

# Professional, Scientific, & Technical Services

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## A Susquehanna Region Industry Brief



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Sage Policy Group, Inc.

Submitted to:

The Susquehanna Workforce Network



# Professional, Scientific, & Technical Services: A Susquehanna Region Industry Brief

## Executive Summary

### Background

There are certain economic segments that are named such that one can instantly deduce the types of industries and occupations implicated. This group includes the likes of financial services (e.g. banks, insurers), transportation (e.g., airlines, mass transit), and construction (e.g., residential and highways).

The professional, scientific, and technical services sector is not one of these self-defining sectors. Nonetheless, this Sage Policy Group, Inc. (Sage) report has endeavored to take a deep dive into industry dynamics by characterizing the companies involved, workers, associated credentials, compensation, and industry growth prospects. In general, the segment is associated with elevated requirements for educational attainment and lofty compensation.

In 2019, U.S. professional, scientific, and technical services employment grew 2.8 percent, twice the rate of all industries. Pre-COVID-19, professional, scientific, and technical services was expected to grow 1.1 percent annually nationwide between 2018 and 2028, faster than the 0.5 percent projected annual growth rate for all industries.

COVID-19 is likely to expand demand for R&D and other technical activities going forward, strongly implying that the segment's pace of growth will accelerate relative to the balance of the economy going forward. Within the sector, computer systems design and related services is projected to grow the fastest, expanding 2.2 percent annually between 2018 and 2028 in the U.S. according to pre-pandemic forecasts.<sup>1</sup>

In the Susquehanna region, professional, scientific, and technical services employment accounts for about 7 percent of total employment. From 2017 to 2018, employment in this sector expanded by nearly 500 positions or 5.5 percent. Within the Susquehanna region, professional, scientific, and technical services employment is mostly concentrated in Harford County (90%+), largely attributable to the defense contracting enterprises that operate in and around Aberdeen Proving Ground. The industry also encompasses law firms, accountancies, and many other segments that require industry-specific credentials and ongoing professional development.

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<sup>1</sup> U.S. Bureau of Labor Statistics. *Employment Projections — 2018-2028*. <https://www.bls.gov/emp/>.

## Findings

This industry brief addresses the following questions:

1. What are the realistic growth prospects for professional, scientific, and technical services employment in the Susquehanna region?
2. To what extent is there evidence of inadequate human capital supply now and into the future with respect to regional professional, scientific, and technical services?
3. What does an individual need to do to access professional, scientific, and technical services opportunities and are those opportunities available within the confines of the Susquehanna region?

Sage concludes that: 1) this is an industry with significant growth prospects in the region; 2) there is substantial evidence of inadequate human capital supply in the region, prompting significant recruitment from beyond the region's boundaries; and 3) higher education credentials are critical in accessing the bulk of jobs in this segment.

Since this is an industry that requires such substantial educational credentialing, the Susquehanna Workforce Network should not seek to directly supply programing that positions people for the industry. Rather, SWN's best approach may be to:

1. Serve as an information clearinghouse linking jobseekers with available positions, including among those with entry-level skills in management, bookkeeping, basic software, etc.; and
2. Work with local two-year colleges to ensure tight fit between the evolving needs of employers and the capacity of programing available at Cecil College and Harford Community College.

## I. Industry Overview

*Industry/Sector Definition.* The professional, scientific, and technical service sector (also sometimes simply referred to as the professional and technical services sector) is part of the professional and business services super-sector. The professional, scientific, and technical services sector is comprised of establishments that specialize in activities typically requiring an elevated degree of expertise and training.

Establishments in this sector generally specialize in very specific technical activities, but may provide services to a host of clients in a variety of industries. In certain instances, industry participants also provide services to households. Among these services are legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services.<sup>2,3</sup>

*Key Subsectors/Industries.* Individual industries in the professional, scientific, and technical services sector are defined according to the particular expertise and training of the services provider.<sup>4</sup> The sector includes the following 9 industry groups:

- *Legal Services (NAICS 5411)*
- *Accounting, Tax Preparation, Bookkeeping, and Payroll Services (NAICS 5412)*
- *Architectural, Engineering, and Related Services (NAICS 5413)*
- *Specialized Design Services (NAICS 5414)*
- *Computer Systems Design and Related Services (NAICS 5415)*
- *Management, Scientific, and Technical Consulting Services (NAICS 5416)*
- *Scientific Research and Development Services (NAICS 5417)*
- *Advertising and Related Services (NAICS 5418)*
- *Other Professional, Scientific, and Technical Services (NAICS 5419)<sup>5</sup>*

Exhibit A1 in the appendix provides definitions of each of the specific industry groups.

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<sup>2</sup> U.S. Bureau of Labor Statistics. *Industries at a Glance: Professional, Scientific, and Technical Services: NAICS 54*. <https://www.bls.gov/iag/tgs/iag54.htm>.

<sup>3</sup> The professional, scientific, and technical services sector excludes establishments primarily engaged in providing a range of day-to-day office administrative services such as financial planning, billing and recordkeeping, personnel supply, and physical distribution and logistics. (U.S. Census Bureau. *North American Industry Classification System*.)

<sup>4</sup> Maryland DLLR. *Industry Clusters - Workforce Information & Performance*. <https://www.dllr.state.md.us/lmi/industryclusters/>.

<sup>5</sup> U.S. Bureau of Labor Statistics. *Industries at a Glance: Professional, Scientific, and Technical Services: NAICS 54*. <https://www.bls.gov/iag/tgs/iag54.htm>.

Nationally, the industry group that represents the largest portion of professional, scientific, and technical services employment is computer system design and related services (NAICS 5415), which accounts for nearly 23 percent of total sector employment. Management, scientific, and technical consulting services (NAICS 5416) and architectural, engineering, and related services (NAICS 5413) each represent approximately 16 percent of total sector employment. Legal services (NAICS 5411) accounts for a bit more than 12 percent of sectoral employment and payroll services (NAICS 5412) accounts for not quite 11 percent of sector employment. In total, these five leading segments comprise nearly 78 percent of professional, scientific, and technical services employment.

Exhibit 1. U.S. Professional, Scientific, & Technical Services Employment by Industry Group, 2018

Industry Group	Employment (000s)	% of Total
Computer Systems Design and Related Services	2,121.6	22.8%
Management, Scientific, and Technical Consulting Services	1,483.2	15.9%
Architectural, Engineering, and Related Services	1,475.8	15.9%
Legal Services	1,140.8	12.3%
Accounting, Tax Preparation, Bookkeeping, and Payroll Services	1,013.6	10.9%
Other Professional, Scientific, and Technical Services	738.5	7.9%
Scientific Research and Development Services	693.0	7.5%
Advertising and Related Services	489.6	5.3%
Specialized Design Services	144.0	1.5%
<b>Total Professional, Scientific, and Technical Services</b>	<b>9,300.1</b>	<b>100.0%</b>

Source: U.S. Bureau of Labor Statistics, *Employment Projections — 2018-2028*; Sage.

Professional, scientific, and technical services employment is expected to grow by 1.1 percent annually nationwide from 2018 to 2028, faster than the 0.5 percent annual growth rate expected for all industries.<sup>6</sup> Within the sector, computer systems design and related services is projected to grow the fastest, expanding by 2.2 percent annually between 2018 and 2028 in the U.S. Other industry groups expected to expand more quickly than the sector as a whole include management, scientific, and technical consulting services (1.8% annually) and other professional, scientific, and technical services (1.4% annually).<sup>7</sup>

<sup>6</sup> Pre-COVID-19 forecasts.

<sup>7</sup> U.S. Bureau of Labor Statistics. *Employment Projections — 2018-2028*. <https://www.bls.gov/emp/>.

*Key Occupations.* Occupational data supply a different manner of framing economic segments than industry-oriented data. Industry data relate to firms, while occupation data relate to workers. Employment in professional, scientific, and technical services in the U.S. is projected to expand 11.7 percent, or by more than 1 million net new jobs between 2018 and 2028.<sup>8</sup>

Exhibit 2 supplies statistical detail regarding the occupational groups most likely to be associated with the professional, scientific, and technical services sector. Computer and mathematical occupations are the most likely to be employed in professional, scientific, and technical services, representing nearly 18 percent of U.S. employment in this segment. Office and administrative support occupations comprise the second largest share of the sector’s employment (17.1%), followed by business and financial operations occupations (16.1%), architecture and engineering occupations (10.2%), and management occupations (10.1%). Together these five occupation groups account for more than 71 percent of professional, scientific, and technical services sector employment in the U.S.

Exhibit 2. U.S. Professional, Scientific, & Technical Services Sector Employment by Top 5 Major Occupation Groups, May 2019

Occupation Group	% of Industry Employment
Computer and Mathematical Occupations	17.7%
Office and Administrative Support Occupations	17.1%
Business and Financial Operations Occupations	16.1%
Architecture and Engineering Occupations	10.2%
Management Occupations	10.1%

Source: U.S. Bureau of Labor Statistics, *Occupational Employment Statistics (OES)*; Sage.

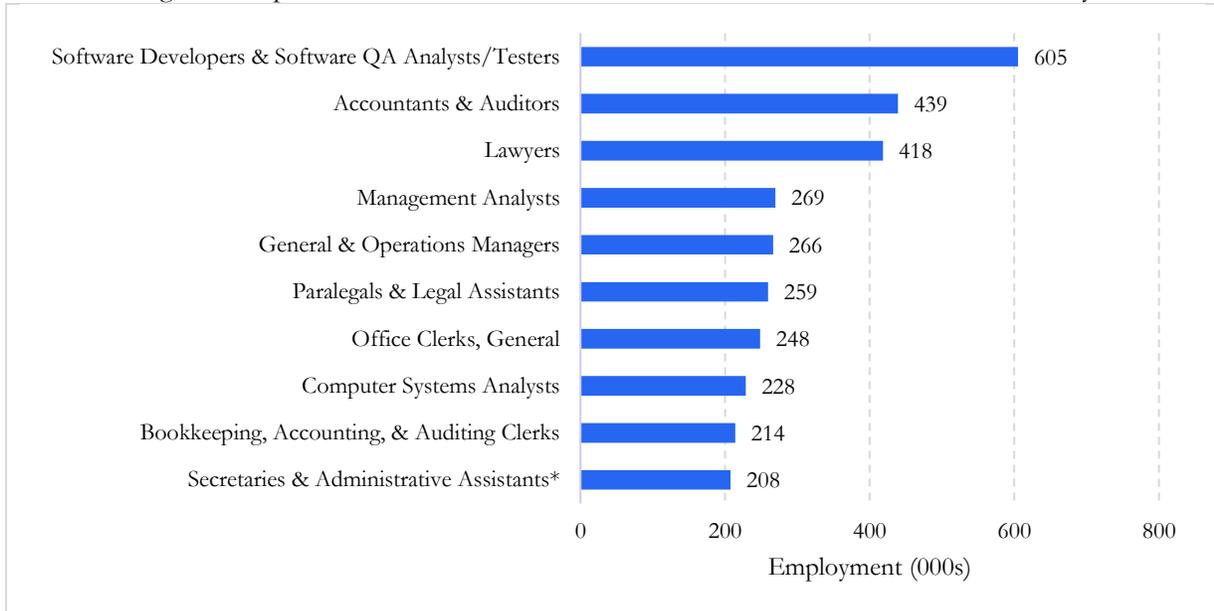
Exhibit 3 presents U.S. employment in the largest detailed occupational classifications falling within the professional, scientific, and technical services sector. Computer and mathematical occupations represent the largest occupational group associated with the sector. Accordingly, the leading detailed occupation is software developers and software quality assurance analysts/testers. Computer systems analysts is another computer and mathematical occupation highly concentrated in the sector.

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<sup>8</sup> U.S. Bureau of Labor Statistics. *Employment Projections — 2018-2028*.

Several office and administrative support occupations are among the top 10 largest occupations in the U.S. professional, scientific, and technical services sector, including general office clerks, bookkeeping, accounting, and auditing clerks, and secretaries and administrative assistants. Business and financial operations-related occupations, including management analysts, accountants, and auditors, are also among the top 10 occupations as are general and operations managers. Finally, legal occupations, including lawyers and paralegals and legal assistants rank among the sector's top 10 most concentrated occupations.

Exhibit 3. Largest Occupations in U.S. Professional, Scientific, & Technical Services Sector, May 2019



Source: U.S. Bureau of Labor Statistics, *Occupational Employment Statistics (OES)*; Sage.  
 Notes: \*Except Legal, Medical, and Executive. QA: Quality Assurance.

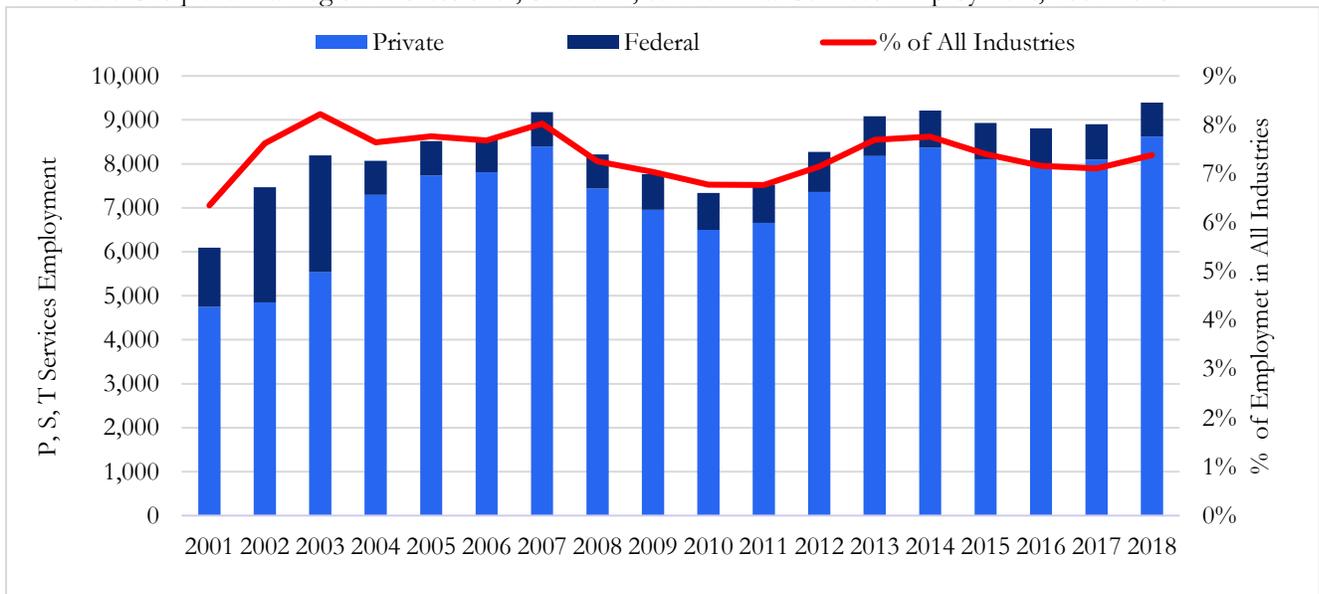
## II. Professional, Scientific, & Technical Services in the Susquehanna Region

Exhibit 4 supplies statistical detail regarding professional, scientific, and technical services employment in the Susquehanna region from 2001 to 2018. Figures presented are a combination of Quarterly Census of Employment and Wages (QCEW) data and Quarterly Workforce Indicators (QWI) data, both sourced from the Bureau of Labor Statistics (BLS).

QCEW data represents the majority of the data presented below. Due to data availability, Sage supplemented QCEW with data from QWI to estimate total Susquehanna regional professional, scientific, and technical services employment.<sup>9</sup>

Since bottoming out in 2010 in the aftermath of the Great Recession, professional, scientific, and technical services employment in the Susquehanna region reached pre-Great Recession levels prior to the pandemic. Between 2010 and 2018, Susquehanna regional professional, scientific, and technical services employment grew 32.6 percent or at an average annual rate of 3.6 percent.

Exhibit 4. Susquehanna Region Professional, Scientific, & Technical Services Employment, 2001-2018



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) program and Quarterly Workforce Indicators (QWI); Sage. Notes: 1. Data are not seasonally adjusted (NSA). \*QCEW data for private professional, scientific, and technical services employment in Cecil County are not available for some years due to data not meeting BLS or State agency disclosure standards. QWI data were substituted for private professional, scientific, and technical services employment in Cecil County.

<sup>9</sup> QCEW data for Cecil County private professional, scientific, and technical services employment are not available for many years due to data not meeting BLS or State agency disclosure standards. To attempt to correct for this, Sage combined QWI data for Cecil County with QCEW data to estimate total professional, scientific, and technical services employment in the Susquehanna region (Cecil County data: private employment from QWI, federal employment from QCEW. Harford County data: private and federal employment from QCEW). Comparing QCEW data with QWI data for Harford County suggests the figures are similar.

Within the Susquehanna region, professional, scientific, and technical services employment is mostly concentrated in Harford County (more than 90%). The majority of professional, scientific, and technical services employment is private (91.8%), with a small portion of industry employment classified as federal (8.2%). Many private employers in professional, scientific, and technical services are contractors to the federal government as well as to other public sector elements.

Exhibit 5 provides professional, scientific, and technical services employment growth in Maryland and the Susquehanna region over two five-year periods. Susquehanna regional professional, scientific, and technical services employment grew 2.0 percent annually between 2008 and 2013, faster than the statewide industry growth rate of 0.8 percent. During the following five-year period, professional, scientific, and technical services employment grew just 0.7 percent annually in the Susquehanna region, slower than the statewide growth rate.

Within the Susquehanna region, Cecil County’s professional, scientific, and technical services employment grew rapidly between 2008 and 2013, by 4.0 percent annually (it actually peaked at a historic high in 2014), before falling back to more “normal” levels (closer to the average level of industry employment seen in the past). In Harford County, professional, scientific, and technical services employment expanded 1.8 percent annually between 2008 and 2013 and then slipped to a 1.1 percent annual growth rate between 2013 and 2018. There are many possible explanations for this, including shifts in federal procurement emerging from Aberdeen Proving Ground.

Exhibit 5. Recent Growth in Professional, Scientific, & Technical Services Employment, Maryland v. Susquehanna Region

	Employment			Net Growth		CAGR	
	2008	2013	2018	2008-2013	2013-2018	2008-2013	2013-2018
Maryland	232,683	242,424	258,599	9,741	16,175	0.8%	1.3%
Susquehanna WIA	8,216	9,081	9,394	866	313	2.0%	0.7%
Cecil County, MD	661	802	646	142	-156	4.0%	-4.2%
Harford County, MD	7,555	8,279	8,748	724	469	1.8%	1.1%

Source: U.S. Bureau of Labor Statistics; Quarterly Census of Employment and Wages (QCEW) program and Quarterly Workforce Indicators (QWI); Sage. Notes: 1. Data are not seasonally adjusted (NSA). 2. QCEW data for private professional, scientific, and technical services employment in Cecil County are not available for some years due to data not meeting BLS or State agency disclosure standards. QWI data were substituted for private professional, scientific, and technical services employment in Cecil County.

Exhibit 6 disaggregates professional, scientific, and technical services employment in the Susquehanna region by detailed category as of 2019Q3. The largest employment category is computer systems design and related services, followed by architectural, engineering, and related services. Together these classifications account for approximately half of all professional, scientific, and technical services employment in the region. Management, scientific, and technical consulting services represents approximately 20 percent of all regional sector employment.

The computer systems design and related services industry employs large numbers of software developers, computer systems analysts, computer user support specialists, programmers, and other computer related occupations, as well as managers and sales representatives. Common occupations in the architectural, engineering, and related services industry include various types of engineers, architects, and managers, as well as support staff like secretaries and administrative assistants and office clerks. The management, scientific, and technical consulting services industry employs a range of personnel, from various types of analysts and specialists, to managers, customer service/sales representatives, office clerks and secretaries/administrative assistants.<sup>10</sup>

Exhibit 6. Susquehanna Region Professional, Scientific, & Technical Services Employment by Detailed Industry, 2019Q3

Industry	Employment	% of Total Sector Employment
Computer Systems Design and Related Services	2,199	24.6%
Architectural, Engineering, and Related Services	2,166	24.2%
Management, Scientific, and Technical Consulting Services	1,796	20.1%
Scientific Research and Development Services	1,130	12.6%
Other Professional, Scientific, and Technical Services	618	6.9%
Accounting, Tax Preparation, Bookkeeping, and Payroll Services	551	6.2%
Legal Services	351	3.9%
Advertising, Public Relations, and Related Services	83	0.9%
Specialized Design Services	58	0.6%
<b>Total</b>	<b>8,952</b>	<b>100.0%</b>

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) program; Sage. Notes: 1. Data are not seasonally adjusted (NSA).

<sup>10</sup> U.S. Bureau of Labor Statistics, *Occupational Employment Statistics (OES)*.

- Business Establishments/Employers

The same three professional, scientific, and technical services industries that represent the majority of sector employment in the region represent the majority of sector establishments, though not in the same order. As of 2019Q3, there were 225 management, scientific, and technical consulting services establishments, 208 computer systems design and related services establishments, and 146 architectural, engineering, and related services establishments in the Susquehanna region. Together these three industries represent approximately 60 percent of professional, scientific, and technical services establishments in the region. Legal services and accounting, tax preparation, and related services comprise a bit less than a quarter of the sector’s establishments.

Exhibit 7. Susquehanna Region Professional, Scientific, & Technical Services Business Establishments by Detailed Industry, 2019Q3

Industry	Total Susq. Region	
	# of Establishments	% of Total Sector Establishments
Management, Scientific, and Technical Consulting Services	225	23.1%
Computer Systems Design and Related Services	208	21.4%
Architectural, Engineering, and Related Services	146	15.0%
Accounting, Tax Preparation, Bookkeeping, and Payroll Services	128	13.2%
Legal Services	106	10.9%
Other Professional, Scientific, and Technical Services	65	6.7%
Scientific Research and Development Services	51	5.2%
Advertising, Public Relations, and Related Services	24	2.5%
Specialized Design Services	19	2.0%
<b>Total</b>	<b>972</b>	<b>100.0%</b>

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) program; Sage. Notes: 1. Data are not seasonally adjusted (NSA).

Examples of major employers in the Susquehanna region considered part of the professional, scientific, and technical services sector include Booz Allen Hamilton, Leidos Engineering, and H&R Block.<sup>11</sup> Aberdeen Proving Ground (APG) serves as the heart of the Susquehanna region’s professional, scientific, and technical services sector, though many who work there are categorized as federal employees. When one takes that into consideration, the role of professional, scientific, and technical services is considerably larger than even the private industry data reveal.

According to MilitaryINSTALLATIONS (a resource from the U.S. Department of Defense’s Military OneSource network), more than 19,500 civilians work at APG and more than 1,000 military

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<sup>11</sup> Maryland Department of Labor, Licensing, and Regulation (DLLR), *Major Employer Lists*. <https://www.dllr.state.md.us/lmi/emplists/>.

personnel are assigned there. In addition, there are approximately 3,000 contractors and private business employees working on the proving ground itself.<sup>12</sup>

Unfortunately, data regarding civilian Department of Defense (DOD) employment at APG are unavailable. However, it is known that civilian employment at APG encompasses a range of fields, including professional, scientific and technical services. Office of Personnel Management (OMP) data characterizing the federal civilian workforce indicate that throughout Maryland more than 40 percent of Army civilian personnel are classified as professional employees, 39 percent are classified as administrative, and 10 percent are classified as technical.<sup>13</sup>

Regarding contractors and private business employees working at APG, some employment data are available from the U.S. Census Bureau. Available data indicate that in 2017, there were more than 3,300 private employees working at APG. These employees are likely to be well educated and earn high wages. Of the more than 3,300 private employees working at the base in 2017, more than 30 percent had a bachelor’s or advanced degree and more than 80 percent earned in excess of \$3,333 per month. Most of these private employees were between the ages of 30-54 (62%). Perhaps most importantly for purposes of this analysis, 60 percent of those private workers were classified as working in the professional, scientific, and technical services industry.<sup>14</sup>

Exhibit 8. Private Employment at Aberdeen Proving Ground Military Base in Select Industries, 2017

	# of Jobs	% of Total
Total Private Primary Jobs	3,369	100.0%
Professional, Scientific, and Technical Services	2,017	59.9%

Source: U.S. Census Bureau. Longitudinal-Employer Household Dynamics Program, OnTheMap Application; Sage. Notes: 1. Numbers represent *primary* jobs, not total jobs. Primary Jobs: Public and private-sector jobs, one job per worker. A primary job is the highest paying job for an individual worker.

Key to growing this segment is to improve Maryland’s commercialization engine. Despite being home to significant institutional R&D activities, including at Aberdeen Proving Ground, the state produces relatively few private technology firms that go on to become significant market players. Many local entrepreneurs move to Silicon Valley or other local hotspots to grow their businesses, citing factors such as recruitment, venture capital, intellectual property attorneys, and other components of a thriving entrepreneurial ecosystem that Maryland does not sufficiently offer (apparently).

<sup>12</sup> Military OneSource-MilitaryINSTALLATIONS. “Aberdeen Proving Ground In-depth Overview”. <https://installations.militaryonesource.mil/in-depth-overview/aberdeen-proving-ground>.

<sup>13</sup> U.S. Office of Personnel Management, *FedScope*. <https://www.fedscope.opm.gov/>.

<sup>14</sup> U.S. Census Bureau. Longitudinal-Employer Household Dynamics Program, OnTheMap Application. Work Area Profile.

Fortunately, there are opportunities in the Susquehanna region to partner with federal labs to bring new technologies to market. Military labs often have a mechanism to allow intellectual property to be licensed for commercial use. DefTech Maryland, or the Defense Technology Commercialization Center, was launched as a pilot program in 2018 at APG and opened a space in Havre de Grace. DefTech seeks to build relationships between federal labs and entrepreneurs in Maryland through outreach and education. It works with entrepreneurs and companies one-on-one to help them understand how they can productively engage with federal labs, navigate the tech transfer process, or locate patents that may be ripe for commercialization.<sup>15</sup>

- Wages

Average wages in professional, scientific, and technical services industries in the Susquehanna region are presented in Exhibit 9. The highest wages are in scientific research and development services and computer systems design and related services. Wages are generally higher than average in all professional, scientific, and technical services industries. This comes as little surprise given the significant educational attainment associated with these positions. Available evidence suggests that many of these professionals come to Maryland from beyond the state’s boundaries, rendering the Susquehanna region a major importer of professional, scientific, and technical talent.

Exhibit 9. Average Wages in the Susquehanna Workforce Region for Select Industries, 2019Q3

Industry	Avg. Hourly Wage*	Avg. Weekly Wage	Avg. Annual Wage*
All Industries	\$25.70	\$1,028	\$53,456
Accounting, Tax Preparation, Bookkeeping, & Payroll Services	\$26.03	\$1,041	\$54,132
Advertising & Related Services	\$37.73	\$1,509	\$78,468
Architectural, Engineering, & Related Services	\$40.65	\$1,626	\$84,552
Computer Systems Design & Related Services	\$52.15	\$2,086	\$108,472
Legal Services	\$26.20	\$1,048	\$54,496
Management, Scientific, & Technical Consulting Services	\$42.10	\$1,684	\$87,568
Scientific Research & Development Services	\$53.43	\$2,137	\$111,124
Specialized Design Services	\$31.78	\$1,271	\$66,092
Other Professional, Scientific, & Technical Services	\$19.73	\$789	\$41,028

Source: Maryland Workforce Exchange, Labor Market Statistics, Covered Employment and Wages Program; Sage.

\*Assumes a 40-hour week worked year round.

<sup>15</sup> Technical.ly Baltimore, “DefTech is connecting Department of Defense labs and Maryland entrepreneurs”. 3/6/2020. <https://technical.ly/baltimore/2020/03/06/deftech-connecting-department-of-defense-labs-maryland-entrepreneurs/>.

### III. Looking Ahead: Meeting Future Demands in Professional, Scientific, & Technical Services

From the perspective of gauging the future, this industry brief addresses the following questions:

1. What are the realistic growth prospects for professional, scientific, and technical services employment in the Susquehanna region?
  2. To what extent is there evidence of inadequate human capital supply now and into the future with respect to regional professional, scientific, and technical services?
  3. What does an individual need to do to access professional, scientific, and technical services opportunities and are those opportunities available within the confines of the Susquehanna region?
1. What are the realistic growth prospects for **professional, scientific, and technical services** employment in the Susquehanna Region?
    - Projected Employment Growth in Key Industries and Occupations

Projections produced by the Office of Workforce Information and Performance (OWIP) within Maryland’s Department of Labor indicate that Susquehanna region professional, scientific, and technical services industries are actually expected to decline 0.9 percent annually between 2016 and 2026. Unfortunately, these projections do not disaggregate to detailed industries within the sector. Moreover, they do not consider the economic shifts wrought by the COVID-19-induced pandemic and accompanying economic downturn.

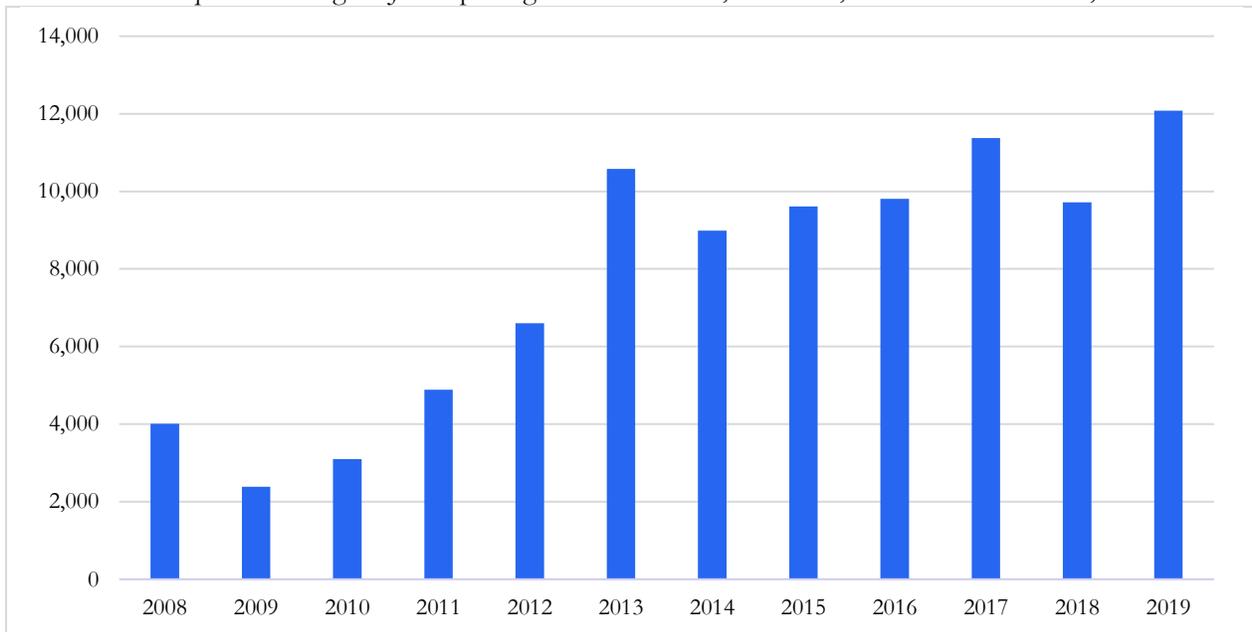
Exhibit 10. Susquehanna Region – Projected Employment Growth in Select Industries, 2016-2026

Industry	2016	2026	2016-2026	
			Total Growth	Annual % Growth
<b>ALL INDUSTRIES</b>	<b>130,904</b>	<b>141,205</b>	<b>10,301</b>	<b>0.8%</b>
<b>Professional, Scientific, &amp; Technical Services</b>	<b>7,852</b>	<b>7,159</b>	<b>-693</b>	<b>-0.9%</b>

Source: Maryland Department of Labor, Licensing and Regulation (DLLR), Workforce Region Industry Projections; Sage.

While State projections suggest professional, scientific, and technical services industries will not experience growth in the Susquehanna region, available evidence suggests that there has been significant demand for workers. Exhibit 11 shows the number of job openings in the Susquehanna region in professional, scientific, and technical services posted online on the Maryland Workforce Exchange from 2008-2019. As the graph clearly indicates, the need for workers has been growing in recent years. The number of jobs postings in professional, scientific, and technical services jumped by more than 24 percent in 2019 alone, strongly suggesting that state projections regarding industry growth are off the mark.

Exhibit 11. Susquehanna Region Job Openings in Professional, Scientific, & Technical Services, 2008-2019



Source: Maryland Workforce Exchange: Labor Market Information (Job Source: Online advertised jobs data); Sage. Notes: 1. The table shows the number of job openings advertised online in the Susquehanna Workforce Region (Jobs De-duplication Level 2). 2. Jobs De-duplication Level 2: high level de-duplication of advertised job openings (for statistical analysis).

There were more than 12,000 job openings in the Susquehanna region posted on the Maryland Workforce Exchange in professional, scientific, and technical services industries in 2019. More than 44 percent of those openings were for positions in the computer systems design and related services industry (5,353 positions advertised throughout the year). More than 27 percent of openings were for positions in architectural, engineering, and related services (3,320 positions) and nearly 22 percent were for positions in management, scientific, and technical consulting services (2,611 positions). Each of these segments therefore represent important focal points for regional workforce development professionals, two-year colleges, and high schools among others.

Exhibit 12. Susquehanna Region Job Openings: Professional, Scientific, & Technical Services  
Job Openings by Detailed Industry in 2019

Industry	Job Openings
Computer Systems Design and Related Services	5,353
Architectural, Engineering, and Related Services	3,320
Management, Scientific, and Technical Consulting Services	2,611
Scientific Research and Development Services	464
Other Professional, Scientific, and Technical Services	149
Accounting, Tax Preparation, Bookkeeping, and Payroll Services	148
Advertising, Public Relations, and Related Services	27
Specialized Design Services	11
Legal Services	0

Source: Maryland Workforce Exchange, Labor Market Information. Job Source: Online advertised jobs data; Sage. Notes: 1. The table shows the number of job openings advertised online in the Susquehanna Workforce Region in 2019 (Jobs De-duplication Level 2). 2. Jobs De-duplication Level 2: high level de-duplication of advertised job openings (for statistical analysis).

Exhibit 13 reflects the leading 10 professional, scientific, and technical services related occupations by projected growth in absolute terms between 2016 and 2026 in the Susquehanna region. Positions for general and operations managers are expected to expand the most, by 0.7 percent annually or by more than 150 positions over the course of a decade. Positions for customer service representatives are expected to grow faster than average (0.9 percent annually), as are positions for applications software developers (1.1 percent).

Exhibit 13. Susquehanna Region: Projected Employment Growth in Select Detailed Occupations, 2016-2026

Occupations	2016	2026	2016-2026	
			Total Growth	Annual % Growth
<b>ALL OCCUPATIONS</b>	<b>130,904</b>	<b>141,202</b>	<b>10,298</b>	<b>0.8%</b>
<b>OCCUPATIONS LIKELY TO BE EMPLOYED IN PROFESSIONAL, SCIENTIFIC, &amp; TECHNICAL SERVICES*</b>				
General and Operations Managers	2,032	2,187	155	0.7%
Customer Service Representatives	635	692	57	0.9%
Software Developers, Applications	368	411	43	1.1%
Sales Representatives, Services, All Other	506	546	40	0.8%
Managers, All Other	778	812	34	0.4%
Market Research Analysts and Marketing Specialists	206	232	26	1.2%
Business Operations Specialists, All Other	1,479	1,504	25	0.2%
Graphic Designers	370	390	20	0.5%
Financial Managers	183	202	19	1.0%
Information Security Analysts	141	160	19	1.3%

Source: Maryland Department of Labor, Licensing and Regulation (D.L.R.), Workforce Region Occupational Projections; Sage.

Notes: \*Top 10 growing occupations in the Susquehanna region out of the 50 occupations representing the largest share of professional, scientific, & technical services sector (NAICS 54) employment nationwide in 2018.

Exhibit 14 details the number of Susquehanna region job openings in professional, scientific, and technical services related occupations in 2019. There were nearly 1,000 job openings posted on the Maryland Workforce Exchange for computer user support specialists in the Susquehanna region throughout the year. Other computer occupations are also in high demand, including systems software developers, computer programmers, applications software developers, and computer systems analysts, among others. There is also demand for customer service representatives, general and operations managers, management analysts, and business operations specialists.

Given the boost that the pandemic has given to e-commerce and working remotely, pre-existing forecasts regarding growth prospects for programmers, systems analysts and others are likely understated. In other words, post-pandemic, there is an even greater need to train people in computing.

Exhibit 14. Susquehanna Region Job Openings: Select Professional, Scientific, & Technical Services Related Occupations, 2019\*

Occupation Title	Job Openings	Mean Annual Wage
Computer User Support Specialists	994	\$58,934
Software Developers, Systems Software	721	\$115,334
Customer Service Representatives	644	\$31,670
Computer Programmers	618	\$102,433
Software Developers, Applications	422	\$110,750
Computer Systems Analysts	357	\$107,598
General and Operations Managers	286	\$75,629
Management Analysts	247	\$88,609
Computer Occupations, All Other	165	N/A
Accountants and Auditors	136	N/A
Business Operations Specialists, All Other	132	N/A
Office Clerks, General	106	\$27,386
Bookkeeping, Accounting, and Auditing Clerks	66	\$33,270
Computer and Information Systems Managers	62	N/A
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	52	\$32,514
Market Research Analysts and Marketing Specialists	44	N/A
Sales Representatives, Services, All Other	38	N/A
Civil Engineers	28	N/A
Paralegals and Legal Assistants	17	N/A
Lawyers	13	\$97,926

Source: Maryland Workforce Exchange: Labor Market Information (Wage Data Source: Labor Market Statistics, Occupational Employment Statistics & Wages Program; Job Source: Online advertised jobs data); Sage. Notes: 1. The table shows the number of job openings advertised online in the Susquehanna Workforce Region in 2019 (Jobs De-duplication Level 2). 2. Jobs De-duplication Level 2: high level de-duplication of advertised job openings (for statistical analysis). \*Occupations representing the largest share of professional, scientific, & technical services sector (NAICS 54) employment nationwide in 2018. \*\* Except legal, medical, and executive.

Between mid-January and mid-May of 2020, there were more than 180 jobs openings posted online on the Maryland Workforce Exchange for positions at APG. Companies posting these positions included firms such as AASKI Technology, Booz Allen Hamilton, CACI International, Engineering Solutions and Products, LLC, and NCI Information Systems. The majority of these job openings were for occupations often employed in professional, scientific, and technical services, including engineers, software developers, other computer occupations, and various technical analysts.

2. To what extent is there evidence of inadequate human capital supply now and into the future with respect to regional **professional, scientific, and technical services**?

According to data from the U.S. Census Bureau, more than 8,200 people worked in professional, scientific, and technical services in the Susquehanna region in 2017, including people who do not live in the region. There were more than 13,000 residents of the Susquehanna region working in professional, scientific, and technical services, many of whom commute outside of the region to work.

While U.S. Census Bureau data do not break down exact numbers of residents who commute outside of the region to professional, scientific, and technical services jobs, one can presume that it is not an insignificant number. Given the presence of Aberdeen Proving Ground and the professional/scientific/technical services providers who serve it contractually, it may be surprising that the Susquehanna region is a net exporter of talent attached to this industry.

There are a number of factors at work. First, many of those who both live and work in the region and who are connected to APG are classified as federal workers. Second, while many come into the region to work at or near APG, many Susquehanna residents commute to law, accounting, auditing, architectural, and other firms in proximate metropolitan areas, including Philadelphia/Wilmington and Baltimore.

The more than 8,200 professional, scientific, and technical services jobs in the region represent 8.0 percent of regional employment and the more than 13,000 residents with professional, scientific, and technical services jobs represent 8.6 percent of total employed residents. Exhibit 15 supplies relevant summary detail.

Exhibit 15. Susquehanna Region Professional, Scientific, & Technical Services Employment: Work v. Home Area, 2017

Industry	Work Area	Home Area
Professional, Scientific, and Technical Services	8,237	13,125
All Industries	102,610	152,822

Source: U.S. Census Bureau. Longitudinal-Employer Household Dynamics Program, OnTheMap Application; Sage.  
 Notes: 1. Numbers represent *primary* jobs, not total jobs. Primary Jobs: Public and private-sector jobs, one job per worker. A primary job is the highest paying job for an individual worker. 2. Job figures presented are for the Susquehanna Workforce Investment Area (WIA), which is comprised of Cecil County and Harford County.

Exhibit 16 supplies statistical detail regarding the characteristics of professional, scientific, and technical services workers in the Susquehanna region. More than a quarter of employees are at least 55 years old, though this is largely reflective of the overall population. Nearly 38 percent of professional, scientific, and technical services workers in the region have at least a bachelor’s degree. That compares to approximately 23 percent for all workers in the Susquehanna region.

Exhibit 16. Characteristics of Professional, Scientific & Technical Services Industry Employees in the Susquehanna Region, 2019Q2

	# of Employees	% of Total
<b>TOTAL EMPLOYEES</b>	8,531	100%
<b>SEX</b>		
Male	5,209	61.1%
Female	3,322	38.9%
<b>AGE</b>		
<19	36	0.4%
19-24	415	4.9%
25-34	1,863	21.8%
35-44	2,094	24.5%
45-54	1,970	23.1%
55-64	1,599	18.7%
65+	554	6.5%
<b>RACE</b>		
White Alone	6,802	79.7%
Black or African American Alone	1,100	12.9%
All Other	629	7.4%
<b>ETHNICITY</b>		
Hispanic or Latino	348	4.1%
Not Hispanic or Latino	8,183	95.9%
<b>EDUCATION LEVEL</b>		
Less than high school	709	8.3%
High school or equivalent, no college	1,764	20.7%
Some college or Associate degree	2,400	28.1%
Bachelor’s degree or advanced degree	3,207	37.6%
Educational attainment NA*	451	5.3%

Source: U.S. Census Bureau, LED Extraction Tool - Quarterly Workforce Indicators (QWI); Sage. Notes: 1. Data are not seasonally adjusted (NSA). 2. Employment figures are the number of stable jobs: the number of jobs that are held on both the first and last day of the quarter with the same employer. \*Educational attainment not available—workers aged 24 or younger.

Exhibit 17 compares numbers of online job postings with candidates with active resumes in the Maryland Workforce Exchange for professional, scientific, and technical services related occupations in the region as of early April 2020. While this represents only a snapshot in time, it supplies some sense of the scale of the demand for workers in the sector.

According to these data, there is an ample number of candidates per job opening in most occupational categories. These are, after all, very appealing and prestigious jobs – the kinds of jobs that many parents hope their children will eventually occupy. Including candidates who are willing to work anywhere in the state, there is more than one candidate per job opening in 16 of 20 listed occupations.

However for a few occupations, there are far fewer candidates than available positions. For example, there were 105 job openings for computer programmers at the beginning of April, but only 40 potential candidates (7 of whom were only seeking to work in the Susquehanna region meaning that many will likely land jobs beyond Harford or Cecil counties).

Indeed, data indicate that the majority of jobseekers are not firmly tied to the Susquehanna region of Maryland. Most candidates are willing to work anywhere in Maryland. For example, among the potential candidates for Susquehanna regional job openings in the category of computer user support specialists, 56 candidates were only looking for jobs located in the Susquehanna region. Another 173 candidates indicated that they were willing to work anywhere in Maryland.

Exhibit 17. Susquehanna Region Job Openings & Candidates for Select Professional, Scientific, & Technical Services Related Occupations\*, as of 4/1/2020

Occupation Title	Job Openings	Potential Candidates		Candidates Per Job Opening	
		Only Looking in Susq.	Willing to Work Anywhere in MD	Only Looking in Susq.	Willing to Work Anywhere in MD
Computer Occupations, All Other	207	114	458	0.55	2.21
Computer User Support Specialists	133	56	229	0.42	1.72
Customer Service Representatives	119	213	833	1.79	7.00
Computer Programmers	105	7	40	0.07	0.38
Network and Computer Systems Administrators	84	23	109	0.27	1.30
Software Developers, Systems Software	73	4	25	0.05	0.34
Software Developers, Applications	61	16	59	0.26	0.97
Information Security Analysts	54	23	132	0.43	2.44
General and Operations Managers	50	101	339	2.02	6.78
Executive Secretaries/Executive Admin. Assistants	42	100	350	2.38	8.33
Managers, All Other	42	97	323	2.31	7.69
Computer Systems Analysts	37	16	86	0.43	2.32
Electrical Engineers	35	5	23	0.14	0.66
Computer Network Architects	28	9	36	0.32	1.29
Management Analysts	23	18	92	0.78	4.00
First-Line Supervisors of Office & Admin. Support Workers	20	31	96	1.55	4.80
Business Operations Specialists, All Other	18	24	123	1.33	6.83
Inspectors, Testers, Sorters, Samplers, and Weighers	18	11	24	0.61	1.33
Receptionists and Information Clerks	12	71	272	5.92	22.67
Sales Managers	12	64	268	5.33	22.33

Source: Maryland Workforce Exchange: Labor Market Information (Wage Data Source: Labor Market Statistics, Occupational Employment Statistics & Wages Program; Candidate Source: Individuals with active resumes in the workforce system; Job Source: Online advertised jobs data); Sage.

Notes: 1. Jobs De-duplication Level 2: high level de-duplication of advertised job openings (for statistical analysis). \*Occupations representing the largest share of professional, scientific, & technical services sector (NAICS 54) employment nationwide in 2018.

3. What does an individual need to do to access **professional, scientific, and technical services** job opportunities and are those opportunities available within the confines of the Susquehanna Region?

Exhibit 18 details entry level educational levels, training, and experience required for the top 10 professional, scientific, and technical services-related occupations associated with the most expected growth in the Susquehanna region from 2016-2026. Eight of the 10 occupations require a bachelor’s degree. Just 2 of the 10 occupations require only a high school diploma/equivalency: customer service representatives and sales representatives. Most occupations do not require licensure/certification, though in some occupations certification demonstrates added competence and may provide jobseekers with competitive advantage.

Exhibit 18. Education Requirements in Top 10 Professional, Scientific, & Technical Services Related Occupations with the Most Projected Growth in the Susquehanna Region

Occupation	2019 Median Pay (U.S.)	Entry Level Education	Work Experience in a Related Occup.	On-the-job Training	Licenses/Cert. Required
General and Operations Managers	\$104,690	Bachelor’s Degree	5 years or more	None	Not required except for in some types of work
Customer Service Representatives	\$34,710	HS Diploma or Equivalent	None	Short-term OTJ training	Not required except for in some types of work
Software Developers, Applications	\$105,590	Bachelor’s Degree	None	None	-
Sales Representatives, Services, All Other	\$29,630 (1)	HS Diploma or Equivalent	None	Moderate-term OTJ training	-
Managers, All Other	\$105,660 (2)	Bachelor’s Degree	Less than 5 years	None	-
Market Research Analysts and Marketing Specialists	\$63,790	Bachelor’s Degree	None	None	Not required, but employers may prefer candidates w/ certifications
Business Operations Specialists, All Other	\$69,820 (3)	Bachelor’s Degree	None	None	-
Graphic Designers	\$52,110	Bachelor’s Degree	None	None	Not required, but employers may prefer candidates w/ certifications
Financial Managers	\$129,890	Bachelor’s Degree	5 years or more	None	Not required, but employers may prefer candidates w/ certifications
Information Security Analysts	\$99,730	Bachelor’s Degree	Less than 5 years	None	Not required, but employers may prefer candidates w/ certifications

Source: U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook*; Maryland Department of Labor, Licensing and Regulation (DLLR), Workforce Region Occupational Projections; Sage. Notes: 1. Median annual wage among all sales and related occupations. 2. Median annual wage among all management occupations. 3. Median annual wage among all business and financial occupations. \*Top 10 growing occupations in the Susquehanna region out of the 50 occupations representing the largest share of professional, scientific, & technical services sector (NAICS 54) employment nationwide in 2018.

Exhibit 19 lists certification requirements associated with Susquehanna regional job postings on the Maryland Workforce Exchange related to professional, scientific, and technical services as of March 2020. Many of the certifications pertain to information technology, cybersecurity, and computing.

This is intuitive given that many of the professional, scientific, and technical services related job openings in the Susquehanna region are for computer-related occupations. Moreover, the need for certifications may be especially intense in the region given the presence of Aberdeen Proving

Ground, the elevated data processing requirements associated with the R&D that transpires there, and the need for personnel who are cyber-security savvy and unlikely to accidentally divulge sensitive information.

Exhibit 19. Susquehanna Region Advertised Jobs During the Month of March 2020  
Certification Requirements for Professional, Scientific, & Technical Services Sector Job Openings

Rank	Certification	Certification Category
1	CompTIA Certifications	Information Technology
2	(ISC) <sup>2</sup> Certifications	Information and Cyber Security
3	Cisco Associate Certifications	Computer Network
4	National Association of Forensic Counselors (NAFC) - Addictions Specialties	Counseling
5	SonicWALL Certifications	Information and Cyber Security
6	SolidWorks Certifications	Software
7	Cisco Professional Certifications	Computer Network
8	Commercial Driver's License (CDL)	Ground Transportation
9	Information Systems Audit and Control Association (ISACA)	Information and Cyber Security
10	Society for Protective Coatings (SSPC) Certifications	Painting

Source: Maryland Workforce Exchange, Labor Market Information. Job Source: Online advertised jobs data; Sage. Notes: 1. The table shows the top advertised certifications found in job openings advertised online in Susquehanna Workforce Region (Jobs De-duplication Level 1) 2. Jobs De-duplication Level 1: low level de-duplication of advertised job openings (more jobs).

- Skills & Technology in Demand

Exhibit 20 lists job skill requirements associated with Susquehanna regional job postings on the Maryland Workforce Exchange in the professional, scientific, and technical services sector as of March 2020. Many of the skills in demand are considered basic skills, such as flexibility, problem solving, decision making, and the ability to work independently. Administrative assistant skills, customer service, and interpersonal skills are also in demand. On the more technical side, there is elevated demand for risk management, software maintenance, and software support skills.

Exhibit 20. Susquehanna Region Advertised Jobs During the Month of March 2020  
Jobs Skills Requirements for Professional, Scientific, & Technical Services Sector Job Openings

Skill Rank	Job Skill	Skill Group
1	Must be flexible	Basic Skills
2	Providing information	Administrative Assistant Skills
3	Customer service	Customer Service Skills
4	Problem solving	Basic Skills
5	Risk management	Risk Analyst Skills
6	Interpersonal skills	Interpersonal Skills
7	Software support	Computer Support Specialist Skills
8	Work independently	Basic Skills
9	Decision making	Basic Skills
10	Software maintenance	Software Engineer Skills

Source: Maryland Workforce Exchange, Labor Market Information. Job Source: Online advertised jobs data; Sage. Notes: 1. The table shows the top advertised job skills found in job openings advertised online in Susquehanna Workforce Region (Jobs De-duplication Level 1) 2. Jobs De-duplication Level 1: low level de-duplication of advertised job openings (more jobs).

Exhibit 21 lists the tool/technology requirements associated with Susquehanna regional job postings on the Maryland Workforce Exchange in the professional, scientific, and technical services sector as of March 2020. All of the requested tools/technologies take the form of various types of software. Some software, like Microsoft office, are far more mundane than others. Other technologies require more training, specialization, and expertise, including development and database software.

Exhibit 21. Susquehanna Region Advertised Jobs During the Month of March 2020  
Tools & Technology Requirements for Professional, Scientific, & Technical Services Sector Job Openings

Rank	Tool/Technology	Tool/Technology Group
1	Microsoft (MS) Office	Office Suite Software
2	Linux software	Operating System Software
3	Python	Object or Component Oriented Development Software
4	Microsoft PowerPoint	Presentation Software
5	Structured query language (SQL)	Database User Interface and Query Software
6	C++	Object or Component Oriented Development Software
7	C#	Object or Component Oriented Development Software
8	JavaScript	Web Platform Development Software
9	PowerShell	Operating System Software
10	UNIX	Operating System Software

Source: Maryland Workforce Exchange, Labor Market Information. Job Source: Online advertised jobs data; Sage. Notes: 1. The table shows the top advertised tools and technologies found in job openings advertised online in Susquehanna Workforce Region (Jobs De-duplication Level 1) 2. Jobs De-duplication Level 1: low level de-duplication of advertised job openings (more jobs).

- Education & Training/Career Exploration

Compared to other industries, professional, scientific, and technical services has relatively more bachelor's level occupations. As discussed above, 8 of the top 10 professional, scientific, and technical services related occupations with the most expected growth in the Susquehanna region from 2016-2026 require at least a bachelor's degree.

While the Susquehanna region is not home to a four-year institution of higher education, its community colleges offer associate degree programs in relevant fields that can form the foundation for additional education and credentialing from a four-year college. Harford Community College (HCC) offers degrees in business/applied technology including accounting, business administration, business management, computer aided design and drafting, computer information systems, information assurance and cybersecurity, and information systems management. Other degree programs offered at HCC relevant to professional, scientific, and technical services include computer science, engineering, engineering technology, and mathematics.

At Cecil College, relevant business degree programs include accounting, business administration, leadership, management, and marketing. The College also offers degree programs in computer science, programming, cybersecurity, civil engineering, electrical engineering, mechanical engineering, and mathematics.

Available data indicate that these programs are in demand at the region's community colleges. In 2019, management, accounting, engineering, and mathematics all ranked among the top 10 most awarded associate degrees at Cecil College. At Harford Community College, business administration

transfer, information assurance and cybersecurity, computer information systems, business management, and engineering transfer were among the top 10 most awarded associate degrees in 2019.<sup>16</sup> Importantly, these are all areas that are relevant to future careers in professional, scientific, and technical services.

These degree programs supply a useful foundation for workers/students, but for many professional, scientific, and technical services positions it will be necessary for a student to transfer to a four-year institution and secure a bachelor’s degree. The table below shows common areas of study for select professional, scientific, and technical services related occupations that require at least a bachelor’s degree. For many of these occupations, workers may seek master’s degrees to further their career and position themselves for movement into even higher positions.

Exhibit 22. Select Professional, Scientific, and Technical Services Related Occupations Requiring at Least a Bachelor’s Degree: Common Degrees

Occupation	Common Bachelor’s Degrees
<i>Management Occupations</i>	
General & Operations Managers	Business Administration, Public Administration, Law, Liberal Arts
Computer & Information Systems Managers	Computer Science, Information Science, related fields
Financial Managers	Finance, Accounting, Economics, Business Administration
<i>Business &amp; Financial Operations Occupations</i>	
Accountants & Auditors	Accounting, related fields
Management Analysts	Business, Economics, Finance, Marketing, Psychology
Market Research Analysts & Marketing Specialists	Market Research, Statistics, Math, Computer Science, Business Administration, Social Sciences, Communications
<i>Computer and Mathematical Occupations</i>	
Software Developers, Applications	Computer Science, Software Engineering, related fields
Computer Systems Analysts	Computer-related fields
Computer Programmers	Computer Science, related fields
<i>Architecture &amp; Engineering Occupations</i>	
Civil Engineers	Civil Engineering, Civil Engineering Technology, other civil engineering specialties
Architects	Architecture (typically a 5-year Bachelor Of Architecture Degree)
Mechanical Engineers	Mechanical Engineering, Mechanical Engineering Technology

Source: U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook*; Sage.

Common fields of study in the category of *management occupations* include business administration, public administration, law, liberal arts, finance, accounting, economics, computer science, and information science, depending on the specific type of management position. For *business and financial operations occupations*, common fields of study include accounting, business, business administration, economics, finance, marketing, psychology, market research, statistics, math, computer science, social sciences, and communications.

<sup>16</sup> Maryland Higher Education Commission, February 2020. “Trends In Degrees and Certificates by Program, Maryland Higher Education Institutions 2006-2019.

In the category of *computer and mathematical occupations*, common fields of study typically relate to computer science, software engineering, and related fields. *Engineering occupations* generally require a degree in an engineering field and architectural occupations require a degree in architecture. In other words, two-year degrees are unlikely to be enough for one to reach the upper reaches of these occupational categories.

While many occupations in the professional, scientific, and technical services sector require higher levels of education, there are associated occupations that require less education, like office clerks, secretaries and administrative assistants, customer service representatives, legal secretaries, and tax preparers. Exhibit A2 in the Appendix highlights some occupations that offer meaningful numbers of entry level opportunities.

Many occupations that are highly concentrated in the professional, scientific, and technical services sector can also fall within the four corners of other industries. For example, while approximately 41 percent of software developers and programmers worked in professional, scientific, and technical services in 2018, many software developers and programmers worked in other industries like information, manufacturing, and finance.

Accountants and auditors, one of the leading occupations in professional, scientific, and technical services, can also be found working in many other industries, including government, finance, manufacturing, construction and healthcare. As another example, civil engineers are highly concentrated in the professional, scientific, and technical services sector, but also in government and construction. The professional, scientific, and technical services sector employs many general office clerks, but even more office clerks work in educational services, healthcare, government, and a variety of other industries.<sup>17</sup>

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<sup>17</sup> U.S. Bureau of Labor Statistics, *Employment Projections: National Employment Matrix*.

## Conclusion

The professional, scientific, and technical services industry is heavily represented in the Susquehanna region both in terms of jobs and in terms of the number of residents who work within the category. Many of these jobs require significant educational attainment, which means that people seeking to work in the industry will generally be required to earn degrees beyond the boundaries of the Susquehanna region. One of the implications of this is that many who work in the area in segments such as computer programming, cyber-security, or engineering are recruited from outside of the region.

At the heart of the professional, scientific and technical services industry in the Susquehanna region is Aberdeen Proving Ground. The R&D activities that transpire in and around the installation create abundant opportunities for computer programmers and others fluent in a variety of software languages. Area two-year colleges provide ample exposure to computing and related concentrations and are among the most popular at both Harford Community College and Cecil College.

Since this is an industry that requires such substantial educational credentialing, the Susquehanna Workforce Network should not seek to directly supply programming that positions people for the industry. Rather, SWN's best approach may be to:

1. Serve as an information clearinghouse linking jobseekers with available positions, including among those with entry-level skills in management, bookkeeping, basic software, etc.; and
2. Work with local two-year colleges to ensure tight fit between the evolving needs of employers and the capacity of programming available at Cecil College and Harford Community College.

## Appendix

### Exhibit A1. Professional, Scientific, & Technical Services Sector Industry Groups-Definitions

<i>Legal Services (NAICS 5411)</i>
This industry group comprises establishments primarily engaged in offering legal services, such as those offered by offices of lawyers, offices of notaries, and title abstract and settlement offices, and paralegal services.
<i>Accounting, Tax Preparation, Bookkeeping, and Payroll Services (NAICS 5412)</i>
This industry comprises establishments primarily engaged in providing services, such as auditing of accounting records, designing accounting systems, preparing financial statements, developing budgets, preparing tax returns, processing payrolls, bookkeeping, and billing.
<i>Architectural, Engineering, and Related Services (NAICS 5413)</i>
This industry group comprises establishments primarily engaged in architectural, engineering, and related services, such as drafting services, building inspection services, geophysical surveying and mapping services, surveying and mapping (except geophysical) services, and testing services.
<i>Specialized Design Services (NAICS 5414)</i>
This industry group comprises establishments providing specialized design services (except architectural, engineering, and computer systems design).
<i>Computer Systems Design and Related Services (NAICS 5415)</i>
This industry comprises establishments primarily engaged in providing expertise in the field of information technologies through one or more of the following activities: (1) writing, modifying, testing, and supporting software to meet the needs of a particular customer; (2) planning and designing computer systems that integrate computer hardware, software, and communication technologies; (3) on-site management and operation of clients' computer systems and/or data processing facilities; and (4) other professional and technical computer related advice and services.
<i>Management, Scientific, and Technical Consulting Services (NAICS 5416)</i>
This industry group comprises establishments primarily engaged in providing advice and assistance to businesses and other organizations on management, environmental, scientific, and technical issues.
<i>Scientific Research and Development Services (NAICS 5417)</i>
This industry group comprises establishments engaged in conducting original investigation undertaken on a systematic basis to gain new knowledge (research) and/or the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes (experimental development). Techniques may include modeling and simulation. The industries within this industry group are defined on the basis of the domain of research; that is, on the scientific expertise of the establishment.
<i>Advertising and Related Services (NAICS 5418)</i>
This industry group comprises establishments primarily engaged in advertising, public relations, and related services, such as media buying, independent media representation, outdoor advertising, direct mail advertising, advertising material distribution services, and other services related to advertising.
<i>Other Professional, Scientific, and Technical Services (NAICS 5419)</i>
industry group comprises establishments engaged in professional, scientific, and technical services (except legal services; accounting, tax preparation, bookkeeping, and related services; architectural, engineering, and related services; specialized design services; computer systems design and related services; management, scientific, and technical consulting services; scientific research and development services; and advertising, public relations, and related services).

Source: U.S. Census Bureau. *North American Industry Classification System*. <https://www.census.gov/eos/www/naics/>.

Exhibit A2. Examples of Occupations Often Employed in the Professional, Scientific, & Technical Services Sector by Education Level

High School Diploma or Equivalent
Office Clerks, General
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive
Sales Representatives, Services, All Other
Customer Service Representatives
Legal Secretaries
Receptionists and Information Clerks
First-Line Supervisors of Office and Administrative Support Workers
Veterinary Assistants and Laboratory Animal Caretakers
Executive Secretaries and Executive Administrative Assistants
Tax Preparers
Some College, No Degree/ Postsecondary Non-Degree Award
Bookkeeping, Accounting, and Auditing Clerks
Computer User Support Specialists
Medical Records and Health Information Technicians
Associate's Degree
Paralegals and Legal Assistants
Veterinary Technologists and Technicians
Architectural and Civil Drafters
Web Developers
Computer Network Support Specialists
Bachelor's Degree
Management occupations such as: General and Operations Managers; Computer and Information Systems Managers; Financial Managers; Architectural and Engineering Managers; Marketing Managers; Sales Managers
Business and financial operations occupations such as: Accountants and Auditors; Management Analysts; Market Research Analysts and Marketing Specialists; Business Operations Specialists; Human Resources Specialists; Financial Analysts
Computer and mathematical occupations such as: Computer Systems Analysts; Computer Programmers; Computer Network Architects; Information Security Analysts; Network and Computer Systems Administrators; Software Developers, Applications; Software Developers, Systems Software
Architecture and engineering occupations such as: Architects, Except Landscape and Naval; Civil Engineers; Electrical Engineers; Mechanical Engineers
Master's Degree
Statisticians
Computer and Information Research Scientists
Survey Researchers
Economists
Urban and Regional Planners
Doctoral or Professional Degree
Lawyers
Veterinarians
Medical Scientists, Except Epidemiologists
Biochemists and Biophysicists
Physicists

Source: U.S. Bureau of Labor Statistics, *Employment Projections*: 1. Industry-occupation matrix data, by industry, 2. Education and training assignments by detailed occupation; Sage.