

Workforce Development Council of Seattle-King County

Professional, Scientific, and Technical Services Talent Pipeline

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Submitted by:





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EXECUTIVE SUMMARY

Background and Purpose

The Workforce Development Council of Seattle-King County (WDC) is a nonprofit workforce organization aimed at supporting a strong economy. The WDC is headed by private sector leaders and oversees a wide range of workforce initiatives and programs. Improving skill development, aligning educators with the public workforce system and private employers, and preparing young people for employment in the workforce are key goal areas of the council. In order to better anticipate and plan for forthcoming labor shortages or surpluses, the WDC has commissioned a talent pipeline analysis of the county's professional, scientific, and technical services sector.

Methods

The professional, scientific, and technical services sector comprises skilled services including computer systems design, architectural and engineering services, legal services, accounting services, scientific research and development services, and other related services.

The analysis draws from data published by the Washington State Employment Security Department (ESD), the Bureau of Labor Statistics (BLS) and the National Center for Education Statistics (NCES).

Program completion data used in this analysis is published by NCES in the Integrated Postsecondary Education Data System (IPEDS). It is important to note that IPEDS data is published by academic year—which straddles two calendar years—and for the purposes of workforce analysis, completions during academic year 2012-2013 are matched to calendar year 2013, when most individuals who complete programs begin seeking employment.

The data for employment are defined by the four-digit North American Industry Classification System (NAICS) and the data for occupations is defined by the six-digit Standard Occupational Classification (SOC) system. These classifications help frame the demand portion of the analysis, and economic forecasts adhere to these codes. The supply portion of the analysis draws on data that count graduates by degree and unemployment insurance claimants by previous occupation.

Key Findings

King County's professional, scientific, and technical services sector is a significant employer in the region, representing 111,300 employees in 2013. Total employment in professional, scientific, and technical services occupations is slated to grow at a compound annual growth rate (CAGR) of 2.4%. Growth among the core professional, scientific, and technical

services occupations through 2023 is expected to total 4,525 jobs per year, including existing employees regularly exiting employment to retire, move, or change jobs, but not employees who change jobs within the same occupation and area. A software developer who takes another software development job at a different company in the same area, for example, would not be counted, but a software developer who takes a management position at the same company would.

The **Talent Pipeline Dashboard** on the following page describes occupational employment in the professional, scientific, and technical services sector grouped by educational requirement and ranked by average annual openings from 2018 to 2023 within the sector. The expected CAGR for each occupation from 2013 to 2023 is displayed to show how fast occupations are expected to grow relative to each other.

Total supply, composed of new graduates and existing unemployment insurance claimants, is compared with each occupation to illustrate where supply shortfalls and surpluses can be expected. Graduates from local institutions will supply 2,061 qualified workers each year. Unemployed workers suitable for employment in professional, scientific, and technical services, those whose most recent occupation was a core sector occupation, will average 530 workers annually. This leaves a net annual gap of 1,933 jobs, meaning local supply is expected to meet 57% of demand.

Occupational shortfalls are anticipated for jobs at all educational requirement levels. Jobs that require on-the-job training represent approximately 20% of annual demand, and will experience a shortage of an estimated 221 workers.

Jobs that require an associate degree or Postsecondary Award, which represent approximately 5% of annual openings in the industry, are expected to experience a shortfall of 77 workers per year.

Among jobs that require a bachelor's degree, the greatest shortfall will be among "software developers, applications" with just 11 of 424 annual openings supplied by local sources. Jobs that require a bachelor's degree, account for roughly 97% of annual demand, and are expected to be undersupplied by an estimated 1,500 workers per year.

Jobs that require a master's degree or higher will experience a shortage of an estimated 137 positions, with just 173 of 310 annual openings supplied by local sources. Among these positions, lawyers will experience the greatest shortfall, with just 93 of 197 annual openings being supplied by local sources.

King County Professional, Scientific, and Technical Services Talent Pipeline

On-the-Job Training

Annual Average Demand and Supply All Occupations by Education	Occupation Ranked by Annual Openings (2018-2023)	Employment		CAGR 2013-2023	Annual Demand and Supply, 2018-2023		Gap
		2013	2023		Scale: 0 - 400 annual openings in sector		
	1 Sales Representatives, Services, All Other	8,983	12,488	3.3%	Demand: 259	Supply: 65	(194)
	2 Computer User Support Specialists	8,903	12,668	3.6%	Demand: 214	Supply: 0	(214)
	3 Business Operations Specialists, All Other	17,025	20,852	2.0%	Demand: 126	Supply: 27	(99)
	4 Managers, All Other	10,527	12,459	1.7%	Demand: 71	Supply: 379	308

Associate's degree or Postsecondary Award

Annual Average Demand and Supply All Occupations by Education	Occupation Ranked by Annual Openings (2018-2023)	Employment		CAGR 2013-2023	Annual Demand and Supply, 2018-2023		Gap
		2013	2023		Scale: 0 - 100 annual openings in sector		
	1 Web Developers	4,527	6,343	3.4%	Demand: 90	Supply: 15	(75)
	2 Paralegals and Legal Assistants	2,974	3,569	1.8%	Demand: 82	Supply: 9	(73)
	3 Computer Network Support Specialists	2,056	2,752	3.0%	Demand: 32	Supply: 40	8
	4 Architectural and Civil Drafters	1,022	1,135	1.1%	Demand: 23	Supply: 86	63
	5 Veterinary Technologists and Technicians	625	763	2.0%	Demand: 21	Supply: 20	(1)

Bachelor's degree

Annual Average Demand and Supply All Occupations by Education	Occupation Ranked by Annual Openings (2018-2023)	Employment		CAGR 2013-2023	Annual Demand and Supply, 2018-2023		Gap
		2013	2023		Scale: 0 - 450 annual openings in sector		
	1 Software Developers, Applications	49,281	68,086	3.3%	Demand: 424	Supply: 11	(413)
	2 Accountants and Auditors	16,327	20,541	2.3%	Demand: 281	Supply: 14	(267)
	3 Computer Systems Analysts	11,311	15,459	3.2%	Demand: 255	Supply: 40	(215)
	4 Management Analysts	13,224	17,573	2.9%	Demand: 243	Supply: 48	(195)
	5 Market Research Analysts and Marketing Specialists	10,825	14,780	3.2%	Demand: 198	Supply: 5	(193)
	6 Civil Engineers	5,678	7,012	2.1%	Demand: 180	Supply: 23	(157)
	7 Computer and Information Systems Managers	7,109	10,052	3.5%	Demand: 158	Supply: 98	(60)
	8 Architects, Except Landscape and Naval	2,843	3,397	1.8%	Demand: 136	Supply: 4	(132)
	9 Software Developers, Systems Software	7,406	10,039	3.1%	Demand: 126	Supply: 25	(101)
	10 Computer Occupations, All Other	2,813	4,074	3.8%	Demand: 93	Supply: 16	(77)
	11 Environmental Scientists and Specialists, Including Health	2,047	2,747	3.0%	Demand: 88	Supply: 61	(27)
	12 Network and Computer Systems Administrators	4,495	6,151	3.2%	Demand: 86	Supply: 6	(80)
	13 Graphic Designers	3,668	4,715	2.5%	Demand: 77	Supply: 39	(38)
	14 Marketing Managers	3,615	4,880	3.0%	Demand: 69	Supply: 70	1
	15 Multimedia Artists and Animators	4,080	5,694	3.4%	Demand: 68	Supply: 20	(48)
	16 Art Directors	1,314	1,752	2.9%	Demand: 54	Supply: 1	(53)

Master's degree or Higher

Annual Average Demand and Supply All Occupations by Education	Occupation Ranked by Annual Openings (2018-2023)	Employment		CAGR 2013-2023	Annual Demand and Supply, 2018-2023		Gap
		2013	2023		Scale: 0 - 200 annual openings in sector		
	1 Lawyers	9,472	10,804	1.3%	Demand: 197	Supply: 93	(104)
	2 Medical Scientists, Except Epidemiologists	3,496	4,139	1.7%	Demand: 59	Supply: 71	12
	3 Veterinarians	601	702	1.6%	Demand: 30	Supply: 0	(30)
	4 Statisticians	635	865	3.1%	Demand: 24	Supply: 8	(16)

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2015; National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

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INTRODUCTION

Background and Purpose

This professional, scientific, and technical services sector talent pipeline analysis will assist the Workforce Development Council of Seattle-King County (WDC) as it plans for forthcoming labor shortages and surpluses within the region. In the years following the initial talent pipeline study in 2011-2012, changes in local industries and the King County economy as a whole have generated interest in updating the data for three important sectors, including professional, scientific, and technical services.

Professional, scientific, and technical services is a diverse sector, including computer systems design, architecture and engineering, legal services, scientific research and other service industries. Overall, this sector employs more than 111,000 people in King County, accounting for almost 9% of the county's employment. This sector includes employers like the Fred Hutchinson Cancer Research Center, a wide variety of biotechnology firms, legal firms, accounting firms and much more. Occupations within this sector also have high average wages, \$89,391 annually, compared to the regional average of \$57,370 annually. Median wages in this sector range between \$25,610 and \$175,770.

Knowledge of expected gaps in local demand and supply allows workforce development professionals to collaborate and work to ensure the region is offering the appropriate mix of educational and training opportunities. Linking educational preparation to occupational demand ensures a competitive workforce is available to support the regional economy. This analysis aims to increase awareness of the local labor demand and supply chain for professional, scientific, and technical services as well as highlight opportunities for support organizations involved in economic and workforce development.

Methods

The WDC serves King County, Washington's most populous county. Community Attributes' analysis relies on data published by the state of Washington and federal agencies. Specifically, the following data sources form the foundation of the modeling:

- **Occupational estimates and forecasts from the Washington State Employment Security Department (WA ESD) and the Bureau of Labor Statistics.** These data provide current estimates and forecasted demand for occupations in King County and associated educational requirements. Occupational forecasts include openings created by retirements and separations. For this

reason, average annual openings are larger than the average of net jobs created over a period of time.

- **Washington unemployment insurance (UI) claims.** These data, also published by WA ESD, provide monthly unemployment claims and the previous occupations of the claimant by occupation code.
- **Educational attainment data from the National Center for Education Statistics Integrated Postsecondary Education System (IPEDS).** IPEDS provides the number of graduates by educational program, defined according to the Classification of Instructional Programs (CIP), for King County’s higher education institutions as well as a table of equivalences used to translate between educational programs and occupations.

Subsequent sections explain the details and limits of these data. In general, these data provide measures of demand and supply by occupation across industry sectors. The occupations are defined in accordance with the Bureau of Labor Statistics Standard Occupational Classification (SOC) system and industries are delineated using definitions from the North American Industry Classification System (NAICS).

Organization of Report

- **Demand Analysis.** Describes the composition of professional, scientific, and technical services occupational demand in King County.
- **Supply Analysis.** Breaks out the two elements of talent supply: new graduates entering the workforce and the existing pool of unemployment insurance claimants.
- **Supply and Demand.** Examines how local supply is slated to meet occupational demand in King County.
- **Summary of Key Findings.** Assesses in detail the results of the talent pipeline analysis, focusing on key implications for King County.

PROFESSIONAL, SCIENTIFIC, AND TECHNICAL SERVICES SECTOR OVERVIEW

In order to determine the primary occupations, representing the core set of skills within King County's professional, scientific, and technical services sector, developing an operational definition for the sector is necessary. The North American Industry Classification System (NAICS) groups industries in increasingly specific segments from the two-digit to the six-digit level. For the purposes of this analysis the professional, scientific, and technical services sector is defined by all four-digit NAICS codes nested within the two-digit industry 54.

Overall, the professional, scientific, and technical services sector employs 111,300 people in King County. NAICS 5415, computer systems design and related services, is the largest of these sectors with 34,850 jobs in King County in 2013, followed by architectural, engineering, and related services (NAICS 5413) at 18,610. Together these two NAICS represent 48% of professional, scientific, and technical services sector employment. (Exhibits 1).

Exhibit 1. King County Professional, Scientific, and Technical Services NAICS by Employment, 2013

Four Digit NAICS	Description	Estimated Jobs in King County, 2013
5415	Computer Systems Design and Related Services	34,850
5413	Architectural, Engineering, and Related Services	18,610
5416	Management, Scientific, and Technical Consulting Services	14,760
5411	Legal Services	12,240
5417	Scientific Research and Development Services	9,910
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	8,860
5419	Other Professional, Scientific, and Technical Services	5,250
5418	Advertising, Public Relations, and Related Services	4,860
5414	Specialized Design Services	1,960
	Total	111,300

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; Community Attributes, Inc., 2015.

Another way to define the King County professional, scientific, and technical services sector is to identify the primary occupations that compose the cluster. **Exhibits 2 and 3** lay out the occupations that define professional, scientific, and technical services in King County. Assembling the list began by examining the code system that the Bureau of Labor Statistics uses for occupations and grouping them according to their concentrations within the NAICS-defined professional, scientific, and technical services sector.

Occupations with fewer than 300 employees, less than 15% concentration in the sector, or with no projected annual openings are excluded from the analysis, as they are not considered primary to the sector. The primary occupations identified represent only a portion of employment within the professional, scientific, and technical services sector. These occupations are highlighted for this analysis because they represent the core skills that define employment within the sector. Overall employment within the professional, scientific, and technical services sector includes employment in other occupations that are not primary to the sector. Additionally, primary professional, scientific, and technical services occupations are also employed in industries other than professional, scientific, and technical services throughout King County.

Professional, scientific, and technical services occupations in King County are diverse and span a wide range of SOC codes. SOC codes that begin with the prefix 15, computer and mathematical occupations, compose the largest share of professional, scientific, and technical services sector occupational employment, with 23,516 out of 80,583 jobs in the sector in King County. Combined SOC codes with the prefixes 15, 13 (business and financial operations occupations), 17 (architecture and engineering occupations) and 23 (legal occupations) comprise 69% of King County professional, scientific, and technical services sector occupational employment. Among these occupations in SOC codes with the prefixes 13, 15, 17, and 23, 3,392 jobs are employed in sectors other than professional, scientific, and technical services. Overall, 66% of these jobs are within the sector. (**Exhibit 2 and 3**).

Exhibit 2. Professional, Scientific, and Technical Services Occupations, Employment in Cluster and Total Employment, SOCs 15, 13, 17 and 23, King County, 2013

SOC	Occupation	Employment in Cluster	Employment in Other Industries	Total Employment	Share in Cluster
15-1132	Software Developers, Applications	8,171	43,100	51,271	16%
15-1121	Computer Systems Analysts	4,309	6,973	11,282	38%
15-1151	Computer User Support Specialists	3,432	5,788	9,220	37%
15-1133	Software Developers, Systems Software	2,337	5,189	7,526	31%
15-1142	Network and Computer Systems Administrators	1,541	3,120	4,661	33%
15-1199	Computer Occupations, All Other	1,357	1,458	2,815	48%
15-1134	Web Developers	1,145	2,450	3,595	32%
15-1152	Computer Network Support Specialists	607	1,510	2,117	29%
15-2041	Statisticians	315	355	670	47%
15-1141	Database Administrators	302	1,534	1,836	16%
	15 Subtotal	23,516	71,477	94,993	25%
13-2011	Accountants and Auditors	4,573	11,210	15,783	29%
13-1161	Market Research Analysts and Marketing Specialists	3,738	7,325	11,063	34%
13-1111	Management Analysts	3,506	7,125	10,631	33%
13-1199	Business Operations Specialists, All Other	3,277	14,161	17,438	19%
13-2082	Tax Preparers	357	0	357	100%
	13 Subtotal	15,451	39,821	55,272	28%
17-2051	Civil Engineers	3,166	2,396	5,562	57%
17-1011	Architects, Except Landscape and Naval	2,051	137	2,188	94%
17-2141	Mechanical Engineers	919	1,563	2,482	37%
17-2071	Electrical Engineers	913	1,586	2,499	37%
17-3011	Architectural and Civil Drafters	847	150	997	85%
17-2081	Environmental Engineers	545	253	798	68%
17-1012	Landscape Architects	540	63	603	90%
17-2011	Aerospace Engineers	532	2,341	2,873	19%
17-2072	Electronics Engineers, Except Computer	304	1,251	1,555	20%
	17 Subtotal	9,817	9,740	19,557	50%
23-1011	Lawyers	4,708	2,523	7,231	65%
23-2011	Paralegals and Legal Assistants	2,013	869	2,882	70%
	23 Subtotal	6,721	3,392	10,113	66%

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; Community Attributes, Inc., 2015.

Remaining professional, scientific, and technical services SOCs in King County span occupations beginning with prefixes 11, 41, 19, 43, 27 and 29. These SOC prefixes cover management, sales, science, office and administration and design occupations. Together these occupations represent 24,046 jobs in King County’s professional, scientific, and technical services sector, or 31% of the sector’s occupational employment. Overall, among all professional, scientific, and technical services occupations 33% work within the sector, the remaining 163,462 jobs are employed in other industries. (Exhibit 3).

Exhibit 3. Professional, Scientific, and Technical Services Occupations, Employment in Cluster and Total Employment, All Other SOCs, King County, 2013

SOC	Occupation	Employment in Cluster	Employment in Other Industries	Total Employment	Share in Cluster
11-3021	Computer and Information Systems Managers	2,523	4,687	7,210	35%
11-2021	Marketing Managers	1,097	2,556	3,653	30%
11-9041	Architectural and Engineering Managers	956	1,501	2,457	39%
11-9199	Managers, All Other	653	3,474	4,127	16%
11-9121	Natural Sciences Managers	626	252	878	71%
11-1011	Chief Executives	513	1,551	2,064	25%
11-3121	Human Resources Managers	349	1,546	1,895	18%
	11 Subtotal	6,717	15,567	22,284	30%
41-3099	Sales Representatives, Services, All Other	3,521	5,547	9,068	39%
41-9011	Demonstrators and Product Promoters	657	1,327	1,984	33%
	41 Subtotal	4,178	6,874	11,052	38%
19-1042	Medical Scientists, Except Epidemiologists	1,349	2,223	3,572	38%
19-2041	Environmental Scientists and Specialists, Including Health	1,202	865	2,067	58%
19-4021	Biological Technicians	943	676	1,619	58%
19-2042	Geoscientists, Except Hydrologists and Geographers	494	185	679	73%
19-2031	Chemists	324	274	598	54%
	19 Subtotal	4,312	4,223	8,535	51%
43-6012	Legal Secretaries	1,699	301	2,000	85%
43-3021	Billing and Posting Clerks	1,262	3,650	4,912	26%
43-4111	Interviewers, Except Eligibility and Loan	953	1,932	2,885	33%
	43 Subtotal	3,914	5,883	9,797	40%
27-1024	Graphic Designers	1,031	1,816	2,847	36%
27-3031	Public Relations Specialists	885	1,673	2,558	35%
27-1025	Interior Designers	664	619	1,283	52%
27-4021	Photographers	489	200	689	71%
27-1014	Multimedia Artists and Animators	418	1,322	1,740	24%
27-1011	Art Directors	353	193	546	65%
	27 Subtotal	3,840	5,823	9,663	40%
29-2056	Veterinary Technologists and Technicians	613	29	642	95%
29-1131	Veterinarians	472	25	497	95%
	29 Subtotal	1,085	54	1,139	95%
31-9096	Veterinary Assistants and Laboratory Animal Caretakers	706	57	763	93%
47-4011	Construction and Building Inspectors	326	551	877	37%
	All Occupations	80,583	163,462	244,045	33%

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; Community Attributes, Inc., 2015.

Median annual wages among professional, scientific, and technical services occupations requiring on-the-job training have a wide range, between \$135,540 among “managers, all other” to just \$25,610 for demonstrators and product promoters. Occupations requiring an associate degree or Postsecondary Award have a wide range in median wages as well, between \$111,420 and \$37,980. (Exhibit 4).

**Exhibit 4. Professional, Scientific, and Technical Services Occupations
Median Wage and 90th Percentile Wage, On-the-Job Training and
Associate Degree or Postsecondary Award, Seattle-Tacoma-Bellevue
MSA, 2013**

SOC	Occupation	Employment in Cluster	Median Wage ↓	90th Percentile Wage
On-the-Job Training				
11-9199	Managers, All Other	653	\$135,540	\$174,280
13-1199	Business Operations Specialists, All Other	3,277	\$93,900	\$119,830
47-4011	Construction and Building Inspectors	326	\$84,860	\$94,630
41-3099	Sales Representatives, Services, All Other	3,521	\$81,440	\$112,470
15-1151	Computer User Support Specialists	3,432	\$68,910	\$96,840
43-6012	Legal Secretaries	1,699	\$63,410	\$73,130
43-3021	Billing and Posting Clerks	1,262	\$47,070	\$55,030
43-4111	Interviewers, Except Eligibility and Loan	953	\$45,730	\$52,840
13-2082	Tax Preparers	357	\$38,880	\$58,250
27-4021	Photographers	489	\$36,610	\$59,250
31-9096	Veterinary Assistants and Laboratory Animal Caretakers	706	\$30,290	\$35,800
41-9011	Demonstrators and Product Promoters	657	\$25,610	\$30,850
Associate's degree or Postsecondary Award				
15-1134	Web Developers	1,145	\$111,420	\$137,190
15-1152	Computer Network Support Specialists	607	\$90,330	\$114,300
23-2011	Paralegals and Legal Assistants	2,013	\$71,120	\$83,160
17-3011	Architectural and Civil Drafters	847	\$69,780	\$78,090
29-2056	Veterinary Technologists and Technicians	613	\$37,980	\$44,520

Note: due to data limitations median and 90th percentile wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are considered representative of wages in King County. Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes, Inc., 2015.

Among professional, scientific, and technical services occupations requiring a bachelor's degree, median annual wages range between \$55,280 among biological technicians, to \$175,770 among computer and information systems managers. More than 35,523 workers are employed within this sector in occupations with median annual wages greater than \$100,000. Within professional, scientific, and technical services occupations requiring a master's degree or higher, median annual wages range between a low of \$90,550 and a high of \$157,010. (Exhibit 5).

Exhibit 5. Professional, Scientific, and Technical Services Occupations Median Wage and 90th Percentile Wage, Bachelor's Degree and Master's Degree or Higher, Seattle-Tacoma-Bellevue MSA, 2013

SOC	Occupation	Employment in Cluster	Median Wage ↓	90th Percentile Wage
Bachelor's degree				
11-3021	Computer and Information Systems Managers	2,523	\$175,770 *	
11-9041	Architectural and Engineering Managers	956	\$171,720 *	
11-2021	Marketing Managers	1,097	\$170,410 *	
11-3121	Human Resources Managers	349	\$143,580	\$177,710
15-1132	Software Developers, Applications	8,171	\$138,740	\$160,810
15-1133	Software Developers, Systems Software	2,337	\$137,660	\$155,970
17-2072	Electronics Engineers, Except Computer	304	\$129,880	\$152,250
17-2071	Electrical Engineers	913	\$127,610	\$149,460
13-1111	Management Analysts	3,506	\$124,870	\$156,550
27-1011	Art Directors	353	\$118,570	\$149,830
15-1121	Computer Systems Analysts	4,309	\$116,230	\$144,600
15-1141	Database Administrators	302	\$115,820	\$129,400
17-2141	Mechanical Engineers	919	\$114,630	\$140,870
17-2081	Environmental Engineers	545	\$112,420	\$127,320
13-1161	Market Research Analysts and Marketing Specialists	3,738	\$109,690	\$141,050
19-2042	Geoscientists, Except Hydrologists and Geographers	494	\$101,960	\$136,190
17-2051	Civil Engineers	3,166	\$101,780	\$119,040
15-1142	Network and Computer Systems Administrators	1,541	\$101,300	\$119,640
27-1014	Multimedia Artists and Animators	418	\$96,540	\$122,250
19-2041	Environmental Scientists and Specialists, Including Health	1,202	\$95,080	\$115,480
15-1199	Computer Occupations, All Other	1,357	\$92,500	\$114,630
13-2011	Accountants and Auditors	4,573	\$91,440	\$120,210
17-1011	Architects, Except Landscape and Naval	2,051	\$91,270	\$112,790
19-2031	Chemists	324	\$85,280	\$107,190
27-3031	Public Relations Specialists	885	\$78,450	\$95,340
17-1012	Landscape Architects	540	\$75,220	\$89,000
27-1024	Graphic Designers	1,031	\$71,930	\$90,260
27-1025	Interior Designers	664	\$60,020	\$77,240
19-4021	Biological Technicians	943	\$55,280	\$65,270
11-9121	Natural Sciences Managers	626 *		*
11-1011	Chief Executives	513 *		*
17-2011	Aerospace Engineers	532 *		*
Master's degree or higher				
23-1011	Lawyers	4,708	\$157,010 *	
29-1131	Veterinarians	472	\$110,520	\$136,440
15-2041	Statisticians	315	\$99,930	\$121,730
19-1042	Medical Scientists, Except Epidemiologists	1,349	\$90,550	\$148,870

Note: * indicates that data is suppressed by the U.S. Bureau of Labor Statistics in order to comply with nondisclosure rules. Due to data limitations median and 90th percentile wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are considered representative of wages in King County. Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes, Inc., 2015.

Average wages for occupations in professional, scientific, and technical services at all education requirements are higher than the average wage for the region. The sector's overall average wage is \$89,391, compared to the average wage in the region of \$57,370. **(Exhibit 6)**

Exhibit 6. Comparative Average Wages, King County and Seattle-Tacoma-Bellevue MSA, 2013

	Employment	Average Wage
King County Professional, Scientific, and Technical Services Sector		
On-the Job Training Occupations	17,332	\$58,395
Associate's degree or Postsecondary Award Occupations	5,225	\$64,670
Bachelor's degree Occupations	51,182	\$99,124
Master's degree or higher Occupations	6,844	\$114,724
Professional, Scientific, and Technical Services Sector Total	80,583	\$89,391
Seattle-Tacoma-Bellevue MSA	1,761,920	\$57,370

Note: due to data limitations median and 90th percentile wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are considered representative of wages in King County. Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes, 2015.

A substantial number of professional, scientific, and technical services occupations are represented in other industries. Overall, 163,462 workers are employed in industries other than professional, scientific, and technical services. The software publishing industry employs the greatest number of individuals in these occupations, at 39,802. Aerospace product and parts manufacturing (12,314 jobs), as well as electronic shopping and mail order houses (12,155) are also major employers of professional, scientific, and technical service occupations. (Exhibit 7).

Exhibit 7. Professional, Scientific, and Technical Services Occupational Employment in Other Industries, 2013

Sector	Professional, Scientific, and Technical Services Occupation Employment in Industry
Software Publishers	39,862
Aerospace Product and Parts Manufacturing	12,314
Electronic shopping and mail-order houses	12,155
Management of Companies & Enterprises	10,278
Education	9,930
Local Government Other	8,022
Other information services	5,722
Employment Services	4,389
Wireless telecommunications carriers	4,086
Federal Government	4,077
General medical and surgical hospitals	3,884
Insurance carriers	2,843
Travel arrangement and reservation services	2,398
Commercial equip. merchant wholesalers	2,076
Electronic markets and agents and brokers	1,874
Outpatient care centers	1,870
Data processing and related services	1,826
Wired telecommunications carriers	1,372
Business support services	1,354
Building equipment contractors	1,321
Offices of physicians	1,235
State Government Other	1,161
Insurance agencies, brokerages, and related	1,035
Freight transportation arrangement	1,026
All Other Industries	27,352
Total	163,462

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; Community Attributes, Inc., 2015.

Among core professional, scientific, and technical service occupations, “software developers, applications” have the largest employment outside the sector, at 43,100 out of 163,462 jobs in other industries. Within this occupation the most employment in another sector is within the software publishing industry. (Exhibit 8).

Exhibit 8. Professional, Scientific, and Technical Services Occupation Employment in Other Industries, 2013

Occupation	Employment in Other Industries	Top Other Industry
Software Developers, Applications	43,100	Software Publishers
Business Operations Specialists, All Other	14,161	Education
Accountants and Auditors	11,210	Software Publishers
Market Research Analysts and Marketing Specialists	7,325	Software Publishers
Management Analysts	7,125	Software Publishers
Computer Systems Analysts	6,973	Aerospace Product and Parts Manufacturing
Computer User Support Specialists	5,788	Software Publishers
Sales Representatives, Services, All Other	5,547	Wireless Telecommunications Carriers (except Satellite)
Software Developers, Systems Software	5,189	Software Publishers
Computer and Information Systems Managers	4,687	Software Publishers
Billing and Posting Clerks	3,650	General Medical and Surgical Hospitals
Managers, All Other	3,474	Federal Government
Network and Computer Systems Administrators	3,120	Education
Marketing Managers	2,556	Management of Companies and Enterprises
Lawyers	2,523	Local Government Other
Web Developers	2,450	Software Publishers
Civil Engineers	2,396	Local Government Other
Aerospace Engineers	2,341	Aerospace Product and Parts Manufacturing
Medical Scientists, Except Epidemiologists	2,223	Education
Interviewers, Except Eligibility and Loan	1,932	General Medical and Surgical Hospitals
Graphic Designers	1,816	Electronic Shopping and Mail-Order Houses
Public Relations Specialists	1,673	Education
Electrical Engineers	1,586	Aerospace Product and Parts Manufacturing
Mechanical Engineers	1,563	Aerospace Product and Parts Manufacturing
Chief Executives	1,551	Management of Companies and Enterprises
Human Resources Managers	1,546	Management of Companies and Enterprises
Database Administrators	1,534	Management of Companies and Enterprises
Computer Network Support Specialists	1,510	Wireless Telecommunications Carriers (except Satellite)
Architectural and Engineering Managers	1,501	Aerospace Product and Parts Manufacturing
Computer Occupations, All Other	1,458	Federal Government
Demonstrators and Product Promoters	1,327	Business Support Services
Multimedia Artists and Animators	1,322	Software Publishers
Electronics Engineers, Except Computer	1,251	Wireless Telecommunications Carriers (except Satellite)
All Other Occupations	6,054	
Total	163,462	

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; Community Attributes, Inc., 2015.

DEMAND ANALYSIS: KING COUNTY PROFESSIONAL, SCIENTIFIC, AND TECHNICAL SERVICES OCCUPATIONAL FORECASTS

Total demand for occupations matching the King County professional, scientific, and technical services sector is forecasted to average 13,745 annual openings between 2018 and 2023. Total demand for occupations covers demand across all industries in King County, including but not exclusive to professional, scientific, and technical services. The occupation with the greatest forecasted annual openings is by far “software developers, applications,” with 2,660 projected annual openings. The occupation with the highest forecasted growth rate among King County professional, scientific, and technical services occupations is “computer occupations, all other” with a 3.5% CAGR and has projected annual openings of 192 between 2018 and 2023. Within the sector these occupations are projected to have 4,525 average annual openings, the most openings being among “software developers, applications,” with 424 openings annually within the professional, scientific, and technical services sector. (**Exhibit 9**).

Exhibit 9. King County Professional, Scientific, and Technical Services Occupational Demand per Year, 2018 and 2023

SOC	Occupation	Estimated Employment 2018	Estimated Employment 2023	Average Annual Openings (2018-2023)	Average Annual Openings in Cluster (2018-2023)	CAGR (2018-2023)
15-1132	Software Developers, Applications	59,487	68,086	2,660	424	2.7%
13-2011	Accountants and Auditors	18,613	20,541	971	281	2.0%
13-1111	Management Analysts	15,321	17,573	736	243	2.8%
13-1199	Business Operations Specialists, All Other	18,991	20,852	671	126	1.9%
15-1121	Computer Systems Analysts	13,370	15,459	668	255	2.9%
41-3099	Sales Representatives, Services, All Other	10,760	12,488	666	259	3.0%
13-1161	Market Research Analysts and Marketing Specialists	12,883	14,780	585	198	2.8%
15-1151	Computer User Support Specialists	10,817	12,668	574	214	3.2%
11-3021	Computer and Information Systems Managers	8,591	10,052	452	158	3.2%
11-9199	Managers, All Other	11,531	12,459	449	71	1.6%
15-1133	Software Developers, Systems Software	8,702	10,039	405	126	2.9%
17-2051	Civil Engineers	6,289	7,012	316	180	2.2%
23-1011	Lawyers	10,190	10,804	303	197	1.2%
15-1134	Web Developers	5,446	6,343	282	90	3.1%
27-1014	Multimedia Artists and Animators	4,885	5,694	282	68	3.1%
15-1142	Network and Computer Systems Administrators	5,348	6,151	261	86	2.8%
11-2021	Marketing Managers	4,246	4,880	231	69	2.8%
43-3021	Billing and Posting Clerks	5,468	5,974	218	56	1.8%
27-1024	Graphic Designers	4,237	4,715	214	77	2.2%
15-1199	Computer Occupations, All Other	3,437	4,074	192	93	3.5%
19-1042	Medical Scientists, Except Epidemiologists	3,816	4,139	155	59	1.6%
19-2041	Environmental Scientists and Specialists, Including Health	2,371	2,747	151	88	3.0%
17-1011	Architects, Except Landscape and Naval	3,063	3,397	145	136	2.1%
17-2141	Mechanical Engineers	2,649	2,846	134	50	1.4%
23-2011	Paralegals and Legal Assistants	3,281	3,569	118	82	1.7%
43-4111	Interviewers, Except Eligibility and Loan	3,151	3,424	118	39	1.7%
11-9041	Architectural and Engineering Managers	2,633	2,812	117	46	1.3%
41-9011	Demonstrators and Product Promoters	2,342	2,581	114	38	2.0%
11-1011	Chief Executives	2,765	3,018	113	28	1.8%
15-1152	Computer Network Support Specialists	2,413	2,752	113	32	2.7%
17-2071	Electrical Engineers	2,725	2,963	111	41	1.7%
11-3121	Human Resources Managers	2,086	2,294	100	18	1.9%
	All Other Occupations (21)	28,285	30,602	1,120	597	1.6%
	Total	300,192	337,788	13,745	4,525	2.4%

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; Community Attributes, Inc., 2015.

SUPPLY ANALYSIS: AVAILABILITY OF REGIONAL TALENT AND EMPLOYABLE WORKFORCE

Local workforce supply is composed of two elements: the entry of new graduates into the talent pool and the existing talent pool of unemployed persons actively seeking employment. Qualified graduates are drawn from NCES data through a match of CIP codes to SOC codes and adjusted accordingly to workforce-wide occupational demand. Unemployment insurance claimants are organized by most recent occupation (SOC) and represent the second element of supply. It is important to note that changes in migration can affect changes in supply and demand.

Local Graduates

The National Center for Education Statistics standardizes educational curricula with Classification of Instructional Program (CIP) codes. Each CIP code maps to multiple SOC codes because graduates from the same program go on to employment in a range of occupations. At the same time, each occupation draws graduates from several relevant CIPs. For example graduates from artificial intelligence programs who are qualified to work as “software developers, applications” are also qualified to work as computer and information research scientists; software developers, systems software; computer systems analysts; and computer programmers. The latter two occupations are further supplied by graduates from four additional educational programs, information technology; computer programming/programmer, general; computer programming, specific applications; and computer science. (Exhibit 10).

Exhibit 10. Other Occupational Matches for Graduates Qualified to Work as Software Developers, Applications

CIP	Description	SOC	Description
11.0102	Artificial Intelligence.	15-1132	Software Developers, Applications
11.0103	Information Technology.	15-1111	Computer and Information Research Scientists
11.0104	Informatics.	15-1133	Software Developers, Systems Software
11.0201	Computer Programming/Programmer, General.	15-1121	Computer Systems Analysts
11.0202	Computer Programming, Specific Applications.	15-1131	Computer Programmers
11.0701	Computer Science.		

Sources: National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

Programs matching to one or more professional, scientific, and technical service occupations must be summarized across educational institutions in order to determine the number of graduates that will be able to fill forecasted annual openings within the King County professional, scientific, and technical services sector.

Graduate data is tied to the primary location of the educational institution. For this reason, institutions primarily located in adjacent counties that have programs in King County are not attached to King County, and therefore are not included in the local talent supply.

Local educational institutions conferred 17,369 degrees or awards to individuals in 2013 in CIPs that match to one or more professional, scientific, and technical service occupation(s). Among these graduates a large proportion cannot be expected to seek employment in King County or within occupations in the professional, scientific, and technical services sector. This number of graduates represents the largest possible pool of new graduates from King County who are qualified to work in professional, scientific, and technical service occupations. **(Exhibit 11)**.

Exhibit 11. Total Graduates by CIP Codes that Match to One or More Professional, Scientific, and Technical Services Occupation(s), King County, 2013

CIP	Description	Graduates
52.0201	Business Administration and Management, General.	2,006
42.0101	Psychology, General.	741
52.0101	Business/Commerce, General.	704
52.0302	Accounting Technology/Technician and Bookkeeping.	669
9.0101	Speech Communication and Rhetoric.	535
22.0101	Law.	496
52.0301	Accounting.	492
26.0101	Biology/Biological Sciences, General.	459
45.1001	Political Science and Government, General.	424
52.1401	Marketing/Marketing Management, General.	406
45.1101	Sociology.	401
45.0601	Economics, General.	395
40.0101	Physical Sciences.	382
11.0901	Computer Systems Networking and Telecommunications.	348
52.0801	Finance, General.	340
26.0202	Biochemistry.	337
14.1001	Electrical and Electronics Engineering	313
44.0401	Public Administration.	292
	Veterinary/Animal Health Technology/Technician and Veterinary	
51.0808	Assistant.	275
45.0201	Anthropology.	273
14.0801	Civil Engineering, General.	265
11.0101	Computer and Information Sciences, General.	251
54.0101	History, General.	223
14.1901	Mechanical Engineering.	207
27.0101	Mathematics, General.	198
50.0401	Design and Visual Communications, General.	173
11.0201	Computer Programming/Programmer, General.	159
11.0701	Computer Science.	157
11.0103	Information Technology.	156
	Other	5,292
	Total	17,369

Source: National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

Due to data limitations, especially a lack of data linking high school graduates who do not matriculate into higher education and then secure occupations, the supply of local high school graduates who are interested in positions that require on-the-job training cannot be estimated. Some Postsecondary Award and bachelor's degree programs, however, do match to on-the-job training occupations for which past graduates have gone on to work in on-the-job training positions. Not all training programs that would qualify an individual for these positions are included

in IPEDS data, and as a result, the talent pool available for employers looking to fill jobs that require on-the-job training positions in understated.

Among King County education institutions the University of Washington Seattle campus graduated 9,030 students qualified to work in professional, scientific, and technical service occupations in 2013. This represents 52% of the local graduates qualified to work in the King County professional, scientific, and technical services sector. Including the Bothell campus, the University of Washington conferred degrees or awards to 9,706 students qualified to work in the sector, or 56% of local graduates qualified to work in professional, scientific, and technical services occupations. **(Exhibit 12).**

Exhibit 12. King County Educational Institutions by Graduates Qualified for Professional, Scientific, and Technical Service Occupations, 2013

Institution	Graduates Qualified for Professional, Scientific, and Technical Service Occupations
University of Washington-Seattle Campus	9,030
Seattle University	1,411
Bellevue College	895
City University of Seattle	857
University of Washington-Bothell Campus	676
Green River Community College	600
Seattle Pacific University	543
Highline Community College	377
Lake Washington Institute of Technology	353
Seattle Community College-North Campus	286
Shoreline Community College	245
Renton Technical College	231
DeVry University-Washington	200
ITT Technical Institute-Seattle	153
The Art Institute of Seattle	150
Pima Medical Institute-Seattle	142
Seattle Central College	129
Seattle Community College-South Campus	125
Northwest University	121
DigiPen Institute of Technology	121
Pima Medical Institute-Renton	117
Argosy University-Seattle	106
Cascadia Community College	93
Antioch University-Seattle	79
International Academy of Design and Technology-Seattle	75
University of Phoenix-Western Washington Campus	71
Bainbridge Graduate Institute	71
The Seattle School of Theology & Psychology	49
Cornish College of the Arts	36
Academy of Interactive Entertainment	11
Seattle Vocational Institute	7
Bastyr University	5
Photographic Center Northwest	3
Bakke Graduate University	1
Total	17,369

Sources: National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

In order to determine how many graduates are likely to fill occupations within King County's professional, scientific, and technical services sector, graduates are totaled by every combination of CIP and SOC. Each combination is adjusted to match the ratio of occupational demand to total occupational demand for all possible occupations matching to that CIP. This process leads to an estimate of how many graduates would be able to obtain employment in each available occupation. Each estimate is adjusted for the approximate share of local graduates who obtain work locally after graduation, by multiplying the estimates by the 70% local retention rate. Finally, the number of graduates expected to seek work locally is adjusted again to account for the number of local graduates who can be expected to fill positions within the professional, scientific, and technical services sector.

This method yields a total of 2,061 graduates in 2013 that map to professional, scientific, and technical service occupations. Among these, 492 are mapped to occupations that require on-the-job training, however, these occupations are undercounted due to the lack of information linking programs to occupations outside of IPEDS. In 2013 just four SOCs in this category were supplied by graduates in King County. (**Exhibits 13 and 14**).

IPEDS data is available only through the 2012-2013 academic year. Although these individuals completing programs in 2013 would be expected to seek employment in 2013, this data provides a picture of what educational programs can be expected to look like in future years if current conditions do not change.

Due to the nature of the data recorded by IPEDS, information on graduates is more complete for occupations require an associate degree, Postsecondary Award or a bachelor's degree. In 2013, King County's educational institutions conferred 448 degrees or awards to graduates qualified for occupations in the former category, of these individuals 162 can be expected to seek employment in King County, within the professional, scientific, and technical services sector. (**Exhibit 13**).

**Exhibit 13. Professional, Scientific, and Technical Service Occupations
by Total Graduates, On-the-Job Training and Associate Degree or
Postsecondary Award, King County, 2013**

SOC	Description	All Graduates	Graduates after 70% retention	Graduates in Cluster
11-9199	Managers, All Other	3,424	2,397	379
13-2082	Tax Preparers	134	94	94
43-6012	Legal Secretaries	17	12	10
27-4021	Photographers	16	11	8
41-3099	Sales Representatives, Services, All Other	1	1	0
41-9011	Demonstrators and Product Promoters	1	1	0
15-1151	Computer User Support Specialists	1	0	0
13-1199	Business Operations Specialists, All Other	0	0	0
31-9096	Veterinary Assistants and Laboratory Animal Caretakers	0	0	0
43-3021	Billing and Posting Clerks	0	0	0
43-4111	Interviewers, Except Eligibility and Loan	0	0	0
47-4011	Construction and Building Inspectors	0	0	0
	On-the-Job Training Subtotal	3,594	2,516	492
17-3011	Architectural and Civil Drafters	129	91	77
15-1152	Computer Network Support Specialists	200	140	40
29-2056	Veterinary Technologists and Technicians	30	21	20
15-1134	Web Developers	69	48	15
23-2011	Paralegals and Legal Assistants	19	13	9
	Associate's degree or Postsecondary Award	448	314	162

Sources: National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

Occupations requiring bachelor's degrees are more common within the professional, scientific, and technical services sector. In 2013, 1,247 graduates were qualified for professional, scientific, and technical service occupations after retention and expected to work within the sector. Just three occupations requiring a master's degree or higher have graduates mapping from local institutions. King County's educational institutions graduated 159 individuals qualified for occupations requiring a master's degree or higher within the professional, scientific, and technical services sector and expected to work within the sector. (**Exhibit 14**).

**Exhibit 14. Professional, Scientific, and Technical Service Occupations
by Total Graduates, Bachelor's Degree and Master's Degree or Higher,
King County, 2013**

SOC	Description	All Graduates	Graduates after 70% retention	Graduates in Cluster
11-9121	Natural Sciences Managers	1,209	847	604
11-9041	Architectural and Engineering Managers	629	440	171
11-1011	Chief Executives	385	270	67
19-2041	Environmental Scientists and Specialists, Including Health	126	88	51
11-3021	Computer and Information Systems Managers	201	141	49
13-1111	Management Analysts	177	124	41
15-1121	Computer Systems Analysts	150	105	40
27-1024	Graphic Designers	140	98	35
15-1133	Software Developers, Systems Software	117	82	25
27-3031	Public Relations Specialists	100	70	24
27-1014	Multimedia Artists and Animators	118	83	20
15-1199	Computer Occupations, All Other	49	34	16
13-2011	Accountants and Auditors	69	48	14
27-1025	Interior Designers	37	26	13
17-2011	Aerospace Engineers	87	61	11
15-1132	Software Developers, Applications	95	67	11
17-2051	Civil Engineers	23	16	9
15-1141	Database Administrators	65	46	8
17-2071	Electrical Engineers	25	17	6
15-1142	Network and Computer Systems Administrators	26	18	6
13-1161	Market Research Analysts and Marketing Specialists	19	13	5
11-2021	Marketing Managers	19	13	4
17-1011	Architects, Except Landscape and Naval	5	4	4
17-2072	Electronics Engineers, Except Computer	25	17	3
19-2042	Geoscientists, Except Hydrologists and Geographers	5	3	2
19-4021	Biological Technicians	5	4	2
17-2141	Mechanical Engineers	7	5	2
19-2031	Chemists	4	3	1
27-1011	Art Directors	2	2	1
17-1012	Landscape Architects	0	0	0
11-3121	Human Resources Managers	0	0	0
17-2081	Environmental Engineers	0	0	0
	Bachelor's degree Subtotal	3,919	2,743	1,247
23-1011	Lawyers	205	143	93
19-1042	Medical Scientists, Except Epidemiologists	218	153	58
15-2041	Statisticians	25	18	8
29-1131	Veterinarians	0	0	0
	Masters degree or higher Subtotal	448	314	159
	Grand Total	8,409	5,886	2,061

Sources: National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

Unemployment Insurance

The second key element of local talent supply is the pool of unemployment insurance (UI) claimants whose previous occupations match to those in King County's professional, scientific, and technical services sector. Due to nondisclosure rules, not all UI data is available for every SOC. These SOCs can be estimated by leveraging known employment totals and disclosed data from previous years. Additionally,

in order to capture the expected unemployment rate in future the ratio of a ten year average of forecasted unemployment rates, from the Puget Sound Economic Forecaster, and the current unemployment rate from BLS is used. This method helps complete the expectation for future UI claimants. The ten year average of forecasted unemployment rates is 108.9% of the March 2015 unemployment rate of 4.1%.

There is an expected total of 1,385 UI claimants whose previous occupation was in a professional, scientific, and technical services occupation in King County. Out of these total UI claimants, 530 can be expected to work within the professional, scientific, and technical services sector. There were just 11 UI claimants whose previous position required an associate degree or Postsecondary Award applicable to professional, scientific, and technical services, and just 9 can be expected to work within the sector in King County. Out of the 530 UI claims mapping to the sector, 297 had positions that required a bachelor's degree and 14 came from positions that required a master's degree or higher. The occupation with the largest number of claimants is expected to be marketing managers, with 219 individuals, of which 66 can be expected to work in the professional, scientific, and technical services sector. (**Exhibit 15**).

Exhibit 15. Unemployment Insurance Claimants by Previous SOC, King County

SOC	Description	Total Qualified Unemployment Insurance Claimants	Unemployment Insurance Claimants In Sector
41-3099	Sales Representatives, Services, All Other	165	64
13-1199	Business Operations Specialists, All Other	142	27
43-3021	Billing and Posting Clerks	135	35
43-6012	Legal Secretaries	39	33
13-2082	Tax Preparers	37	37
41-9011	Demonstrators and Product Promoters	22	7
27-4021	Photographers	8	5
47-4011	Construction and Building Inspectors	5	2
	On-the-Job Training Subtotal	553	210
17-3011	Architectural and Civil Drafters	11	9
	Associate's degree or Postsecondary Award Subtotal	11	9
11-2021	Marketing Managers	219	66
11-3021	Computer and Information Systems Managers	140	49
11-1011	Chief Executives	111	28
11-9041	Architectural and Engineering Managers	89	35
11-9121	Natural Sciences Managers	67	48
17-2051	Civil Engineers	24	14
27-3031	Public Relations Specialists	22	8
13-1111	Management Analysts	21	7
27-1025	Interior Designers	17	9
19-2031	Chemists	16	9
19-2041	Environmental Scientists and Specialists, Including Health	16	9
17-2071	Electrical Engineers	12	4
27-1024	Graphic Designers	10	4
17-2072	Electronics Engineers, Except Computer	7	1
17-2081	Environmental Engineers	4	3
19-2042	Geoscientists, Except Hydrologists and Geographers	4	3
17-2011	Aerospace Engineers	4	1
	Bachelor's degree Subtotal	785	297
19-1042	Medical Scientists, Except Epidemiologists	36	14
	Master's degree or higher Subtotal	36	14
	Grand Total	1,385	530

Sources: Washington State Employment Security Department, 2015; Community Attributes, Inc., 2015.

Total supply is defined by local graduates and unemployment insurance claimants. Within King County there is a total of 2,061 local graduates and 530 unemployment insurance claimants that can be expected to fill positions within the King County professional, scientific, and technical services sector. (**Exhibit 16**).

Exhibit 16. Total Talent Supply, King County

Source of Supply	Qualified Workers
On-the-Job Training	492
Associate's degree or Postsecondary Award	162
Bachelors degree	1,247
Master's degree or higher	159
Graduates Subtotal	2,061
Unemployment Insurance Claimants	530
Grand Total	2,591

Sources: National Center for Education Statistics Integrated Postsecondary Education System, 2013; Washington State Employment Security Department, 2015; Community Attributes, Inc., 2015.

SUPPLY AND DEMAND

Combining the elements of expected supply with projected demand yields annual occupational gaps within the sector. **Exhibits 17 and 18** summarize graduate supply, total demand, UI claimant supply, and total gaps for each professional, scientific, and technical services occupation.

Professional, scientific, and technical services occupations that require on-the-job training have a supply of 492 graduates and 210 UI claimants, totaling a supply of 702 workers. Total demand for these occupations is estimated at 923 positions yearly, leaving a shortage of 221 people in the local talent supply. Among occupations that require an associate degree or Postsecondary Award there is an expected gap of 77 individuals. Between these two categories several occupations are expected to experience an oversupply of local talent. The greatest of these is “managers, all other,” projected to have an annual surplus of 308 individuals. (**Exhibit 14**)

Exhibit 17. Annual Supply and Demand, On-the-job Training and Associate Degree or Postsecondary Award, Professional, Scientific, and Technical Service Occupations, King County

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Computer User Support Specialists	0	214	(214)	0	(214)
Sales Representatives, Services, All Other	0	259	(259)	64	(194)
Business Operations Specialists, All Other	0	126	(126)	27	(99)
Interviewers, Except Eligibility and Loan	0	39	(39)	0	(39)
Demonstrators and Product Promoters	0	38	(38)	7	(30)
Veterinary Assistants and Laboratory Animal Caretakers	0	27	(27)	0	(27)
Photographers	8	37	(29)	5	(24)
Billing and Posting Clerks	0	56	(56)	35	(21)
Construction and Building Inspectors	0	18	(18)	2	(16)
Legal Secretaries	10	14	(4)	33	29
Tax Preparers	94	24	70	37	107
Managers, All Other	379	71	308	0	308
On-the-Job Training Subtotal	492	923	(431)	210	(221)
Web Developers	15	90	(75)	0	(75)
Paralegals and Legal Assistants	9	82	(73)	0	(73)
Veterinary Technologists and Technicians	20	21	(1)	0	(1)
Computer Network Support Specialists	40	32	8	0	8
Architectural and Civil Drafters	77	23	54	9	63
Associate's degree or Postsecondary Award Subtotal	162	248	(86)	9	(77)

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

With 1,247 local graduates and 297 UI claimants, occupations requiring a Bachelor's degree have a projected annual supply of 1,544 people. Total demand for these occupations, however, is estimated at 3,044 positions yearly. This means that on average, the sector can expect an annual shortfall of local talent of 1,500 positions per year. The greatest absolute

final gap in this category is among “software developers, applications,” with an annual shortfall of 413 employees. Several of these occupations are projected to experience an oversupply of local talent. Chief among these are natural science managers, with an anticipated oversupply of 619 qualified workers per year. (**Exhibit 18**).

Positions that require a master’s degree or higher are projected to experience a shortage of 137 workers per year. Among these occupations, lawyers are projected to experience a shortage of 104 individuals, while medical scientists, except epidemiologists are expected to have an annual surplus of 12 people. Across all occupational groupings, 1,934 positions are expected to go unfilled by the local talent supply per year. (**Exhibit 18**).

Not all occupations within an educational grouping are substitutable. An oversupply in one occupation may not necessarily be countered by an undersupply in another occupation. Although the educational requirement may be the same, the actual degree or skills may not be the same between occupations. For this reason it is important to have a detailed account of supply and demand for each primary occupation in order to anticipate and plan for labor surpluses and shortages in the future.

Exhibit 18. Annual Supply and Demand, Bachelor's Degree and Master's Degree or Higher, Professional, Scientific, and Technical Service Occupations, King County

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Software Developers, Applications	11	424	(413)	0	(413)
Accountants and Auditors	14	281	(267)	0	(267)
Computer Systems Analysts	40	255	(215)	0	(215)
Management Analysts	41	243	(202)	7	(195)
Market Research Analysts and Marketing Specialists	5	198	(193)	0	(193)
Civil Engineers	9	180	(171)	14	(157)
Architects, Except Landscape and Naval	4	136	(132)	0	(132)
Software Developers, Systems Software	25	126	(101)	0	(101)
Network and Computer Systems Administrators	6	86	(80)	0	(80)
Computer Occupations, All Other	16	93	(77)	0	(77)
Computer and Information Systems Managers	49	158	(109)	49	(60)
Art Directors	1	54	(53)	0	(53)
Mechanical Engineers	2	50	(48)	0	(48)
Multimedia Artists and Animators	20	68	(48)	0	(48)
Biological Technicians	2	49	(47)	0	(47)
Graphic Designers	35	77	(42)	4	(38)
Landscape Architects	0	36	(36)	0	(36)
Electrical Engineers	6	41	(35)	4	(30)
Environmental Engineers	0	32	(32)	3	(29)
Environmental Scientists and Specialists, Including Health	51	88	(37)	9	(27)
Geoscientists, Except Hydrologists and Geographers	2	31	(29)	3	(25)
Interior Designers	13	47	(34)	9	(25)
Human Resources Managers	0	18	(18)	0	(18)
Chemists	1	20	(19)	9	(10)
Database Administrators	8	16	(8)	0	(8)
Electronics Engineers, Except Computer	3	13	(10)	1	(8)
Aerospace Engineers	11	17	(6)	1	(5)
Marketing Managers	4	69	(65)	66	1
Public Relations Specialists	24	31	(7)	8	1
Chief Executives	67	28	39	28	67
Architectural and Engineering Managers	171	46	125	35	160
Natural Sciences Managers	604	33	571	48	619
Bachelor's degree Subtotal	1,247	3,044	(1,797)	297	(1,500)
Lawyers	93	197	(104)	0	(104)
Veterinarians	0	30	(30)	0	(30)
Statisticians	8	24	(16)	0	(16)
Medical Scientists, Except Epidemiologists	58	59	(1)	14	12
Master's degree or higher Subtotal	159	310	(151)	14	(137)
Grand Total	2,061	4,525	(2,464)	530	(1,934)

Source: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2015; National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

INTERIM FINDINGS AND NEXT STEPS

Interim Findings

The professional, scientific, and technical services sector in King County is projected to have an average of 4,525 openings annually between 2018 and 2023. Overall, the core professional, scientific, and technical sector occupations are projected to grow from 300,192 jobs in 2018 to 337,788 jobs in 2023, a compound annual growth rate of 2.4%.

King County's professional scientific, and technical services sector is projected to experience a local supply of 2,061 graduates and 530 unemployment insurance claimants per year that both match to professional, scientific, and technical service occupations, can be expected to work within the sector, and can be expected to stay in the area after graduating. (**Exhibit 19**).

Exhibit 19. Summary of Annual King County Professional, Scientific, and Technical Services Sector Talent Supply, 2018-2023

Projected Talent Supply (Annual)	
Unemployed	530
Newly-Trained Candidates	2,061

Sources: Washington State Employment Security Department, 2015; National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, 2015.

The professional, scientific, and technical services sector will experience a total annual shortage of 1,933 workers between 2018 and 2023. Overall, 57% of annual openings are expected to be filled by local talent. (**Exhibit 20**).

Exhibit 20. Summary of Annual King County Professional, Scientific, and Technical Services Sector Talent Supply and Demand, 2018-2023

Annual Surplus or (Shortage)	
Total Openings (Demand)	4,525
Total Supply	2,592
Surplus or (Shortage)	(1,933)

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2015; National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.

Demand within the professional, scientific, and technical services sector for occupations requiring a bachelor's degree is the highest out of the educational requirement categories. Total annual demand for occupations that require a bachelor's degree is 3,044 workers. Supply among these occupations is projected to be 1,544 workers, leaving a shortage in local

talent of 1,500 workers. Positions that require on-the-job training have a projected annual demand of 923 workers, and a total supply of 702 workers, which, after subtracting local supply from annual demand leaves a gap of 221 unfilled positions annually. Occupations that require an associate degree or Postsecondary Award have the smallest shortage among educational requirement categories in the professional, scientific, and technical services sector, with just 77 unfilled positions and 69% of demand being filled by local talent. Positions requiring a master's degree or higher have a total projected annual demand of 310 workers, and a total annual supply of 173, resulting in a projected annual shortage of 137 workers. (Exhibit 21).

Exhibit 21. Summary of Annual Talent Supply and Demand by Education Requirement, 2018-2023

Educational Requirement	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap
On-the-Job Training	492	923	(431)	210	(221)
Associate's degree or Postsecondary Award	162	248	(86)	9	(77)
Bachelor's degree	1,247	3,044	(1,797)	297	(1,500)
Master's degree or higher	159	310	(151)	14	(137)
Total	2,061	4,525	(2,464)	530	(1,934)

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2015; National Center for Education Statistics Integrated Postsecondary Education System, 2013; Community Attributes, Inc., 2015.