute to the supply of talent in the Uplands.

In this section, we describe current trends in regional educational institutions: 1) at the secondary public-school district level and 2) at the postsecondary level, looking at credential production in Indiana's two- and four-year colleges and universities that are relevant to the Uplands labor market. To the extent possible, given data availability, we focus on those institutions that lie in closer proximity to the region or that have regional campuses (e.g., Ivy Tech and Purdue's Polytechnic) that are important sources of talent. We will not only look at the *overall* volume of talent supply in terms of total credentials being awarded, but also examine *relevant* talent production in specific programs related to ROI's three key sectors.

Secondary Education in The Uplands (High Schools and Career and Technical Education)

Summary Observations

Three important trends are shaping secondary education in the Uplands. First, although enrollment trends vary considerably among Uplands schools and counties, enrollments in most high schools across the region have declined over the last decade. This is largely a function of population trends and reflects shrinking age cohorts working their way through secondary school years. Based on our population growth analysis earlier, there is no reason to believe that this trend will turn toward growth any time soon. Over at least the next decade, the numbers of students entering secondary schools in the region will continue to decline, mitigated only by population flows into the region.

Second, a remarkable transformation in career-related education is taking place in high schools and career centers across the Uplands. Substantially more students are enrolling in STEM-related programs and clusters of courses related to those technologies that are foundational to high-demand fields and careers in the region. The creation of career pathways in high schools, as well as of CTE career centers, seems to

have surpassed a tipping point; now successfully encouraging more students to enter career- or technically oriented paths through secondary education. The course offerings in areas such as engineering have significantly increased exposure to and focus on technical fields, both in terms of number and depth of courses as well as enrollment. Indiana is among the national leaders in policy for revitalizing career and technical education; this shift has been in planning and implementation for well over a decade and has taken on significant momentum since 2012. Now this effort appears to be bearing fruit, as more and more students enroll in career-oriented education in STEM-related fields.

Third, it appears that despite this shift, many high school graduates are still not able to translate their exposure to career-related education easily into employment in the labor market. Using data that links high school graduation and employment status, it appears that of the students graduating who do not matriculate into colleges but enter the labor force, most enter into employment *not* related to their fields of study (in CTE coursework, for example). **Only one out of six high school graduates who enter employment report that their employment is related to the technical or career fields they studied in high school⁵.**

Declining population and declining high school enrollments mean fewer diploma awards from high schools in the region. This will have a negative impact on the potential supply of talent both for jobs that do not require postsecondary credentials *and* for those that do, as fewer high school graduates will be available to enter either the job market or higher education. On the other hand, many more students are now engaged in career-related educational programs in career pathway and career cluster curricula. Those students may be better prepared to enter employment in jobs that offer greater career potential and higher wages, and that support economic growth in the region as whole. The implication from our data that graduates *do not* enter fields they prepared for, however, suggests a large-scale waste of regional talent.

These trends offer the region an opportunity to respond in a positive way, to become much more efficient and intentional around cultivating the talent coming from Uplands high schools. Even if there are fewer students, if more of them—many of whom are now enrolling in more career-related courses and education programs—could have a better entry into the labor market and into fields that promise career potential, then communities would be making more efficient use of their talent pool. And hopefully this would mean less wasted talent than occurs now when students leave high school to enter low-wage employment or jobs with limited career-building potential.

The following discussion first describes high school enrollments and graduations across the region, and then explores recent trends in career and technical education (CTE) offered in Uplands high schools and career centers. There is a great deal of activity within communities and high schools to increase the quality of education, both in general high school and career-related curricula. Often these efforts involve increased engagement with both wider civic communities and business communities. This engagement is unquestionably important and is the foundation for social and economic well-being and enhancing student learning. Here we primarily rely on quantitative data to describe the relationship between secondary education and the development of a talent supply for the region.

⁵Source: Indiana Department of Education. Data provided to authors, authors' analysis.

High School Enrollments

The 11 counties in the Uplands are home to 29 high schools; seven career centers lie in the region or accept students from the region (including the Columbus Area Career Connection). The high schools show considerable range of enrollments from very small in less-populated districts to those with over 1,000 students in Bloomington, Bedford, and Jasper. In the 2017–2018 school year, these high schools collectively enrolled almost 16,000 students. Table 23 shows high school enrollments by county and suggests an additional impact of population decline: fewer students entering high schools. As shown in the table, only two counties, Daviess and Martin, experienced growth in high school enrollments over the last decade. Across all schools, enrollments have declined by an average of 6.4 percent.

Table 23. High school enrollments (grades 9–12) by county, 2008-2018

County	2008–2009	2017–2018	% Change 2008–2018
Brown	755	665	-11.9%
Crawford	543	450	-17.1%
Daviess	1,255	1,289	2.7%
Dubois	2,387	2,295	-3.9%
Greene	1,606	1,502	-6.5%
Lawrence	2,201	2,061	-6.4%
Martin	437	454	3.9%
Monroe	4,428	4,176	-5.7%
Orange	988	955	-3.3%
Owen	909	803	-11.7%
Washington	1,508	1,284	-14.9%
Region	17,017	15,934	-6.4%

Source: IDOE, Compass 2008-2018.

A decade earlier, Uplands high schools enrolled 1,000 more students than in 2018. Within some schools, enrollments have declined sharply either as a result of reorganization within a district or overall population declines. In the handful of schools where enrollment increased, the significance of the percentage increase very much depends on the size of the school (Table 24). Loogootee Jr/Sr High School in Martin County, for example, experienced a 26 percent increase in enrollment but that increase still represents a total enrollment of only 275 students. No larger school showed a significant increase in enrollment over the decade, and in fact only one larger school, Jasper High School in Dubois County showed positive growth.

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Table 24. High School Enrollment, Uplands Region, 2008-2018.

High School	County	Grades 9-12 Enrollment 2008-2009	Grades 9-12 Enrollment 2107-2018	% Change 2008-2018
Brown County High School	Brown	755	665	-11.9%
Crawford County Jr-Sr High School	Crawford	543	450	-17.1%
Barr Reeve Jr-Sr High School	Daviess	213	206	-3.3%
North Daviess Jr-Sr High Sch	Daviess	296	316	6.8%
Washington High School	Daviess	746	767	2.8%
Forest Park Jr-Sr High School	Dubois	459	385	-16.1%
Jasper High School	Dubois	1063	1094	2.9%
Northeast Dubois High School	Dubois	308	279	-9.4%
Southridge High School	Dubois	557	537	-3.6%
Bloomfield High School	Greene	383	237	-38.1%
Eastern District Jr-Sr High School	Greene	388	377	-2.8%
Linton-Stockton High School	Greene	344	381	10.8%
Shakamak Jr-Sr High School	Greene	258	233	-9.7%
White River Valley High School	Greene	233	274	17.6%
Bedford-North Lawrence High School	Lawrence	1620	1564	-3.5%
Mitchell High School	Lawrence	581	497	-14.5%
Loogootee Jr/Sr High School	Martin	218	275	26.1%
Shoals Community Jr-Sr High School	Martin	219	179	-18.3%
Bloomington High School North	Monroe	1622	1598	-1.5%
Bloomington High School South	Monroe	1733	1690	-2.5%
Edgewood High School	Monroe	870	768	-11.7%
Academy of Science and Entrepreneurship	Monroe	203	120	-40.9%
Orleans Jr-Sr High School	Orange	256	230	-10.2%
Paoli Jr & Sr High School	Orange	450	458	1.8%
Springs Valley Community High School	Orange	282	267	-5.3%
Owen Valley Community High School	Owen	909	803	-11.7%

Eastern High School	Washington	543	458	-15.7%
Salem High School	Washington	663	570	-14.0%
West Washington Jr-Sr High School	Washington	302	256	-15.2%
Total Enrollments		1,7017	1,5934	-6.4%

Source: Indiana Department of Education, Compass, April 2019.

High School Graduations

In the Uplands, the number of student graduations generally follows the direction of enrollments. In total, graduations did not appreciably change between 2008 and 2018. Some counties experienced significant gains in the number of students completing high school, while others (Green, Orange, and Crawford) show equally steep declines. Because the figures shown in Table 25 are three-year averages, these are not anomalies of a one-year fluctuation. They represent real direction in the graduation of students in the counties. This, of course, has implications for the numbers of graduates joining the labor market and implications for the overall well-being of communities. Fewer people joining the labor market, earning income, and residing in counties threatens the overall health of the communities that experience a decline in graduations.

Table 25. Average high school graduations by county, 2008–2018

County	2008–2010	2016–2018	% Change
Brown	141	149	6%
Crawford	117	94	-19%
Daviess	252	300	19%
Dubois	532	528	-1%
Greene	351	320	-9%
Lawrence	409	413	1%
Martin	106	100	-5%
Monroe	851	922	8%
Orange	219	187	-15%
Owen	168	162	-3%
Washington	303	286	-6%
Region	3,449	3,461	0%

Source: IDOE, Compass 2008–2018.

Career and Technical Education

Despite declining high school enrollments and more or less flat graduations in the region, participation in career-related education—through the Upland’s seven career and technical education (CTE) centers or career-related programs in high schools—is increasing dramatically. This is an important newer aspect of education in the Uplands that we will now explore in some detail.

After about 15 years of reform and reorganization at the state level of Indiana’s CTE programming and curricula, as well as a greater emphasis on career readiness at the district level, the Uplands is now seeing several impacts. First, course enrollment in CTE-identified courses is substantially higher, and significantly, greater numbers of students are entering and completing CTE pathway programs. Second, the content of these programs has also changed; compared to what was typically offered as career training 15 years ago, today’s CTE training addresses more current issues in technology and reflects greater emphasis on engineering and engineering technology programs. Third, the distinction between vocational education or career training education offered through career centers on one hand, and academic education offered through district high schools on the other, is fading. Today, career centers offer a broader range of technical education programs, and high schools offer greater choice in technically oriented education that prepares students either for employment or for college readiness in technical subjects.

The following set of tables and figures depict the strong upward trends in CTE at the region’s career centers and increasing career-related course-taking at district high schools. Table 26 shows enrollments in career clusters across all the region’s career centers and high schools. Career clusters encompass several related career or job pathways: sets of course that could prepare students either for employment or as foundation for entry into postsecondary education in a technical field. Career centers do not all offer the same set of pathway programs; programming varies widely. **Several of the clusters that are important to the Uplands and important to the talent supply for local industry have grown by over 200 percent between 2008 and 2018.** Programs in the Information Technology cluster have increased the most steeply and are directly relevant to the talent needs of all three of the Uplands’ key sectors. **Overall, from 2008 to 2018, there was a 52 percent increase in enrollments throughout the region’s career centers.**

Table 26. Enrollments in career clusters in Uplands CTE career centers and high schools, 2008-2018

Career Cluster	2008*	2009	2013	2017	2018	% Change
Information Technology	56	114	119	281	344	514.3%
Business, Management, & Administration	158	208	1276	856	783	395.6%
Hospitality & Tourism	94	134	210	308	397	322.3%
Health Services	548	664	1,093	1,579	1,771	223.2%
Architecture & Construction	206	273	554	604	642	211.7%
Law & Protective Services	50	68	44	67	141	182.0%
Manufacturing & Processing	191	245	428	425	535	180.1%

Arts, Technology, & Communications	193	326	357	292	328	69.9%
Science, Engineering, & Technologies	670	629	996	1,047	1,070	59.7%
Other Career Tech Programs and FACS**	1,746	1,444	1,938	2,047	2,376	36.1%
Agriculture, Food, & Natural Resources	1,697	2,560	1,938	2,008	2,279	34.3%
Transportation and Logistics	325	389	507	518	419	28.9%
Educational Services	941	864	749	784	790	-16.0%
Human Services	1,591	1,376	1,419	1,150	1,028	-35.4%
Total	8,466	9,294	11,628	11,966	12,903	52.4%

Source: Indiana Department of Education, INTERS Data, April 2019. *Some years excluded for presentation; percentages reflect totals for all years 2008–2018. The enrollments do not represent a count of individual students; a single student may enroll in several courses. **Now includes career and college exploration and preparation courses that are increasing, in addition to FACS that include nutrition and family health courses.

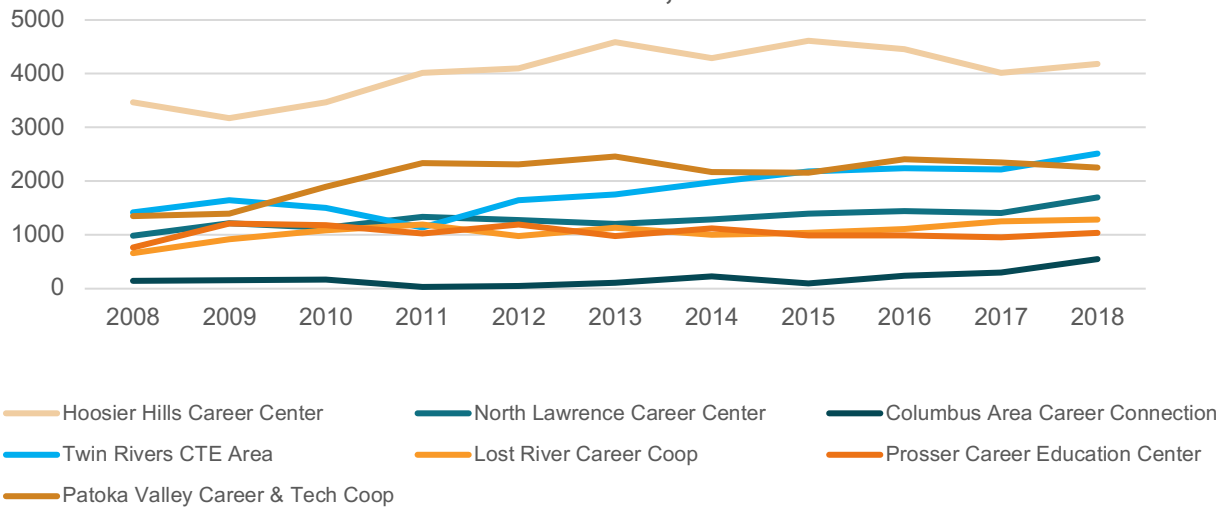
In these enrollment numbers we can also see shifts in the most frequently enrolled programs. In 2008, Human Services was the third most frequently enrolled program among all the career centers. Since then, the Indiana Department of Education has de-emphasized (both in per-course funding and in advising) one of its main components, cosmetology; accordingly, by 2018, enrollments in the Human Services cluster declined by 35 percent. Over the same period, **the Science and Engineering cluster, on the other hand, which includes CTE STEM courses and Project Lead the Way courses, grew by 60 percent and includes additional STEM courses offered within the district high schools).** Meanwhile, **enrollments in the Manufacturing cluster** (which includes pathways in advanced manufacturing, robotics, electronics, and precision machining) **increased from under 200 enrollments to over 500—an increase of 180 percent over the last decade.**

In recent years, the Indiana Department of Education has implemented a course funding formula that provides higher levels of funding for courses and pathways programs in designated high-demand and high-wage fields. While this may explain some of the increase in course *offerings*, it does not completely explain the dramatic increase in course *enrollments*. Given the years of effort at the state and district levels to revitalize vocationally oriented career and technical education into “college and career readiness” curricula and to emphasize STEM in programs such as Project Lead the Way, it is equally likely that students are now more interested in these courses which results in greater numbers of enrollees.

Figure 6 shows how enrollments in career and technical education–related courses (the building blocks of pathways and clusters) have increased around the region. Each line of the figure shows the growth path and scale of enrollments at each career center. For example, Hoosier Hills Career Center, the largest CTE center in the region, saw an increase from about 3,500 enrollments in 2008 to about 4,200 in 2018. Twin Rivers CTE district increased enrollments 77 percent, from about 1,400 in 2008 to just over 2,500 in 2018. In

fact, all the centers increased enrollments during the ten-year period. These increases also brought significant increases of funding to the centers and school districts.

Figure 6. Course enrollment trends at Career and Technical Education districts,* 2008-2018



Source: Indiana Department of Education, INTERS Data, April 2019. *Showing number of course enrollments in CTE programs and offerings; a single student will enroll in multiple courses.

While high school students can enroll in individual CTE courses, their entry into a sequence of pathway courses means they may become a “concentrator” in a career pathway; concentrators take at least two and up to four courses in a pathway. Concentrators, then, are students who have chosen a technical field as a focus and have chosen to attend, in almost all school districts, a CTE center. Because they are enrolling in multiple courses, concentrators are a relatively small subset of all enrollments. Table 27 shows high school graduates who have earned concentrator status. Except for Twin Rivers CTE Area Center, all the other centers show significant increases of students graduating with a CTE concentration. Overall, the districts showed a 69 percent increase in the numbers of concentrators coming from their programs.

Table 27. High school graduates with a CTE concentration by CTE center, 2011–2018

CTE Career Center	2011	2012	2013	2014	2015	2016	2017	2018	% Change
Columbus Area Career Connection	1	2	1	3	14	9	7	16	1,500%
Hoosier Hills Career Center	210	260	278	306	295	359	291	338	61%
Lost River Career Coop	40	38	106	71	77	78	101	91	128%
North Lawrence Career Center	130	161	214	157	43	150	129	176	35%
Patoka Valley Career & Tech Coop	33	32	126	188	130	190	187	246	645%
Prosser Career Education Center	5	73	37	75	40	23	26	31	520%

Twin Rivers CTE Area	171	246	44	69	58	58	78	98	-43%
Total	590	812	806	869	657	867	819	996	69%

Source: Indiana Department of Education, INTERS Data, April 2019. *Prior to 2011, data definitions and data reporting of CTE concentrations were inconsistent and are not included here.

Postgraduation Experience

In 2017, the state's high schools graduated a little over 73,000 students. Of those graduates, 63 percent, as described in Table 28, enrolled in a college (in or out of Indiana). The Uplands compared favorably to the statewide college-going percentage with a total reported percentage of 68 percent of its 3,400 graduates entering a college. There is a considerable range of college matriculation among the counties in the region, however, ranging from a high of 76 percent in Dubois County to the low of 50 percent in Owen County. Although not shown here, the Indiana College Readiness Reports, created by the Indiana Commission for Higher Education, indicate that about two-thirds of Indiana's high school students who enroll in college after graduation will do so in Indiana postsecondary institutions. So, among the 2,331 Uplands graduates enrolled in college, we can expect about 1,450 of them to have entered Indiana colleges. Some of these new college students will eventually become part of the Uplands labor force.

Table 28. Total high school graduates enrolled in college by county, 2017

County	Graduates	Enrolled	% Enrolled
Brown	153	87	57%
Crawford	95	53	56%
Daviess	316	206	65%
Dubois	509	386	76%
Greene	323	225	70%
Lawrence	335	237	62%
Martin	102	65	64%
Monroe	962	723	75%
Orange	187	110	59%
Owen	165	82	50%
Washington	280	157	56%
Region	3,427	2,331	68%
State	73,238	46,149	63%

Source: Indiana Commission for Higher Education, Indiana College Readiness Reports, Counties, 2019 (academic Year 2017).

Another third of the high school graduates in the region do not enroll in a college and instead enter the labor force, generally seeking employment in the local market. Their experience in job finding and employment is not as well documented as that of their college-bound classmates. (In Indiana, schools collect information on college acceptances or employment plans as graduation nears and follow up after graduation to identify the postgraduation plans of graduates; these data are reported to the Indiana Department of Education.)

We can, however, make some inferences about their experience. Table 29 shows data for graduates in the 11 Uplands counties for the years between 2008 and 2018; included here are *only* high school graduates who also completed at least some CTE coursework to focus on their particular employment experience. This allows us to probe the issue, of those graduates who reported employment after graduation, how many are employed in a field related to their high school field of study? The data are imperfect, and so we can only use them as a heuristic tool to address the connection students make between their CTE-related education in high school and their entry into and participation in the labor force.

Table 29 suggests that among the graduates, a substantial number report being employed (some may also be enrolled in a college). However, a far smaller number report being employed in a field that was related to their CTE study in high school.

Table 29. Postsecondary status of unduplicated high school graduates with CTE coursework, 2008–2018

Year of Graduation	Eligible to Graduate* and Taken One or More CTE/Stem Courses	Entered Postsecondary Education	Employed**	Employed in Job Related to CTE Courses or Pathways	% Employed in Related Field to CTE Courses or Pathways
2008	2,062	1,293	1,131	210	18.6%
2009	2,599	1,623	1,462	271	18.5%
2010	2,464	1,571	2,006	401	20.0%
2011	2,769	1,777	2,242	404	18.0%
2012	2,819	1,804	2,205	330	15.0%
2013	3,212	2,027	2,466	409	16.6%
2014	3,146	1,968	2,334	400	17.1%
2015	3,100	1,817	2,022	335	16.6%
2016	3,099	1,861	1,660	245	14.8%
2017	2,997	1,668	1,283	160	12.5%
2018	3,273	1,293	1,418	NA	NA
Average	2,867	1,700	1,839	293	15.9%

Source: IDOE, INTERS reporting. Data are generally obtained through student reporting at and after graduation by schools and school districts; 2018 may not be finalized. *Students who were in 12th grade during the graduation year and who had enrolled in up to four courses in CTE approved courses. ** In these data, employment can include overlap with those students who also entered postsecondary education.

Across the ten-year period shown in Table 29, consistently only 15 to 20 percent of graduates reported being employed in a field related to their high school CTE or pathway studies. There may be several reasons for the low rate of related employment. For example, students may have looked for but could not find employment in a related field; they may not have wanted employment in a field related to their CTE coursework; or, they may have taken jobs based on their income needs rather than field preferences. For whatever reason, less than one out of six employed graduates reported working in a field that reflected their CTE coursework.

Another explanation could be that the connections between high school curricula and knowledge of or information about regional career options are simply not explicit enough to offer students a clear step from education to employment. In our interviews, several businesses told us that they believe few local students know that their company exists or what other companies in the region do—much less the opportunities those companies offer for jobs, careers, and incomes. In other words, students can graduate from high school without knowing very much about opportunities for employment and careers within the regional labor market. Moreover, without information on the range of possibilities, graduates are generally limited to opportunities that are within their line of sight. And typically, the most visible and accessible components of the labor market are service jobs (in retail or healthcare, for example), at often low-wage employment.

In high schools and in the experiences of recent graduates, as these data suggest, there appears to be a disjuncture between the recent increases in participation in technical education programs and courses within the high school curricula and the resulting employment paths pursued by graduates. This disjuncture also represents a loss of talent for the region's labor market, or at the very least a delay in realizing the talent contribution. Given the declining population in the region, declining enrollments in high schools, and declining graduations in some counties, the Uplands can ill afford to waste the talents of young people as they graduate from high schools and seek employment.

We believe these data point toward a very significant opportunity for Uplands leaders, educators, and employers to offer Uplands high school graduates better outcomes in the labor market. After having successfully increased the offerings and numbers of students engaged in college and career-ready curricula, in CTE technical education pathways, and in STEM-related programs, Uplands leaders must find ways to make a more direct and secure connection between education experience and employment outcomes. To more fully realize the benefits of the investment in CTE education reform, the next step is to increase the effectiveness and efficiency of linkages to the labor market.

Postsecondary Education Serving the Uplands

Although employment opportunities within the region encompass a broad spectrum of occupations with varying educational requirements, talent needs within the key growth sectors identified by ROI are remarkably concentrated in technical fields that require postsecondary credentials, ranging from associate degrees in technology to PhDs in mathematics and physics. Meeting this demand for credentialed talent is an important requisite to sustain the Uplands' transformation, but it does present significant challenges. This section of the report focuses on postsecondary education in or near the region and the essential supply of talent generated by those postsecondary institutions.

Summary Observations

Unless they enroll in Indiana University, Ivy Tech Community College, or Vincennes University (with a Jasper campus), students matriculating from the Uplands counties must leave the region to attend postsecondary institutions. No other region of Indiana has so few postsecondary choices within its boundaries. On the other hand, Indiana's other major universities and internationally leading postsecondary institutions, community college campuses, and regional campuses are relatively close, within a 100-mile radius of the region's center, with a combined enrollment of over 335,000 students.

Thus, there is a great deal of additional educational capacity near the region, including outstanding institutions for teaching and research in fields that are of high importance in the Uplands, such as engineering specialties, computer sciences, and life sciences (see Figure 7).

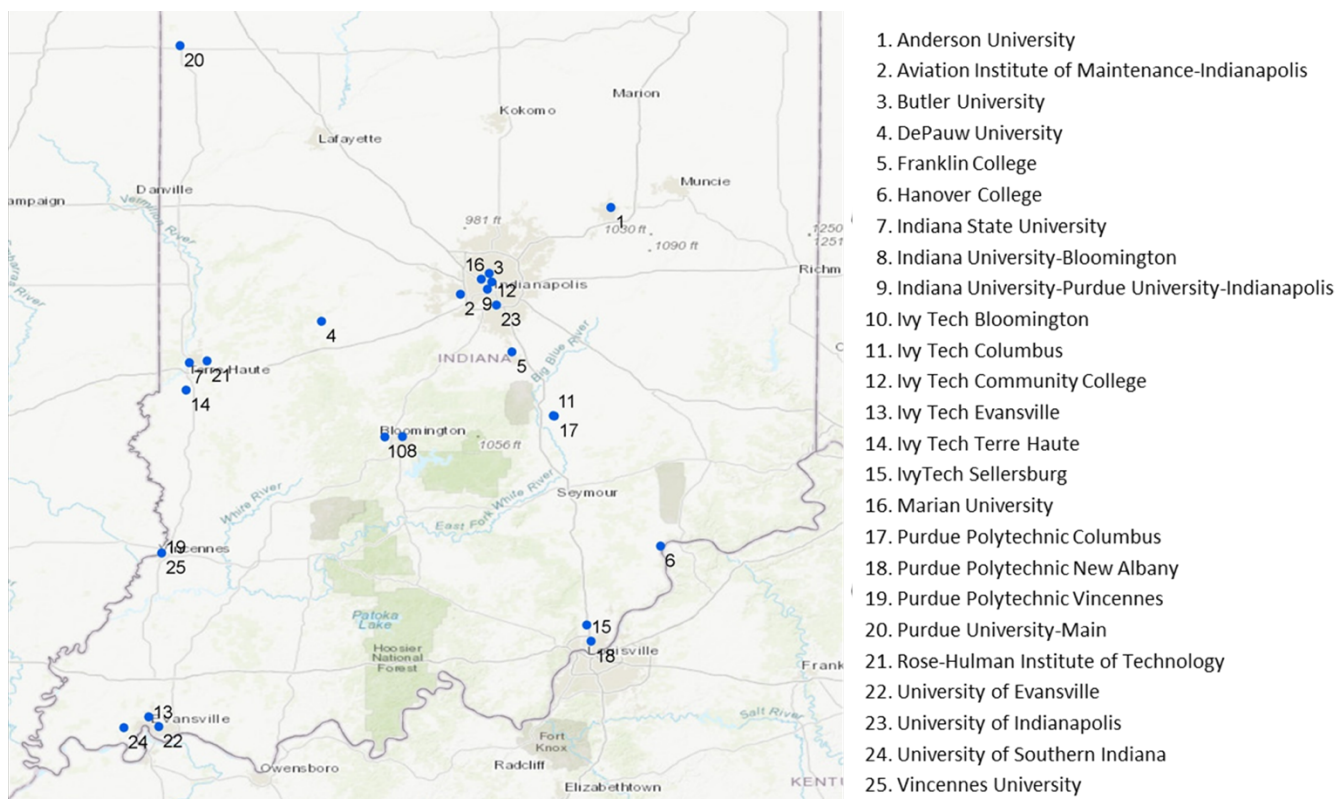


Figure 7: Postsecondary colleges and universities within 100 miles of the Uplands region

However, there are distinct challenges to tapping this capacity and ensuring a robust supply of graduates with skills in high-demand fields into the region. As we described earlier, economic growth in the region is fueling demand for talent. Combined with other state, national, and international demands for talented graduates, the increase in demand is steeper than the increase in output from Indiana colleges and universities. As such, Uplands employers are encountering an increasingly competitive labor market within the region, as well as increased competitiveness between the region and everywhere else. Using

educational data from regions and institutions, we describe the following challenges in postsecondary education.

First, in our sample, degree-seeking enrollments in Indiana colleges and universities have been declining since about 2010; this is an effect of shrinking age cohorts entering college and a robust employment economy in which high school graduates and adults enter the labor force instead of enrolling in postsecondary education.

Second, among colleges serving the region, degree awards are highly concentrated in a small number of fields of study—liberal arts, business and management, and healthcare—compared to other fields such as those in the technologies and scientific specialties that are very important within the region.

Third, these concentrations of graduates in a relatively small number of fields of study means many fewer students are graduating from postsecondary institutions with technical credentials aligned with the needs of local employers in the region. Among some baccalaureate institutions, there are considerable recent increases in degree awards in technical fields such as engineering and computer and information sciences; however, the high reputations of these schools globally attract a national and international student population, and as a result, a substantial proportion of students leave Indiana—upwards of 60 percent.

As we described in earlier sections of this report, many Uplands employers, particularly larger employers in the key sectors, are responding to these trends in creative and positive ways. Employers are engaged in greater outreach to postsecondary institutions in Indiana and are building deeper, strategic, multifaceted relationships with educational institutions. Many are refining their talent acquisition strategies to increase effectiveness in attracting and hiring talented people to either stay in the Uplands or move into the region. Additionally, some are implementing talent management and talent development strategies that will increase employee retention.

This trend among employers is full of potential. With these new strategies, Uplands employers can increase their capacity to identify and attract vital talent. By understanding and adapting to those new strategies, postsecondary institutions can increase their capacity to meet Indiana's workforce needs. And by helping to make these new strategies more widely understood and facilitating their adoption across the region, communities and organizations like ROI can increase their impact on the Uplands economy. Recruiting and attracting talent will probably never be simple or easy again due to long-term population change and shifts in productivity due to technology and automation. However, by getting better at specifying talent needs, building sustainable talent pipelines, and identifying talent, Uplands employers, communities, and institutions may be able to capture and attract the workforce needed to thrive.

Postsecondary Education and The Supply of Talent

Within the Uplands, Ivy Tech Community College, Vincennes University Jasper, and Indiana University are the only sub baccalaureate and baccalaureate public or private colleges. However, in a wider sweep of

selected two- and four-year Indiana postsecondary institutions within a 100-mile radius of the center of the region, there are about 17 colleges with total 2016–2017 enrollments of about 335,000 students.⁶

While we will examine the output of these schools relative to the needs of the region, it is first important to note that the enrollments in most of these schools have declined significantly since 2010. In fact, colleges selected as part of this research had an overall decline of 6 percent in undergraduate enrollment between 2010 and 2017, as shown in Table 30. This is part of a national trend in declining college enrollments. There are a few important exceptions to this decline, however. The Indiana University at Bloomington and Rose-Hulman Institute of Technology both show double-digit increases in undergraduate enrollments since 2010. Increases in enrollment and (eventually) degree completion increases the base population of students who might consider employment in the region. This is particularly good news in the case of Rose-Hulman Institute of Technology, which concentrates in engineering technologies that are in high demand in the region. Numerous employers we interviewed wanted to hire more students from Rose-Hulman Institute of Technology.

Table 30. Undergraduate enrollment change among selected Indiana colleges and universities, 2010–2017*

Institution	% Change
Anderson University	-10%
Aviation Institute of Maintenance-Indianapolis	-23%
Butler University	9%
DePauw University	-7%
Franklin College	-9%
Hanover College	9%
Indiana State University	24%
Indiana University-Bloomington	15%
Indiana University-Purdue University-Indianapolis	-9%
Ivy Tech Community College (State)	-6%
Marian University	10%
Purdue University-Main Campus	-5%
Rose-Hulman Institute of Technology	17%
University of Evansville	-13%
University of Indianapolis	4%

⁶ See Appendix for a list of the colleges and universities included in the sample. Includes statewide enrollment for Ivy Tech Community College.

University of Southern Indiana	-13%
Vincennes University	-6%
<i>Source: US Department of Education, NCES, IPEDS, author's analysis. *Selected colleges within 100 miles of the zip code 47462 (center of Uplands region), excluding single-purpose institutions and those with less than 100 students.</i>	

Indiana University, in Bloomington, is adding large numbers of students, too, as well as the relevant programs, such as intelligent systems engineering (ISE), a new department in the (also) new School of Informatics, Computing, and Engineering. These next-generation technology programs integrate engineering with computing and artificial intelligence—directly addressing growing needs in the Uplands for increased talent in digital engineering specialties and applications of artificial intelligence. Nevertheless, declining numbers of enrollments across many other schools in the region may eventually mean reduced numbers of graduates and will place greater competitive pressures on employers in the region as they seek new talent.

Looking backward over the last eight years of completion data for the institutions in our sample, we can plot the direction and scale of growth or change in the total number of graduates by degree level. Table 31 shows an overall 7 percent increase in the number of bachelor's degrees produced among the 17 schools (from about 23,000 awards to almost 27,000), and a more robust 11 percent increase in master's degrees (from about 7,000 awards in 2010 to almost 8,500 in 2017).

Table 31: Total degree awards by level for 17 Indiana postsecondary institutions, 2010-2017*

Year	Certificates > 1 Academic Year	Certificates > 1 Academic Year < 2	Associate Degree	Bachelor's Degree	Master's Degree
2010				23,048	6,961
2011				24,494	7,420
2012	3,658	4,034	11,248	25,326	7,604
2013	3,551	5,402	11,472	25,720	7,557
2014	3,703	7,896	11,719	25,314	7,647
2015	3,650	8,677	12,055	26,390	7,627
2016	4,155	8,192	11,334	26,594	7,848
2017	4,060	10,619	11,148	26,979	8,418
<i>* In 2012, Ivy Tech began to report data to NCES-IPEDS as a single statewide system. Prior to 2012, Ivy Tech reported each campus separately. Available IPEDS data for 2011 and 2010 for associate degrees and certificates show only the Indianapolis campus of Ivy Tech. Those two years are excluded from this chart.</i>					

Aggregate sub baccalaureate awards—certificates and associate degrees—paint a more complex picture. Total sub baccalaureate awards increased by a substantial 36 percent in just six years from 2012 to 2017; however, *all* of that increase is due to growth in certificate awards of between one and two years of academic coursework. These are certificates generally designed for entry into employment in a technical field or for upward career movement. In general, certificates offer the technical courses that are also offered

in degree programs, but without requiring additional general education courses such as humanities and language arts or capstone courses. These certificates are almost exclusively granted by Ivy Tech Community College and Vincennes University. In 2012, for example, Ivy Tech and Vincennes awarded 3,334 and 67 certificates of between one- and two-years study, respectively. By 2017, those awards had increased to 9,369 and 1,161 certificate awards, respectively. This accounts for *all* the total credential award growth in Indiana's sub baccalaureate institutions. Associate degree production, by contrast, declined by slightly over 1 percent.

The dramatic increase in technical certificate awards may represent attempts by institutions to increase completion and graduation rates. By promoting certificates that emphasize technical content, institutions capture (and can report) completions for those students who take the occupational or technical courses but who would often not complete the general education requirements. Thus, even though enrollments declined at Ivy Tech Community College and Vincennes University by 6 percent, overall credential awards increased sharply after 2012. Institutions may also be responding to what they recognize as a market shift. Technical certificates allow people to gain important credentials and workplace-related and technical skills; they may not see completing the other academic degree requirements as important as gaining those specific skills that have immediate value in the labor market or in their current job. In some of our interviews, employers reported that demonstrated technical skills, as evidenced by either industry certifications or academic certificate awards, are as important in their hiring criteria as possession of an associate degree.

Program Completions by Field of Study

In exploring the supply of talent from Indiana's postsecondary institutions, we now examine in what fields students graduate and whether there are significant numbers in fields relevant to local employment opportunities and careers. Even if overall enrollments are declining, if proportionally more students enter fields of high opportunity in the local labor market, could the talent supply be able to meet the talent demand? To answer this question, we looked at completions by field of study. The following figures show total completions across fields of study and the total percentage of all graduates in major fields (associate degrees and certificates are examined separately from bachelor's and master's degrees).

Sub Baccalaureate Institutions

Among the colleges granting two-year degrees and certificates (largely but not exclusively Ivy Tech and Vincennes), 68 percent of all certificates and associate degrees are awarded in three fields of study, as shown in Table 32. The largest proportion of degrees and certificates are granted in Liberal Arts and General Studies. Many receiving that degree are likely to transfer to bachelor's degree programs within a few years of graduation. A similar process takes place for those receiving credentials in business management or marketing. Many students obtain this kind of credential as a preliminary step before transferring their credits into another program.

Nevertheless, Table 32 clearly depicts a substantial drop-off in the proportions of graduates in technical fields such as engineering technologies, mechanic and repair technologies, computer and information sciences and other technical fields in high demand in the key sectors in the Uplands.

Table 32. Certificates and associate degrees by field of study as proportion of all credential awards, top 15 fields, 2016-2017

Liberal Arts and Sciences - General Studies	29%
Health Professions	23%
Business Management & Marketing	16%
Engineering Technologies	5%
Construction Trades	4%
Mechanic and Repair Technologies	4%
Education	4%
Computer and Information Sciences	3%
Homeland Security and Public Safety	3%
Precision Production	3%
Visual and Performing Arts	1%
Personal and Culinary Services	1%
Parks & Recreation / Leisure	1%
Legal Professions and Studies	1%
Agriculture - Agriculture Operations	1%
Total Certificate and Associate Degree Awards N = 25,777. Source: NCES, IPEDS 2016-2017	

While the data for Table 32 is drawn from statewide data, Table 33 paints a similar picture for Vincennes University and for regional campuses of Ivy Tech Community College, institutions that are in or close to the Uplands and are important educational resources for the region. The highlighted area shows that 63 percent of degree and certificate awards fall in the fields of Liberal Arts, Health, and Business Management and Marketing. Together with Construction Trades (a program not offered at all campuses), these four fields account for 70 percent of all degree awards. Although degree awards do vary among campuses and institutions, for the Uplands, the more important, critical divide lies between the most popular fields and the region's most needed fields. Only a few fields attract and graduate the large majority of students; and they do not include the programs in high demand in the Uplands key sectors.

Table 33 Top 10 fields of study at sub baccalaureate colleges serving the Uplands, by proportion of credential

Fields of Study (CIP)	Bloomington ITCC	Columbus ITCC	Sellersburg ITCC	Terre Haute ITCC	Vincennes University	Average % of Awards

Liberal Arts, General Studies	33%	19%	23%	16%	53%	29%
Health Professions	20%	25%	20%	29%	7%	20%
Business, Management, Marketing	21%	16%	12%	13%	5%	14%
Construction Trades	0%	1%	20%	12%	2%	7%
Mechanic and Repair Technologies	2%	2%	7%	7%	5%	5%
Engineering Technologies	3%	6%	2%	5%	4%	4%
Computer and Information Sciences	7%	4%	4%	4%	2%	4%
Education	5%	9%	2%	3%	1%	4%
Homeland Security, Protective Services	4%	3%	2%	4%	3%	3%
Precision Production	-	1%	4%	3%	5%	3%
Multi/Interdisciplinary Studies	-	11%	-	-		-
Total Awards All Types	1165	1158	1969	1457	3171	

Source: Ivy Tech Community College, Institutional Research 2016–2017; Vincennes: NCES, IPEDS 2016–2017.

Baccalaureate Degree–Granting Institutions

Bachelor's and master's degrees awards show more even distribution of credentials across various fields of study as well as higher concentrations of credential awards in the technical fields that are very important in the region. Note that public universities in Indiana do not offer a general liberal arts degree program.⁷ While Healthcare and Business fields still account for about 30 percent of the total credentials awarded among the schools in our sample, the distributions of other fields and the larger numbers of students entering in-demand technical fields are much more robust than those graduating from two-year colleges. The presence of Indiana's major universities (Indiana and Purdue Universities) and a technically focused institute (Rose-Hulman Institute of Technology) in this group of colleges has a pronounced effect on the distribution of degrees in fields of study related to engineering and technical fields. Substantial numbers of students are graduating with technical and scientific degrees

⁷ Indiana University at Bloomington, for example, does not offer a degree (Bachelor of Arts) in Liberal Arts. It does offer a Bachelor of Liberal Studies, which is largely a self-directed, multidisciplinary program. Lack of a large liberal arts degree program certainly changes the percentage distribution of degree awards, but at the same time encourages students to identify other specific fields as areas of study.

In our interviews with employers, Purdue University, Indiana University, IUPUI, and Rose-Hulman Institute of Technology were among the most frequently mentioned Indiana colleges from which employers recruited technical and professional talent. These employers also reported developing a variety of partnerships with these schools in joint research or through internships, or, increasingly, a combination of the two. All were viewed as important sources for engineering talent, scientific specialties, and technical areas; graduates of these schools' technical programs were especially sought after. Uplands employers now compete for those graduates with companies from around the world. In Table 34, we present the combined bachelor's and master's degree output for those schools as illustration of the levels of talent production in those hard-to-fill technical and scientific areas.

Table 34. Bachelor's and master's degrees by field as proportions of all graduates, 2016-2017

Business Management Marketing	19%
Health Professions and Related Programs	10%
Engineering	10%
Education	6%
Computer and Information Sciences	5%
Communication and Journalism	5%
Visual and Performing Arts	4%
Biological and Biomedical Sciences	4%
Public Administration and Social Services	4%
Social Sciences	4%
Parks % Recreation / Leisure	4%
Psychology	3%
Engineering Technologies	3%
Multi/Interdisciplinary Studies	3%
Physical Sciences	2%
Total bachelor's and master's awards N = 35,397. <i>Source: NCES, IPEDS 2016-2017</i>	

For these schools, the distribution of degree awards and fields of study in selected technical areas is quite robust, and significant numbers of degrees are awarded in fields in high demand in the Uplands. In addition, many of the fields show very large percentage increases in both bachelor's and master's degree awards between 2010 and 2017. Some of these increases are due, as in the case of Indiana University, to the launch of a new school and department focused on computer and information sciences. The overall percentage increase in degree awards in the fields shown in Table 35 from 2010 to 2017 is 56 percent in just 7 years. Some fields, however, in engineering technologies (important to advanced manufacturing) and

the sciences showed more modest gains or, as in the case of master's programs in the sciences, experienced declines in the numbers of degree awards.

Table 35. Bachelor's and master's degree awards, selected fields of study, Indiana University-Bloomington, IUPUI, Purdue University (Main), Rose-Hulman Institute of Technology, 2010–2017

	2010 Bachelor's Degrees	2017 Bachelor's Degrees	% Change 2010 to 2017	2010 Master's Degrees	2017 Master's Degrees	% Change 2010 to 2017
Computer and Information Sciences	432	1,202	178%	110	413	275%
Engineering	1,809	2,418	34%	449	844	88%
Engineering Technologies	659	671	2%	50	163	226%
Mathematics and Statistics	183	403	120%	60	85	42%
Biological and Biomedical Sciences	715	1,000	40%	192	172	-10%
Physical Sciences	257	318	24%	66	61	-8%

Source: NCES, IPEDS, 2009–2010 and 2016–2017; analysis used two-digit CIP field of study codes.

The presence of triple-digit increases for some fields side-by-side with flat growth or declines for others reminds us that the question of whether these institutions generate a robust supply of talent depends on the specific demands for talent. In the Uplands, employers express needs for specialties in engineering that are subsets of the general engineering category shown in Table 35. For example, of the 2,418 bachelor's degrees awarded in engineering in 2017, just 290 of those were in electrical engineering; yet that field was one of the most cited in-demand technical and professional fields among the employers we interviewed. Other specialties, such as mathematics and physics, also are in demand but comprise just a small subset of the broader fields of study described above.

Finally, although not located within the counties of the Uplands, Purdue University's Polytechnic Institute (formerly the College of Technology) maintains three regional campuses in close proximity, in Columbus, New Albany, and Vincennes. The Polytechnic offers Bachelor of Science degrees in technical fields that are of relevance for all the of key sectors in the region. The Polytechnic is also important because of its emphasis on applied learning and experiential learning: each degree requires internships or projects with employers. In general, similar programs are available at all the campuses, with the exception of Vincennes, where the sole program is a Bachelor of Science degree in multidisciplinary technology and is located on the campus of Vincennes University. Table 36 shows degree awards at these campuses from 2009 through 2018. Although not shown for reasons of space, degree awards at these campuses peaked in 2013 with 81 bachelor's degree awards. Over the decade shown, degree awards at these campuses have declined from a three-year average (2009–2011) of 74 degree awards to 71 degree awards average for the most recent three years.

Table 36. Purdue Polytechnic Institute regional campus completions by degree awards and majors, 2009–2018

Degree Level and Field of Study	2008 – 2009	2009 – 2010	2010 – 2011	2011 – 2012	2012 – 2013	2013 – 2014	2014 – 2015	2015 – 2016	2016 – 2017	2017 – 2018
Total Associate of Science and Certificates	31	35	28	24	35	12	4	4	4	1
BS Mechanical Engineering Technology	10	17	22	18	25	15	36	25	33	25
BS Industrial Technology General Operations	0	1	6	9	22	15	3	14	11	18
BS Computer Graphics Technology	2	7	5	11	9	9	5	9	5	9
BS Organizational Leadership	9	13	5	9	13	11	18	9	7	7
BS Electrical Engineering Technology	0	10	12	11	9	6	9	9	10	5
BS Computer & Information Technology	1	3	5	5	3	6	2	2	5	1
BS Engineering Technology	0	0	0	0	0	0	0	0	0	1
Total Bachelor of Science Degrees	22	51	55	63	81	62	73	68	71	66

Source: Data supplied by Purdue University, Polytechnic Institute. School year includes three terms for calculating annual degree awards (for example, 2008–2009 includes fall 2008, spring 2009, and summer 2009).

The Purdue Polytechnic Institute is creating new educational capacity at WestGate, located near the entrance to NWSC Crane, as part of the Westgate Academy and Purdue@Westgate economic development efforts. The WestGate area is a technology park mainly populated with Crane contractors. Plans are being developed to expand companies in the park beyond contractors to other types of firms. The training and education part of this new effort is called Purdue CareerMakers and is beginning with a focus on cyber-security, delivering courses and training to area firms and workers. Purdue, in combination with its Polytechnic Institute locations, provides an important set of educational resources in the Uplands. At the same time, the declining numbers of credentials awarded at the campuses and the relatively low total degrees awarded across the campuses suggest an opportunity to make greater use of the existing capacity at the Polytechnic. Each degree in Table 32 represents an important skill area for Uplands key sector firms. Moreover, the Polytechnic's emphasis on applied and experiential learning offers regional companies the opportunity to develop strong educational partnerships that could help students find local employment opportunities.

Graduate Retention

Statistics of enrollment and graduation provide important information about the talent supply within a region, but not the whole picture. An important determinant of the size and shape of the talent pool of graduates from Indiana colleges and universities is the number of graduates who will stay in the state after graduation and, presumably, begin their career with local employers.

Table 37. Working location of Indiana alumni per LinkedIn, 2013–2016

Institution	2013–2016 Alumni*	Working in Indiana	% Working in Indiana
Anderson University	3,486	2,351	67.4%
Butler University	7,170	3,799	53.0%
DePauw University	4,106	1,439	35.0%
Franklin College	1,990	1,254	63.0%
Hanover College	1,505	544	36.1%
Indiana State University	14,321	8,653	60.4%
Indiana University-Bloomington	61,234	27,934	45.6%
Indiana University-Purdue University-Indianapolis	28,189	22,326	79.2%
Ivy Tech Community College	33,540	21,435	63.9%
Marian University	3,659	2,183	59.7%
Purdue University-Main Campus	66,627	28,985	43.5%
Rose-Hulman Institute of Technology	4,020	1,490	37.1%
University of Evansville	3,592	2,013	56.0%
University of Indianapolis	6,391	4,573	71.6%
University of Southern Indiana	8,788	6,663	75.8%
Vincennes University	4,761	2,679	56.3%
Average Alumni in State			56.5%

Source: LinkedIn Alumni Tools (www.linkedin.com/alumni), author's calculations. *These include only those alumni who registered with LinkedIn and provided educational and employment information; the data are self-reported.

Until recently, estimating geographic retention rates of graduates was difficult and involved considerable calculation and some speculation across multiple data sources. Career-related social media sites like LinkedIn now generate large amounts of data that, with appropriate cautions, allow researchers to link alumni of specific schools with current work and residential location. The corresponding data for the group of colleges and universities serving the Uplands, shown in Table 37, reveals significant variation in the

proportion of 2013-2016 alumni who report currently residing and working in Indiana. It ranges from a high of 79 percent for IUPUI to lows of about 35 percent for the more traditional liberal arts colleges in the group, Hanover College and DePauw University. Across all the schools in our sample, about 56 percent of the alumni reporting on LinkedIn also report being located and employed in Indiana.

Indiana University, Purdue University, and Rose-Hulman Institute of Technology show some of the lowest rates of in-state alumni retention, at least as reported through LinkedIn. This has impact on the regional talent supply. Despite considerable growth in the numbers of awards in high-demand fields among these schools, with the exception of IUPUI, the total talent pool available to employers in the state from these schools shrinks by around 60 percent of the reported total alumni. The talent pool remaining in the state is substantially reduced, thus increasing employer competition.

At the same time, several of the colleges in our group and several in closer proximity to the Uplands (such as University of Indianapolis, Indiana State University, Anderson University, Ivy Tech Community College, and University of Southern Indiana) all demonstrate that relatively high percentages of their alumni stay in (or return to) Indiana. These schools draw from a more regional population that, according to the LinkedIn data, tends to remain in the area after graduation.⁸ Upwards of 65 percent of their alumni report working in Indiana. In our interviews, these schools were described as important sources of talent, and among some employers, they are taking on increased importance. Employers reported deepening relationships with these schools and becoming more engaged with them through joint research or technical projects, internships, and sponsorships that help faculty and students become more familiar with local opportunities for engagement and employment. We believe this illustrates a very promising strategy for regional employers to develop closer relationships with primarily regional colleges and universities to strengthen their ability to recruit talent for positions within their firms.

4. CONCLUSIONS: A REGIONAL TRANSFORMATION UNDERWAY

We believe the data presented in this report describe an economic and social transformation underway in the Indiana Uplands. The region's historical roots in a rural environment, in agriculture, and in traditional manufacturing are spreading in new directions. The data show that the Uplands growth is now dependent on more knowledge-based, technically intensive industries. The three key sectors are the leading edge of the

⁸ While we show the percentage of alumni remaining in the state of Indiana as a whole, the LinkedIn tool allows researchers to drill deeper to identify specific locations (e.g. Indianapolis or Evansville) and employers where the alumni report they are employed. LinkedIn's Alumni Information pages not only provide information on residential and work locations, but also provide employers and frequencies of the alumni reporting working for those companies.

Uplands transformation, driving ancillary shifts in higher income levels and community wealth. Astonishingly, this transformation is occurring despite slow population growth.

Our focus in this report has been on one part of that transformation: the demand and supply of talent, which serves as a guidepost toward future possibilities. While the region shows modest growth overall, the locus of rapid and relatively large-scale growth lies in advanced manufacturing, life sciences, and national security and defense; and within those sectors, an important common element is the strong demand for technically skilled and highly educated talent. These sectors offer high-demand, high-opportunity occupations that pay a living wage and generally require a postsecondary credential. So talent will play a significant role in fueling the pace of transformation. If the Uplands growth trends continue for a while, and if planned growth in these sectors comes to fruition—and if the talent pipeline to feed that growth is nurtured—then the region's transformation will also continue. Educational attainment will rise. Household incomes will increase. These will have transformative impacts beyond numbers and data points.

The demand for talent in the Uplands—demand that is especially strong in technical, engineering, and scientific fields—is not met without addressing significant challenges. Regional demographic trends and, in particular, declining enrollments in high schools and area colleges are increasing the competition for talent both inside and outside the region. Employers tell us it is getting harder to hire people with the right skills and attributes in the context of very low unemployment and, simply put, a shrinking talent pool. In response, some employers are seeking to become better at more precisely identifying the skills they need, targeting sources of talent, and retaining employees through various kinds of talent and career development strategies. We believe this approach also offers significant policy and programmatic opportunities for communities and civic leadership in the Uplands.

In this report, we've identified points in secondary and postsecondary education where talent is, for want of a better term, being wasted. In high schools, despite significant increases in career and technical education, about 80 percent of the graduates who have taken career and technically related courses report that their employment is *not* related to those courses. In postsecondary education, relatively few degrees in technical fields and scientific fields, which are in high demand in the region, are being granted relative to much higher numbers of degrees in other fields. In sub baccalaureate education, for every student receiving an engineering technology credential, *five* students receive a credential in a healthcare field. Some of the institutions that do produce significant numbers of technical and scientific degrees are also those which have the lowest rates of retention for graduates. Both trends contribute to the talent pool challenge faced by Uplands employers. For Uplands residents, these trends represent missed opportunities for high incomes and rewarding careers.

We believe communities and policymakers *can* respond to these challenges and increase the opportunities for people in the Uplands. Taking cue from the employer community, policymakers need to first examine their current practices in support of talent development and then take steps to make stronger linkages between the demand for and supply of talent in the region. Assisting employers to meet their talent needs and building the overall supply of talent in the Uplands are central to sustaining the regional transformation.

We think there are three main areas in which public policy—in communities, education, and civic leadership—can support increasing the talent supply to benefit both employers and residents in the region. Each of these have programmatic implication, and many related program initiatives are already underway in

the region. Our three points of emphasis—in addition to a focused effort to learn from leading employers in how they are approaching talent development—are:

1. Building closer and deeper connections between K-12 school districts and community employers to expand the talent pool and provide significant employment opportunities to Uplands residents who choose to enter the labor market after high school. *“How can more students leave high school one day and begin a good job in a high demand field the next?”*
2. Closing the gap between the postsecondary degrees that employers seek and those that college students choose by promoting the technologies and fields of study that lead to rich regional employment opportunities. *“How can students in colleges learn more about regional opportunities and learn more about the skills and attributes employers are seeking?”*
3. Developing an innovative, technology-based, regional approach to support students along their educational (K-16+) pathways and help them make important decisions about both fields of study and employment options. *“How can the Uplands use powerful technology tools to help its younger residents learn about careers in the region and help them make informed choices about fields of study and employment opportunities?”*

5. APPENDICES

Contents

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I. Definitions of Key Growth Sectors

For consistency and ease of comparisons, FutureWorks and Econsult Solutions, Inc adopted the definitions of growth sectors provided in the 2014 report, *Strategic Plan for Economic and Community Prosperity in Southwest Central Indiana*, prepared by the Battelle Technology Partnership Practice (now Teconomy). These are six-digit NAICS codes and are divided into subsectors. Except where noted in the text, the NAICS codes used define the three key growth sectors that ROI identified for their economic development planning. The sectors are advanced manufacturing, life sciences, and national defense and security. ROI subsequently used these sectors in three occupational needs assessment reports carried out in 2016 and 2017. FutureWorks and Econsult Solutions, Inc modified the definition of the national security and defense sector to include new NAICS codes (shaded) that were recently added to the NAICS coding system to better capture government employment in military settings and other facilities.

Note that the sectors are not completely mutually exclusive (a few NAICS codes are included in more than one sector) and so cannot be added or calculated to a total across the sectors.

Table 38: Advanced Manufacturing NAICS codes

Automotive/Heavy Vehicle Equipment	
331523	Aluminum Die-Casting Foundries
336111	Automobile manufacturing
336112	Light truck and utility vehicle manufacturing
336120	Heavy duty truck manufacturing
336211	Motor vehicle body manufacturing
336212	Truck trailer manufacturing
336213	Motor home manufacturing
336214	Travel trailer and camper manufacturing
336310	Carburetor, Piston, Piston Ring, and Valve Manufacturing
336320	Vehicular Lighting Equipment Manufacturing
336330	Motor vehicle steering and suspension parts
336340	Motor vehicle brake system manufacturing
336350	Motor vehicle power train components mfg.
336360	Motor vehicle seating and interior trim mfg.
336370	Motor vehicle metal stamping
336390	Motor Vehicle Air-Conditioning Manufacturing
Food Processing and Manufacturing	
311111	Dog and cat food manufacturing
311119	Other animal food manufacturing
311211	Flour milling
311212	Rice milling
311213	Malt manufacturing
311221	Wet corn milling
311224	Soybean Processing
311225	Fats and oils refining and blending
311230	Breakfast cereal manufacturing
311313	Beet sugar manufacturing
311314	Sugarcane Mills
311340	Nonchocolate confectionery manufacturing
311351	Chocolate/Confectionery Manufacturing from Cacao Beans
311352	Confectionery Manufacturing from Purchased Chocolate

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311411	Frozen fruit and vegetable manufacturing
311412	Frozen specialty food manufacturing
311421	Fruit and vegetable canning
311422	Specialty canning
311423	Dried and dehydrated food manufacturing
311511	Fluid milk manufacturing
311512	Creamery butter manufacturing
311513	Cheese manufacturing
311514	Dry, condensed, and evaporated dairy products
311520	Ice cream and frozen dessert manufacturing
311611	Animal, except poultry, slaughtering
311612	Meat processed from carcasses
311613	Rendering and meat byproduct processing
311615	Poultry processing
311710	Seafood Canning
311811	Retail bakeries
311812	Commercial bakeries
311813	Frozen cakes and other pastries manufacturing
311821	Cookie and cracker manufacturing
311824	Flour Mixes/Dough Manufacturing from Purchased Flour
311830	Tortilla manufacturing
311911	Roasted nuts and peanut butter manufacturing
311919	Other snack food manufacturing
311920	Coffee and tea manufacturing
311930	Flavoring syrup and concentrate manufacturing
311941	Mayonnaise, dressing, and sauce manufacturing
311942	Spice and extract manufacturing
311991	Perishable prepared food manufacturing
311999	All other miscellaneous food manufacturing
312111	Soft drink manufacturing
312120	Breweries
312130	Wineries
312140	Distilleries
Furniture	
337110	Wood kitchen cabinet and countertop mfg.

337121	Upholstered household furniture manufacturing
337122	Nonupholstered wood household furniture mfg.
337124	Metal household furniture manufacturing
337125	Household furniture, exc. wood or metal, mfg.
337127	Institutional furniture manufacturing
337211	Wood office furniture manufacturing
337212	Custom architectural woodwork and millwork
337214	Office furniture, except wood, manufacturing
337215	Showcases, partitions, shelving, and lockers
Other Advanced Manufacturing	
334111	Electronic computer manufacturing
334112	Computer storage device manufacturing
334118	Computer Terminal Manufacturing
334210	Telephone apparatus manufacturing
334220	Broadcast and wireless communications equip.
334290	Other communications equipment manufacturing
334310	Audio and video equipment manufacturing
334413	Semiconductors and related device mfg.
321920	Wood container and pallet manufacturing
322211	Corrugated and solid fiber box manufacturing
322212	Folding paperboard box manufacturing
322219	Setup Paperboard Box Manufacturing
333922	Conveyor and conveying equipment mfg.
333923	Overhead cranes, hoists, and monorail systems
333924	Industrial truck, trailer, and stacker mfg.

Table 39: Life Sciences NAICS Codes

325411	Medicinal and botanical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
325414	Other biological product manufacturing
334510	Electromedical apparatus manufacturing
339112	Surgical and medical instrument manufacturing
339113	Surgical appliance and supplies manufacturing

339114	Dental equipment and supplies manufacturing
541711	Research and development in biotechnology
621511	Medical laboratories

Table 40: National Security and Defense NAICS Codes

332992	Small arms ammunition manufacturing
332993	Ammunition, except small arms, manufacturing
332994	Small arms manufacturing
334511	Search, detection, and navigation instruments
336992	Military armored vehicles and tank parts mfg.
541330	Engineering services
541712	Other physical and biological research
928110	National Security
901199 (added)	Federal Government, Civilian, Excluding Postal Service
901200 (added)	Federal Government, Military

2. Key Sectors Growth and Employment by Size of Establishment

The following data is sourced from *Your Time Series Data* that is maintained by the Business Development Resource Center at the University of Wisconsin. These data, unlike many of the federal data sets, are collected directly from companies and organizations and from publicly (and privately) available data. These data are used to supplement information about establishment and employment change among businesses of different sizes. These use the same NAICS codes as federal sources of data (EMSI). However, because of the different collection methodologies and differences in algorithms to process the data between Your Time Series Data and federal sources, the totals for each will not be the same. In most cases, differences are minor and well within acceptable levels of variation. These data are the basis for the Figures 1a, 1b, and 1c in the report text.

Size of Firms by Sector

In advanced manufacturing, most businesses have between 2-100 employees, but the 100-499 employee-size firms have grown most quickly, from 19 businesses in 2010 to 25 in 2017. In total, 19 new advanced manufacturing firms opened during the time period. In life sciences, the strongest growth has been in the 2-9 employee size, or start-up sized firms, while the single-person firms have declined. This could be single-person firms growing and adding new employees during the time period, shifting them from the one employee to 2-9 employee brackets. In addition, the number of new life sciences firms grew by 20 percent compared to employment growth of nearly 70 percent. In other words, the majority of new employment came from existing firms. Finally, in the national security and defense sector, the number of firms declined by five from 2010 to 2017, with four of those losses coming from the 1-9 employees firm size (see Table 41). The scale of employment has remained stable within the sector despite a 5 percent decline in firms.

Table 41: Number of Firms by Size, Key Sectors in the Uplands (2010-2017)

Advanced Manufacturing	2010	2011	2012	2013	2014	2015	2016	2017
1 Employee	11	11	14	13	16	15	14	14
2-9 Employees	67	68	74	78	80	85	76	81
10-99 Employees	59	62	59	53	52	54	59	55
100-499 Employees	19	21	18	21	19	19	25	25
500+ Employees	7	7	7	7	7	7	7	7
Total Firms	163	169	172	172	174	180	181	182
Biomedical Sciences	2010	2011	2012	2013	2014	2015	2016	2017
1 Employee	6	5	7	7	4	3	2	2
2-9 Employees	16	18	25	24	22	23	25	26
10-99 Employees	13	13	14	14	16	17	13	14
100-499 Employees	2	2	3	4	3	3	3	4
500+ Employees	2	2	3	2	2	2	2	2
Total Firms	39	40	52	51	47	48	45	48
National Security & Defense	2010	2011	2012	2013	2014	2015	2016	2017
1 Employee	15	14	14	14	12	9	6	7
2-9 Employees	61	67	77	77	74	60	60	60
10-99 Employees	20	20	21	26	24	26	24	24
100-499 Employees	3	2	2	2	3	2	3	3
500+ Employees	2	2	3	2	2	2	2	2
Total Firms	101	105	116	121	115	99	95	96

Source: YTS (2019); minor variations in firm size and employment totals relative total in other tables in this report are the result of variation in data collection methods of the sources.

Employment Growth by Firm Size

As noted above, life sciences experienced sharp employment growth over the time period, while the net-change in national security and defense was less than 1 percent. Most of the life sciences employment growth has occurred at the 2-9 employee and 500+ employee firms. Advanced manufacturing has experienced a steady increase in employment, driven by employment expansion in 100-499 and 500+ and more employee-sized firms. The latter suggests that these firms survived the recession and either bringing back employment to pre-recession levels and/or adding workers.

Table 42: Employment by Size of Employer in Key Sectors, ROI Region (2010-2017)

Advanced Manufacturing	2010	2011	2012	2013	2014	2015	2016	2017
1 Employee	11	11	14	13	16	15	14	14
2-9 Employees	296	293	317	340	344	365	327	348
10-99 Employees	1,705	1,708	1,742	1,376	1,287	1,292	1,520	1,511
100-499 Employees	4,145	4,620	3,485	4,464	4,105	4,105	5,210	4,920
500+ Employees	7,150	7,151	6,700	6,700	7,500	7,500	7,500	7,500
Total	13,307	13,783	12,258	12,893	13,252	13,277	14,571	14,293
Biomedical Sciences	2010	2011	2012	2013	2014	2015	2016	2017
1 Employee	6	5	7	7	4	3	2	2
2-9 Employees	81	94	129	117	107	118	134	130
10-99 Employees	314	309	321	294	356	371	265	262
100-499 Employees	535	535	835	950	835	835	835	1,035
500+ Employees	1,583	1,583	2,183	2,800	2,800	2,800	2,800	2,800
Total	2,519	2,526	3,475	4,168	4,102	4,127	4,036	4,229
National Security & Defense	2010	2011	2012	2013	2014	2015	2016	2017
1 Employee	15	14	14	14	12	9	6	7
2-9 Employees	258	285	329	313	306	267	269	272
10-99 Employees	484	521	491	620	566	575	609	594
100-499 Employees	400	255	265	265	515	395	495	345
500+ Employees	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700
Total	6,857	6,775	6,799	6,912	7,099	6,946	7,079	6,918

Source: YTS (2019); minor variations in firm size and employment totals relative total in other tables in this report are the result of variation in data collection methods of the sources.

3. Key Sector Staffing Pattern and Job Postings by Three-Digit Occupational Groups

Three-digit occupational groups were derived from 6-digit specific occupations and were aggregated into more manageable groups.

Table 43: Advanced Manufacturing Uplands Region, Vehicle, Food and Wood Products Subsectors by 3-digit SOC Occupational Groups

SOC 3Digit	Occupational Groups	2018 Employees	% of Total
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517	Woodworkers	2,344	15.8%
512	Assemblers and Fabricators	1,932	13.0%
519	Other Production Occupations	1,666	11.2%
513	Food Processing Workers	1,265	8.5%
514	Metal Workers and Plastic Workers	1,230	8.3%
537	Material Moving Workers	1,200	8.1%
511	Supervisors of Production Workers	907	6.1%
499	Other Installation, Maintenance, and Repair	408	2.7%
111	Top Executives	360	2.4%
435	Material Recording, Scheduling, Dispatching,	339	2.3%
172	Engineers	292	2.0%
516	Textile, Apparel, and Furnishings Workers	281	1.9%
113	Operations Specialties Managers	265	1.8%
472	Construction Trades Workers	260	1.8%
131	Business Operations Specialists	244	1.6%
414	Sales Representatives, Wholesale and	222	1.5%
533	Motor Vehicle Operators	180	1.2%
434	Information and Record Clerks	177	1.2%
439	Other Office and Administrative Support	171	1.2%
173	Drafters, Engineering Technicians, and	152	1.0%
433	Financial Clerks	140	0.9%
112	Advertising, Marketing, Promotions, Public	107	0.7%
436	Secretaries and Administrative Assistants	99	0.7%
372	Building Cleaning and Pest Control Workers	59	0.4%
119	Other Management Occupations	58	0.4%
431	Supervisors of Office and Administrative	54	0.4%
151	Computer Occupations	52	0.3%
412	Retail Sales Workers	51	0.3%
132	Financial Specialists	51	0.3%
191	Life Scientists	48	0.3%
491	Supervisors of Installation, Maintenance, and	46	0.3%
271	Art and Design Workers	44	0.3%
531	Supervisors of Transportation and Material	43	0.3%
419	Other Sales and Related Workers	22	0.2%
452	Agricultural Workers	20	0.1%

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299	Other Healthcare Practitioners and Technical	18	0.1%
411	Supervisors of Sales Workers	15	0.1%
471	Supervisors of Construction and Extraction	14	0.1%
493	Vehicle and Mobile Equipment Mechanics,	11	0.1%
	Totals	14,847	

Source: EMSI Industry Staffing Patterns, Author's Calculations of 3 Digit SOC staffing.

Table 44: Job Postings by Occupational Group, Advanced Manufacturing, Uplands Region

SOC 3Digit	Occupational Groups	Unique Postings from Jan 2017 - Dec 2018	% of Total Postings
533	Motor Vehicle Operators	373	15.4%
519	Other Production Occupations	157	6.5%
151	Computer Occupations	154	6.4%
435	Material Recording, Scheduling, Dispatching, and Distributing Workers	138	5.7%
112	Advertising, Marketing, Promotions, Public Relations, and Sales Managers	137	5.7%
172	Engineers	136	5.6%
537	Material Moving Workers	125	5.2%
511	Supervisors of Production Workers	124	5.1%
131	Business Operations Specialists	108	4.5%
113	Operations Specialties Managers	105	4.3%
499	Other Installation, Maintenance, and Repair Occupations	86	3.6%
414	Sales Representatives, Wholesale and Manufacturing	68	2.8%
132	Financial Specialists	60	2.5%
514	Metal Workers and Plastic Workers	54	2.2%
434	Information and Record Clerks	50	2.1%
431	Supervisors of Office and Administrative Support Workers	47	1.9%
413	Sales Representatives, Services	44	1.8%
512	Assemblers and Fabricators	41	1.7%
516	Textile, Apparel, and Furnishings Workers	36	1.5%
119	Other Management Occupations	35	1.4%
472	Construction Trades Workers	29	1.2%
491	Supervisors of Installation, Maintenance, and Repair Workers	29	1.2%

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271	Art and Design Workers	28	1.2%
173	Drafters, Engineering Technicians, and Mapping Technicians	23	1.0%
531	Supervisors of Transportation and Material Moving Workers	22	0.9%
433	Financial Clerks	19	0.8%
412	Retail Sales Workers	18	0.7%
518	Plant and System Operators	16	0.7%
111	Top Executives	15	0.6%
411	Supervisors of Sales Workers	14	0.6%
439	Other Office and Administrative Support Workers	13	0.5%
372	Building Cleaning and Pest Control Workers	9	0.4%
493	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	9	0.4%
536	Other Transportation Workers	9	0.4%
299	Other Healthcare Practitioners and Technical Occupations	8	0.3%
291	Health Diagnosing and Treating Practitioners	7	0.3%
419	Other Sales and Related Workers	7	0.3%
436	Secretaries and Administrative Assistants	7	0.3%
351	Supervisors of Food Preparation and Serving Workers	6	0.2%
517	Woodworkers	6	0.2%
352	Cooks and Food Preparation Workers	5	0.2%
353	Food and Beverage Serving Workers	4	0.2%
273	Media and Communication Workers	3	0.1%
339	Other Protective Service Workers	3	0.1%
373	Grounds Maintenance Workers	3	0.1%
152	Mathematical Science Occupations	2	0.1%
191	Life Scientists	2	0.1%
211	Counselors, Social Workers, and Other Community and Social Service Specialists	2	0.1%
274	Media and Communication Equipment Workers	2	0.1%
392	Animal Care and Service Workers	2	0.1%
474	Other Construction and Related Workers	2	0.1%
492	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	2	0.1%
513	Food Processing Workers	2	0.1%
193	Social Scientists and Related Workers	1	0.0%
194	Life, Physical, and Social Science Technicians	1	0.0%
251	Postsecondary Teachers	1	0.0%

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292	Health Technologists and Technicians	1	0.0%
359	Other Food Preparation and Serving Related Workers	1	0.0%
399	Other Personal Care and Service Workers	1	0.0%
451	Other Personal Care and Service Workers	1	0.0%
452	Agricultural Workers	1	0.0%
471	Supervisors of Construction and Extraction Workers	1	0.0%
	Totals	2415	

Source: EMSI Job Posting Analytics, Author's Calculations of 3 Digit SOC postings.

Table 45: Life Sciences, Uplands Region, Staffing Patterns by 3-digit SOC Occupational Groups

SOC 3 digit	Occupational Groups	2018 Employees	% of Total
512	Assemblers and Fabricators	1248	21.8%
519	Other Production Occupations	755	13.2%
514	Metal Workers and Plastic Workers	537	9.4%
172	Engineers	440	7.7%
435	Material Scheduling, Dispatching, and Distributing Workers	257	4.5%
131	Business Operations Specialists	214	3.7%
537	Material Moving Workers	205	3.6%
191	Life Scientists	205	3.6%
511	Supervisors of Production Workers	179	3.1%
113	Operations Specialties Managers	174	3.0%
192	Physical Scientists	159	2.8%
414	Sales Representatives, Wholesale and Manufacturing	157	2.7%
499	Other Installation, Maintenance, and Repair Occupations	130	2.3%
173	Drafters, Engineering Technicians, and Mapping Technicians	116	2.0%
111	Top Executives	115	2.0%
434	Information and Record Clerks	110	1.9%
151	Computer Occupations	89	1.6%
119	Other Management Occupations	87	1.5%
439	Other Office and Administrative Support Workers	84	1.5%
533	Motor Vehicle Operators	68	1.2%
433	Financial Clerks	59	1.0%
194	Life, Physical, and Social Science Technicians	55	1.0%

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516	Textile, Apparel, and Furnishings Workers	51	0.9%
112	Advertising, Marketing, Promotions, Public Relations, Sales Managers	47	0.8%
431	Supervisors of Office and Administrative Support Workers	39	0.7%
132	Financial Specialists	27	0.5%
372	Building Cleaning and Pest Control Workers	22	0.4%
436	Secretaries and Administrative Assistants	18	0.3%
152	Mathematical Science Occupations	14	0.2%
491	Supervisors of Installation, Maintenance, and Repair Workers	13	0.2%
231	Lawyers, Judges, and Related Workers	13	0.2%
273	Media and Communication Workers	12	0.2%
531	Supervisors of Transportation and Material Moving Workers	11	0.2%
411	Supervisors of Sales Workers	10	0.2%
	Total	5720	

Source: EMSI Industry Staffing Patterns, Author's Calculations of 3 Digit SOC staffing.

Table 46: Job Postings by Occupational Group, Life Sciences, Uplands Region

SOC 3 digit	Occupational Group	Unique Postings from Jan 2017 - Dec 2018	Percent of Total Postings
172	Engineers	185	23.3%
291	Health Diagnosing and Treating Practitioners	65	8.2%
173	Drafters, Engineering Technicians, and Mapping Technicians	56	7.1%
511	Supervisors of Production Workers	56	7.1%
413	Sales Representatives, Services	47	5.9%
119	Other Management Occupations	40	5.0%
151	Computer Occupations	40	5.0%
414	Sales Representatives, Wholesale and Manufacturing	37	4.7%
131	Business Operations Specialists	33	4.2%
319	Other Healthcare Support Occupations	30	3.8%
519	Other Production Occupations	28	3.5%
113	Operations Specialties Managers	24	3.0%
292	Health Technologists and Technicians	18	2.3%
435	Material Recording, Scheduling, Dispatching, and Distributing	17	2.1%
112	Advertising, Marketing, Promotions, Public Relations, and Sales	13	1.6%

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434	Information and Record Clerks	13	1.6%
132	Financial Specialists	11	1.4%
192	Physical Scientists	10	1.3%
194	Life, Physical, and Social Science Technicians	10	1.3%
152	Mathematical Science Occupations	9	1.1%
273	Media and Communication Workers	8	1.0%
499	Other Installation, Maintenance, and Repair Occupations	6	0.8%
299	Other Healthcare Practitioners and Technical Occupations	4	0.5%
111	Top Executives	3	0.4%
191	Life Scientists	3	0.4%
399	Other Personal Care and Service Workers	3	0.4%
512	Assemblers and Fabricators	3	0.4%
351	Supervisors of Food Preparation and Serving Workers	2	0.3%
412	Retail Sales Workers	2	0.3%
436	Secretaries and Administrative Assistants	2	0.3%
491	Supervisors of Installation, Maintenance, and Repair Workers	2	0.3%
531	Supervisors of Transportation and Material Moving Workers	2	0.3%
211	Counselors, Social Workers, and Other Community and Social	1	0.1%
433	Financial Clerks	1	0.1%
533	Motor Vehicle Operators	1	0.1%
Totals		785	

Source: EMSI Job Posting Analytics, Author's Calculations of 3 Digit SOC postings.

Table 47: National Security and Defense, Uplands Region, Staffing Patterns by 3-digit SOC Occupational Groups

SOC 3 digit	Occupational Groups	2018 Employees	% of Total
131	Business Operations Specialists	1001	16.4%
172	Engineers	725	11.9%
559	Military-only occupations	632	10.4%
173	Drafters, Engineering Technicians, and Mapping Technicians	339	5.6%
119	Other Management Occupations	264	4.3%
291	Health Diagnosing and Treating Practitioners	247	4.1%
434	Information and Record Clerks	222	3.7%
439	Other Office and Administrative Support Workers	217	3.6%

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132	Financial Specialists	206	3.4%
333	Law Enforcement Workers	166	2.7%
499	Other Installation, Maintenance, and Repair Occupations	124	2.0%
151	Computer Occupations	123	2.0%
493	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	118	1.9%
111	Top Executives	112	1.8%
113	Operations Specialties Managers	112	1.8%
292	Health Technologists and Technicians	111	1.8%
475	Extraction Workers	91	1.5%
433	Financial Clerks	81	1.3%
192	Physical Scientists	77	1.3%
191	Life Scientists	70	1.2%
435	Material Recording, Scheduling, Dispatching, and Distributing Workers	67	1.1%
231	Lawyers, Judges, and Related Workers	64	1.1%
472	Construction Trades Workers	62	1.0%
171	Architects, Surveyors, and Cartographers	58	0.9%
436	Secretaries and Administrative Assistants	58	0.9%
372	Building Cleaning and Pest Control Workers	50	0.8%
491	Supervisors of Installation, Maintenance, and Repair Workers	49	0.8%
253	Other Teachers and Instructors	47	0.8%
299	Other Healthcare Practitioners and Technical Occupations	44	0.7%
211	Counselors, Social Workers, and Other Community and Social Service Specialists	36	0.6%
519	Other Production Occupations	35	0.6%
537	Material Moving Workers	33	0.5%
353	Food and Beverage Serving Workers	33	0.5%
193	Social Scientists and Related Workers	32	0.5%
232	Legal Support Workers	30	0.5%
514	Metal Workers and Plastic Workers	30	0.5%
311	Nursing, Psychiatric, and Home Health Aides	28	0.5%
332	Fire Fighting and Prevention Workers	27	0.4%
431	Supervisors of Office and Administrative Support Workers	27	0.4%
492	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	26	0.4%
532	Air Transportation Workers	24	0.4%
511	Supervisors of Production Workers	23	0.4%
352	Cooks and Food Preparation Workers	19	0.3%

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474	Other Construction and Related Workers	19	0.3%
319	Other Healthcare Support Occupations	16	0.3%
331	Supervisors of Protective Service Workers	15	0.2%
194	Life, Physical, and Social Science Technicians	14	0.2%
152	Mathematical Science Occupations	13	0.2%
339	Other Protective Service Workers	13	0.2%
259	Other Education, Training, and Library Occupations	12	0.2%
273	Media and Communication Workers	12	0.2%
512	Assemblers and Fabricators	11	0.2%
536	Other Transportation Workers	11	0.2%
412	Retail Sales Workers	10	0.2%
Total		6,086	

Source: EMSI Industry Staffing Patterns, Author's Calculations of 3 Digit SOC staffing.

Table 48: Job Postings by Occupational Group, National Security & Defense, Uplands Region

SOC 3 digit	Occupational Group	Unique Postings from Jan 2017 - Dec 2018	Percent of Total Postings
151	Computer Occupations	523	25.9%
172	Engineers	250	12.4%
131	Business Operations Specialists	205	10.2%
291	Health Diagnosing and Treating Practitioners	190	9.4%
173	Drafters, Engineering Technicians, and Mapping Technicians	140	6.9%
499	Other Installation, Maintenance, and Repair Occupations	65	3.2%
273	Media and Communication Workers	56	2.8%
333	Law Enforcement Workers	49	2.4%
119	Other Management Occupations	44	2.2%
531	Supervisors of Transportation and Material Moving Workers	38	1.9%
113	Operations Specialties Managers	37	1.8%
292	Health Technologists and Technicians	36	1.8%
434	Information and Record Clerks	27	1.3%
493	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	25	1.2%
132	Financial Specialists	24	1.2%
211	Counselors, Social Workers, and Other Community and Social Service Specialists	23	1.1%

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435	Material Recording, Scheduling, Dispatching, and Distributing Workers	22	1.1%
436	Secretaries and Administrative Assistants	21	1.0%
472	Construction Trades Workers	18	0.9%
193	Social Scientists and Related Workers	17	0.8%
439	Other Office and Administrative Support Workers	15	0.7%
519	Other Production Occupations	14	0.7%
533	Motor Vehicle Operators	14	0.7%
491	Supervisors of Installation, Maintenance, and Repair Workers	12	0.6%
192	Physical Scientists	11	0.5%
299	Other Healthcare Practitioners and Technical Occupations	11	0.5%
514	Metal Workers and Plastic Workers	10	0.5%
171	Architects, Surveyors, and Cartographers	9	0.4%
231	Lawyers, Judges, and Related Workers	8	0.4%
411	Supervisors of Sales Workers	8	0.4%
431	Supervisors of Office and Administrative Support Workers	8	0.4%
537	Material Moving Workers	8	0.4%
511	Supervisors of Production Workers	7	0.3%
251	Postsecondary Teachers	6	0.3%
339	Other Protective Service Workers	6	0.3%
399	Other Personal Care and Service Workers	6	0.3%
111	Top Executives	5	0.2%
112	Advertising, Marketing, Promotions, Public Relations, and Sales	5	0.2%
152	Mathematical Science Occupations	5	0.2%
191	Life Scientists	5	0.2%
271	Art and Design Workers	5	0.2%
332	Fire Fighting and Prevention Workers	5	0.2%
353	Food and Beverage Serving Workers	5	0.2%
492	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	5	0.2%
518	Plant and System Operators	5	0.2%
559	Military-only occupations	5	0.2%
352	Cooks and Food Preparation Workers	4	0.2%
532	Air Transportation Workers	4	0.2%
194	Life, Physical, and Social Science Technicians	3	0.1%
212	Religious Workers	3	0.1%

232	Legal Support Workers	3	0.1%
259	Other Education, Training, and Library Occupations	3	0.1%
274	Media and Communication Equipment Workers	3	0.1%
331	Supervisors of Protective Service Workers	3	0.1%
372	Building Cleaning and Pest Control Workers	3	0.1%
414	Sales Representatives, Wholesale and Manufacturing	3	0.1%
433	Financial Clerks	3	0.1%
272	Entertainers and Performers, Sports and Related Workers	2	0.1%
413	Sales Representatives, Services	2	0.1%
419	Other Sales and Related Workers	2	0.1%
253	Other Teachers and Instructors	1	0.0%
319	Other Healthcare Support Occupations	1	0.0%
393	Entertainment Attendants and Related Workers	1	0.0%
412	Retail Sales Workers	1	0.0%
471	Supervisors of Construction and Extraction Workers	1	0.0%
512	Assemblers and Fabricators	1	0.0%
536	Other Transportation Workers	1	0.0%
Total		2061	

Source: EMSI Job Posting Analytics, Author's Calculations of 3 Digit SOC postings.

4. High Opportunity Occupations and Characteristics by Six-Digit Codes

High opportunity occupations are those that are above average demand within the industry; pay a living wage (midpoint of the MIT Living Wage Calculator for either a family with one working parent or two working parents - \$14.65 per hour); and generally require postsecondary education or technical training after high school.

Table 49: High Opportunity Occupations in Advanced Manufacturing, Life Sciences, and National Security & Defense Sectors 2010-2018, with Median Hourly Earnings and Entry Level Educational Requirements.

SOC	Occupations	Median Hourly Earnings*	Entry Level Education**	Employed in Industry Group (2010)	Employed in Industry Group (2018)	Percent Change 2010-2018***	Growth Index (Base = Total Percent Change 16% in Sectors)
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111011	Chief Executives	\$38.80	Bachelor's degree	65	42	-35.5%	-2.2
111021	General and Operations Managers	\$31.70	Bachelor's degree	366	433	18.3%	1.1
112021	Marketing Managers	\$38.94	Bachelor's degree	28	42	49.8%	3
113011	Administrative Services Managers	\$31.91	Bachelor's degree	13	37	182.9%	11
113021	Computer and Information Systems Managers	\$46.92	Bachelor's degree	54	56	5.0%	0.3
113051	Industrial Production Managers	\$43.30	Bachelor's degree	188	249	32.2%	2
113071	Transportation, Storage, and Distribution Managers	\$35.93	High school diploma OR equivalent	23	31	35.0%	2
113121	Human Resources Managers	\$42.41	Bachelor's degree	18	46	150.1%	9
119039	Education Administrators, All Other	\$19.28	Bachelor's degree	6	13	100.0%	6
119041	Architectural and Engineering Managers	\$51.52	Bachelor's degree	94	89	-5.7%	-0.4
119111	Medical and Health Services Managers	\$40.60	Bachelor's degree	23	44	88.1%	6
119199	Managers, All Other	\$19.69	Bachelor's degree	144	205	42.0%	3
131041	Compliance Officers	\$24.37	Bachelor's degree	131	158	20.4%	1
131051	Cost Estimators	\$25.93	Bachelor's degree	43	50	15.4%	1
131071	Human Resources Specialists	\$24.78	Bachelor's degree	101	145	43.0%	3
131081	Logisticians	\$29.21	Bachelor's degree	196	246	25.9%	2

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131111	Management Analysts	\$29.15	Bachelor's degree	89	108	20.3%	1
131151	Training and Development Specialists	\$23.88	Bachelor's degree	15	37	151.2%	9
131161	Market Research Analysts and Marketing	\$21.30	Bachelor's degree	21	55	166.4%	10
131199	Business Operations Specialists, All Other	\$27.07	Bachelor's degree	436	431	-1.0%	-0.1
151111	Computer and Information Research Scientists	\$51.65	Master's degree	13	17	22.6%	1
151121	Computer Systems Analysts	\$32.96	Bachelor's degree	17	19	11.4%	0.7
151131	Computer Programmers	\$29.76	Bachelor's degree	24	15	-38.2%	-2.4
151132	Software Developers, Applications	\$47.38	Bachelor's degree	12	23	95.3%	6
151142	Network and Computer Systems Administrators	\$30.31	Bachelor's degree	15	27	77.7%	5
151151	Computer User Support Specialists	\$22.76	Some college, no degree	45	52	15.9%	1
151199	Computer Occupations, All Other	\$42.90	Bachelor's degree	81	95	17.3%	1
152031	Operations Research Analysts	\$28.98	Bachelor's degree	13	27	100.0%	6
172071	Electrical Engineers	\$37.49	Bachelor's degree	43	42	-2.1%	-0.1
172072	Electronics Engineers, Except Computer	\$45.80	Bachelor's degree	285	288	0.9%	0.1
172081	Environmental Engineers	\$41.18	Bachelor's degree	19	11	-41.1%	-2.6
172112	Industrial Engineers	\$33.91	Bachelor's degree	349	546	56.7%	4

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172141	Mechanical Engineers	\$38.24	Bachelor's degree	209	244	16.7%	1
172199	Engineers, All Other	\$30.31	Bachelor's degree	198	193	-2.4%	-0.2
173023	Electrical and Electronics Engineering Technicians	\$33.65	Associate's degree	137	170	24.0%	2
173026	Industrial Engineering Technicians	\$22.30	Associate's degree	94	121	28.5%	2
173027	Mechanical Engineering Technicians	\$21.20	Associate's degree	18	27	53.7%	3
173029	Engineering Technicians, Except Drafters, All Other	\$31.97	Associate's degree	146	144	-0.9%	-0.1
191012	Food Scientists and Technologists	\$26.61	Bachelor's degree	18	59	229.4%	14
191021	Biochemists and Biophysicists	\$14.92	Doctoral or professional degree	30	27	-10.1%	-0.6
191022	Microbiologists	\$19.18	Bachelor's degree	153	134	-12.5%	-0.8
191029	Biological Scientists, All Other	\$34.65	Bachelor's degree	55	55	1.4%	0.1
192031	Chemists	\$24.38	Bachelor's degree	172	196	13.8%	0.9
192042	Geoscientists, Except Hydrologists and Geographers	\$25.30	Bachelor's degree	26	20	-23.6%	-1.5
193039	Psychologists, All Other	\$24.67	Master's degree	16	22	38.5%	2
193099	Social Scientists and Related Workers, All Other	\$20.66	Bachelor's degree	5	10	100.0%	6
211029	Social Workers, All Other	\$32.53	Bachelor's degree	22	36	62.5%	4
231011	Lawyers	\$39.35	Doctoral or professional degree	55	77	41.5%	3

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271021	Commercial and Industrial Designers	\$31.88	Bachelor's degree	8	16	100.0%	6
273042	Technical Writers	\$19.25	Bachelor's degree	6	12	100.0%	6
291069	Physicians and Surgeons, All Other	\$112.09	Doctoral or professional degree	58	69	19.5%	1
291141	Registered Nurses	\$27.58	Bachelor's degree	124	154	24.4%	2
291199	Health Diagnosing and Treating Practitioners, All Other	\$21.22	Master's degree	5	11	100.0%	6
292034	Radiologic Technologists	\$24.94	Associate's degree	10	14	28.9%	2
292061	Licensed Practical and Licensed Vocational Nurses	\$19.11	Postsecondary nondegree award	40	50	24.9%	2
299011	Occupational Health and Safety Specialists	\$31.20	Bachelor's degree	42	62	47.5%	3
414011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	\$31.31	Bachelor's degree	44	63	45.1%	3
414012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	\$23.87	High school diploma or equivalent	262	315	20.2%	1
433061	Procurement Clerks	\$20.43	High school diploma or equivalent	23	30	29.9%	2
471011	First-Line Supervisors of Construction Trades and Extraction Workers	\$27.09	High school diploma or equivalent	11	14	28.2%	2

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472111	Electricians	\$22.57	High school diploma or equivalent	36	43	17.6%	1
472152	Plumbers, Pipefitters, and Steamfitters	\$23.03	High school diploma or equivalent	6	12	100.0%	6
475031	Explosives Workers, Ordnance Handling Experts, and Blasters	\$21.09	High school diploma or equivalent	96	91	-4.5%	-0.3
491011	First-Line Supervisors of Mechanics, Installers, and Repairers	\$26.27	High school diploma or equivalent	102	108	5.6%	0.3
492091	Avionics Technicians	\$24.22	Associate's degree	5	10	100.0%	6
492094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	\$27.89	Postsecondary nondegree award	20	16	-16.7%	-1.0
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$19.53	Postsecondary nondegree award	5	10	100.0%	6
499041	Industrial Machinery Mechanics	\$22.22	High school diploma or equivalent	130	167	28.7%	2
499043	Maintenance Workers, Machinery	\$20.70	High school diploma or equivalent	28	35	26.4%	2
499044	Millwrights	\$24.41	High school diploma or equivalent	6	12	100.0%	6
511011	First-Line Supervisors of Production and Operating Workers	\$26.07	High school diploma or equivalent	844	1109	31.3%	2
512031	Engine and Other Machine Assemblers	\$27.44	High school diploma or equivalent	17	35	100.0%	6

514011	Computer-Controlled Machine Tool Operators, Metal and Plastic	\$17.77	High school diploma or equivalent	76	102	34.1%	2.1
514012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	\$17.62	Postsecondary nondegree award	16	32	100.0%	6.3
514041	Machinists	\$20.01	High school diploma or equivalent	277	335	20.8%	1.3
514111	Tool and Die Makers	\$24.82	Postsecondary nondegree award	52	85	65.7%	4
536051	Transportation Inspectors	\$34.12	High school diploma or equivalent	5	11	100.0%	6
537021	Crane and Tower Operators	\$30.75	High school diploma or equivalent	9	18	100.0%	6
			Totals	6,689	8,255	23.4%	

Source: EMSI Job Posting Analytics, Author's Calculations of 3 Digit SOC postings. Uplands

* Criteria for inclusion based on median hourly wages is an \$18.65 hourly wage calculated from MIT Living Wage indicator and represents the midpoint of hourly wages for one adult earner with one dependent and two adult earners and two children.

** Criteria for inclusion is, with exceptions of either high wage or hard to fill jobs, some postsecondary training or postsecondary credential as an entry requirement (not including required work experience).

*** Criteria for inclusion, with the exception of hard-to-fill jobs, is positive growth relative to the overall growth of jobs in the sectors. This is calculated with an overall percentage growth for all jobs in the sectors and used as a base number for calculating a growth index for the percentage change in employment in an occupation. For inclusion, an occupation had to achieve a least a 1.0 index score, except for hard to fill jobs.

5. Common Skills Listings and Frequencies in Job Postings

Table 50: Common Skills by Frequency in Job Postings, 2017 and 2018
Production and Skilled Manufacturing Workers, SOC 49, 51

Skill	Frequency in Postings
Communications	23%
Management	22%
Operations	15%

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Leadership	15%
Problem Solving	12%
Troubleshooting (Problem Solving)	9%
Innovation	9%
Computer Literacy	7%
Interpersonal Skills	5%
Written Communication	5%
Valid Driver's License	5%
Microsoft Outlook	4%
Team Building	4%
Verbal Communication Skills	4%
Decision Making	4%
Mentorship	3%
Sales	2%
Presentations	2%
Trust	2%
Microsoft Excel	2%
Training and Development	2%
Data Entry	2%
Team Performance Management	2%
Time Management	2%
Imagination	2%
Mathematics	2%
Coordinating	2%
Construction	2%
Hospitality	2%
Requirement Prioritization	2%
Team Management	2%
Fine Motor Skills	1%
Literacy	1%
Business Acumen	1%
Sanitation	1%
Customer Service	1%
Listening Skills	1%
Good Driving Record	1%

Microsoft PowerPoint	1%
Reliability	1%
Microsoft Office	1%
Proactivity	1%
Checklists	1%
Spreadsheets	1%
Prioritization	1%
Research	1%
Adaptabilities	1%
Cleanliness	1%
Information Technology	1%
Creativity	1%

Table 51: Common Skills by Frequency in Job Postings, 2017 and 2018
Information Technology and Engineering, SOC 15, 17, 19

Skill	Frequency in Postings
Management	36%
Communications	26%
Operations	22%
Problem Solving	19%
Information Technology	17%
Innovation	13%
Troubleshooting (Problem Solving)	13%
Leadership	13%
Integration	12%
Research	12%
Written Communication	11%
Infrastructure	9%
Interpersonal Skills	9%
Computer Sciences	8%
Microsoft Excel	7%
Microsoft Windows	7%
Microsoft Office	6%
Presentations	6%

Microsoft Outlook	6%
Coordinating	5%
Financial Services	5%
Quality Assurance	5%
Verbal Communication Skills	5%
Microsoft PowerPoint	5%
Decision Making	4%
Valid Driver's License	4%
Application Development	4%
Data Analysis	4%
Investigation	4%
Program Management	4%
Office Suite	4%
Mentorship	3%
Customer Service	3%
Creativity	3%
Mathematics	3%
Construction	3%
Sales	3%
Career Development	2%
Time Management	2%
Imagination	2%
Computer Literacy	2%
Writing	2%
Prioritization	2%
Interpersonal Communications	2%
Reliability	2%
Trust	2%
Critical Thinking	1%
Physics	1%
Business Acumen	1%
Training and Development	1%

**Table 52: Common Skills by Frequency in Job Postings, 2017 and 2018
Leadership and Top Administration, SOC 11, 13**

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Skill	Frequency in Postings
Management	57%
Communications	33%
Sales	25%
Operations	24%
Leadership	23%
Problem Solving	18%
Innovation	17%
Presentations	17%
Microsoft Excel	13%
Written Communication	12%
Research	12%
Customer Service	11%
Microsoft Office	11%
Information Technology	10%
Interpersonal Skills	10%
Program Management	10%
Microsoft PowerPoint	8%
Mentorship	7%
Coordinating	7%
Office Suite	7%
Microsoft Outlook	6%
Negotiation	6%
Valid Driver's License	5%
Integration	5%
Business Acumen	5%
Computer Literacy	5%
Time Management	5%
Verbal Communication Skills	5%
Trust	4%
Investigation	4%
Prioritization	4%
Team Building	3%
Data Analysis	3%
Sourcing (Recruitment)	3%

Decision Making	3%
Spreadsheets	3%
Training and Development	3%
Infrastructure	3%
Business Administration	2%
Writing	2%
Word Processor	2%
Quality Assurance	2%
Timelines	2%
Imagination	2%
Microsoft Word	2%
Intellectual	2%
Multilingualism	2%
Creativity	2%
Proposal (Business)	2%
Career Development	2%

6. Secondary Enrollments by High School

For ease of reading, the table below shows total enrollment change between the 2008-2009 year and 2017-2018 school year. With a handful of exceptions, the trend in high school enrollment in the region is negative. Thirteen out of the 29 schools shown in the table experienced double-digit declines in enrollments over the decade. While some of these changes were due to administrative changes, district reorganization, and school reorganizations, the declines are consistent in direction with the decline in the region's overall population growth and movement of people out of the area. Even in the high schools of Monroe County, the only county in the region with relatively large populations gains, the high school enrollments have declined.

Table 53: High School Enrollment, Uplands Region, 2008-2018.

High School	County	Grades 9-12 Enrollment 2008-2009	Grades 9-12 Enrollment 2017-2018	% Change 2008-2018
Brown County High School	Brown	755	665	-11.9%
Crawford County Jr-Sr High School	Crawford	543	450	-17.1%
Barr Reeve Jr-Sr High School	Daviess	213	206	-3.3%
North Daviess Jr-Sr High Sch	Daviess	296	316	6.8%
Washington High School	Daviess	746	767	2.8%
Forest Park Jr-Sr High School	Dubois	459	385	-16.1%

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Jasper High School	Dubois	1063	1094	2.9%
Northeast Dubois High School	Dubois	308	279	-9.4%
Southridge High School	Dubois	557	537	-3.6%
Bloomfield High School	Greene	383	237	-38.1%
Eastern District Jr-Sr High School	Greene	388	377	-2.8%
Linton-Stockton High School	Greene	344	381	10.8%
Shakamak Jr-Sr High School	Greene	258	233	-9.7%
White River Valley High School	Greene	233	274	17.6%
Bedford-North Lawrence High School	Lawrence	1620	1564	-3.5%
Mitchell High School	Lawrence	581	497	-14.5%
Loogootee Jr/Sr High School	Martin	218	275	26.1%
Shoals Community Jr-Sr High School	Martin	219	179	-18.3%
Bloomington High School North	Monroe	1622	1598	-1.5%
Bloomington High School South	Monroe	1733	1690	-2.5%
Edgewood High School	Monroe	870	768	-11.7%
Academy of Science and Entrepreneurship	Monroe	203	120	-40.9%
Orleans Jr-Sr High School	Orange	256	230	-10.2%
Paoli Jr & Sr High School	Orange	450	458	1.8%
Springs Valley Community High School	Orange	282	267	-5.3%
Owen Valley Community High School	Owen	909	803	-11.7%
Eastern High School	Washington	543	458	-15.7%
Salem High School	Washington	663	570	-14.0%
West Washington Jr-Sr High School	Washington	302	256	-15.2%
Total Enrollments		17,017	15,934	-6.4%

Source: Indiana Department of Education, Compass, April 2019.

7. List of Postsecondary Institutions Included in The Analysis

Below are the colleges and universities selected to use in the analysis of the postsecondary talent supply. These are selected institutions within 100 miles of the center of the Uplands region. Excluded were small schools with less than 100 students, specialized schools such as theological institutes, funeral services schools, and colleges of cosmetology. All of the colleges are Indiana institutions. Data on completions, enrollments, or credential awards for some of the colleges and universities are statewide and were largely drawn from the NCES Integrated Postsecondary Education Data System. In some cases, data is presented

from regional campuses; those data were obtained directly from the institutional research offices of the institution.

- Anderson University
- Aviation Institute of Maintenance-Indianapolis
- Butler University
- DePauw University
- Franklin College
- Hanover College
- Indiana State University
- Indiana University-Bloomington
- Indiana University-Purdue University-Indianapolis
- Ivy Tech Community College (Statewide)
- Ivy Tech Bloomington
- Ivy Tech Columbus
- Ivy Tech Evansville
- Ivy Tech Terre Haute
- Ivy Tech Sellersburg
- Marian University
- Purdue Polytechnic Columbus
- Purdue Polytechnic New Albany
- Purdue Polytechnic Vincennes
- Purdue University-Main
- Rose-Hulman Institute of Technology
- University of Evansville
- University of Indianapolis
- University of Southern Indiana
- Vincennes University