A LABOR STUDY OF SOFTWARE PUBLISHING & COMPUTER SYSTEMS DESIGN

Emphasis on Coding Occupations

April 2018

WORKFORCE SERVICES
RESEARCH & ANALYSIS

TABLE OF CONTENTS

DATA SOURCES

Utah Department of Workforce Services employer wage records within the Unemployment Insurance System

Encompasses more than 90 percent of all Utah employment.

Can quantify and reveal Utah labor movements.

Used to track worker movement to, within and from the Utah labor market.

Cannot speak to the reasons why Utah labor movements may be what they are.

Cannot identify occupational information.

Cannot offer information about a worker's profile or labor characteristics.

U.S. Census Bureau's American Community Survey's Public Use Microdata Sample

Can focus upon occupations within industries.

Can speak to education levels of workers within industries.

Can look at flow and characteristics of labor in- and out-migration.

Can be used to look at other U.S. city labor characteristics.

Can look at education-based wage information by occupation.

U.S. Bureau of Labor Statistics Occupational Wage Data

Standard wage measure methodology applied across all states and metropolitan areas.

Reports median and other wage percentages.

Nominal wages; but these can be cost-of-living adjusted across cities.

U.S. Bureau of Economic Analysis Regional Price Parity Index

Used to make cost-of-living adjustments across metropolitan areas.

EXECUTIVE SUMMARY

This report explores a key component of Utah's information technology (IT) landscape; specifically, IT coding workers. Coding is the backbone of the IT industry;[1] therefore, profiling coding occupations speaks to the Utah IT industry's core disposition. IT often carries a broad industry definition, but this study focuses upon the software publishing and computer systems design segments; sectors that prominently employ IT coders. These industries we identify as "core IT."

- Core IT is a fast-growing industry in Utah. It is common for employment growth to double or triple the state's overall industry growth rate. In addition, core IT pays noticeably above the Utah all-industry average wage.
- Computer and mathematical occupations make up half of the core IT industry's occupational mix, with administrative activities making up the other half. Within that, two-thirds are programmer, analyst, and developer occupations.
- More than 90 percent of core IT new hires come from other industrial sectors within Utah. Therefore, by extension, most of Utah's core IT labor is Utah educated.
- Nearly half of the Salt Lake/Provo tech workforce has been trained to only the certificate, vocational, and associate degree levels; levels that establish foundational coding skills. Other notable tech cities employ a labor force with predominantly STEM-focused bachelor's degrees or higher.[2]
- The earlier-cited economic success of Utah core IT is occurring with a sizable share of its labor force holding a certificate, vocational, or associates degree. Given Utah's IT economic growth, these market observations imply that Utah core IT is prospering with its current educational-attainment distribution.
- Within Utah, the IT industry offers well-paying jobs. For those with education below a bachelor's degree, the IT industry offers rewarding career opportunities.
- Net overall Utah IT labor migration is neutral; in- and out-migration largely offset.
- However, Utah IT labor in-migration carries in lower education levels (50 percent bachelor's or better) than what migrates out (75 percent bachelor's or better).
- When restricting the migration view to just coding workers, and then further to only STEM-educated coding workers, Utah becomes a net labor exporter.
- To a small extent, Utah IT workers with higher education degrees incline toward other IT cities where higher degrees are predominently employed.

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[1] Those who create, modify, and test the code, forms, and script that allow computer applications to run.

[2] STEM (Science, Technology, Engineering, Mathematics) degrees refer to a bachelor's degree or higher.

1.1 – UNDERSTANDING INFORMATION TECHNOLOGY AND INFORMATION TECHNOLOGY JOBS

There is no shortage of media attention extolling tech as the new driver of the nation's economy. Utah is not shy about acclaiming its own tech virtues. It is hard to live in Utah without hearing the phrase 'Silicon Slopes." Forbes magazine wrote:

> "*As for the area that tech entrepreneurs have taken to calling Silicon Slopes… The Interstate 15 corridor that connects Provo to Salt Lake to Ogden is chock-full of tech companies and startups…an ecosystem of entrepreneurial activity has sprung up against the backdrop of the Wasatch Mountains.*"[3]

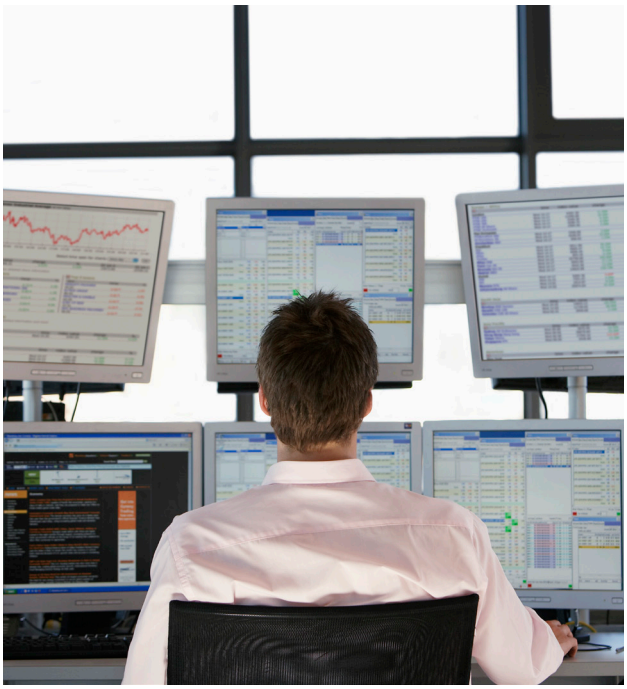
Utah is on the national technology landscape. Utah Business Magazine noted:

> "*So, kudos to us. But before we wax too self-congratulatory, we'd do well to notice some small clouds on the horizon. Yes, Utah, even with its economic victories, faces a few challenges as well. We have a shortage of skilled knowledge workers.*"[4]

If more labor is to be trained, at what level is the most advantageous? With this topic as the backdrop, our study's intent is to understand the drivers of labor growth and labor challenges facing Utah's technology sector.

1.2 – CORE IT INDUSTRY

To get at the Silicon Slopes core labor profile, we narrowed our focus to the software publishing and computer systems design industries; two industries that are significant employers of the IT coding/design occupations. We make the assumption that the backbone of all Silicon Slope industries stand



upon their coding occupations. By focusing upon two industries that employ a sizeable percentage of coding/design occupations, we hypothesize that our findings will translate upward and outward to the greater Utah IT industry.

We understand that IT occupations are found throughout the entire economy. Health care employs IT occupations. So does government, banking, mining, engineering and so on. Our analysis will focus upon the core IT industry as much as possible, but there will be times when including coding/design occupations across all industries will shed additional light upon the IT profile.

Additionally, non-IT occupations are found in the IT industry. IT businesses also employ accountants, human resources and purchasing agents, et al. Identifying that segment will also be necessary to help isolate the coding/design segment.

The North American Industry Classification System (NAICS) is the standard for classifying businesses.[5]

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[3] https://www.forbes.com/sites/amyfeldman/2017/04/03/silicon-slopes-vs-silicon-valley-four-tech-unicorns-thousands-of-startups-no-frenzy/#4ab3dd7e3922

[4] https://utahbusiness.com/headwinds-tailwinds-utahs-tech-industry-thriving-amidst-constant-change-talent-shortage/

[5] https://www.census.gov/eos/www/naics/

The "IT industry" does not have its own NAICS code. One has to subjectively choose and amalgamate NAICS codes to make an IT industry. The Utah Governor's Office of Economic Development recognizes a definition that includes software publishing, computer systems design, telecommunications, e-business and manufacturing support. For our purposes, as mentioned, we will reduce this to the software publishing and computer systems design segments due to their high percentage of coding/design occupations. These two industries serve as a good foundational IT industry proxy; so henceforth, we will refer to their combination as "core IT." In NAICS, these are sectors 5112 and 5415.[6]

1.3 – CORE IT OCCUPATIONS

To evaluate occupations we turn to the Standard Occupational Classification (SOC) system.[7] Produced by the U.S. Government, this structure measures and describes occupations throughout the country. SOC breaks jobs into occupational groups and subsets in a hierarchical fashion (as does NAICS with industries).[8]

In the SOC classification, the computer and mathematical category encompasses the IT occupations; in particular, the coding/design occupations. The core IT industries drive technology; workers in other tech industries are generally users of, and not producers of, foundational technological products. We are trying to get at the development segment of the IT industry, as it is upon this that IT businesses emerge and grow.

Table 1 shows the top six major occupational groups employed within the software publishing and computer systems design industries.

Table 1: Top Occupational Groups Employed in Utah Software Publishing and Computer Systems Design Industries

DESCRIPTION	2016 EMPLOYMENT	SHARE	MEDIAN HOURLY WAGE
Computer and Mathematical	14,556	48%	$36.06
Sales and Related	4,261	14%	$29.29
Office and Administrative Support	3,843	13%	$16.17
Management	3,342	11%	$61.35
Business and Financial Operations	2,790	9%	$31.67
Arts, Design, Entertainment, Sports, and Media	788	3%	$27.25
Total*	**30,554**		**$32.49**

Source: Bureau of Labor Statistics Occupational Employment Statistics (OES).
*The residual 2 percent is miscellaneous.

[6] NAICS defines software publishers (5112) "as primarily engaged in computer software publishing or publishing and reproduction. Establishments in this industry carry out operations necessary for producing and distributing computer software, such as designing, providing documentation, assisting in installation, and providing support services to software purchasers. These establishments may design, develop, and publish, or publish only."

Computer system designers (5415) "are 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 client's computer systems or data processing facilities; and (4) other professional and technical computer-related advice and services."

[7] https://www.bls.gov/soc

[8] As an example, SOC 15-0000 is the top level grouping for Computer and Mathematical Occupations. Underlying this category are several subsets such as 15-1130 — Software Developers and Programmers. A graphic produced by the Montana Department of Labor and Industry illustrates this hierarchy (http://lmi.mt.gov/mtlaborblog/articleid/89/can-i-get-those-digits-understanding-occupation-and-industry-codes).

Half of core IT industry occupations are in the computer segment. The remainder are occupations that administer the business. At $36.06, the average median hourly wage in the computer occupations is more than twice the statewide all-industry median of $16.83. Nearly half of core IT employment, and more than 50 percent of wages, are comprised of jobs in the computer and mathematical occupations.

Table 2 shows the top distribution of these computer and mathematical occupations within core IT. The four specific occupations listed account for 65 percent of the core IT computer and mathematical employment and roughly 75 percent of total wages.

Table 2: Highest Occupational Employment in Utah Software Publishing and Computer Systems Design Industries

DESCRIPTION	EMPLOYMENT	SHARE	MEDIAN WAGE
Software Developers, Applications	5,152	35%	$44.68
Computer Programmers	1,897	13%	$36.70
Computer Systems Analysts	1,351	9%	$32.08
Software Developers, Systems Software	1,168	8%	$43.52

Source: Bureau of Labor Statistics Occupational Employment Statistics (OES).

1.4 – IT EMPLOYMENT SINCE THE GREAT RECESSION

Following the Great Recession, one storyline has been the degree to which Utah has recovered its lost jobs. Over the last six years, the state has matched and exceeded pre-recession employment levels. Since 2011, Utah has ranked in the top 10 for states with the highest annual job growth — including the top ranking in 2015 and 2016. While growth is spread across many industry groups, it is especially robust in software publishing and computer systems design (i.e., tech). These industries, which account for 2.3 percent of total Utah employment, produced 4.3 percent of the state's net new jobs between 2015 and 2016. As seen in Table 3, annual growth in core IT exceeded Utah's overall strong job growth every year between 2011 and 2016.

Table 3: Utah Employment Profile in Software Publishing and Computer Systems Design – Relative to All-Industry Employment Change

YEAR	AVERAGE EMPLOYMENT: CORE IT	ANNUAL CHANGE: CORE IT	ANNUAL CHANGE: ALL INDUSTRIES
2011	21,645	5.8%	2.2%
2012	24,272	12.1%	3.4%
2013	26,405	8.8%	3.2%
2014	28,564	8.2%	3.0%
2015	31,308	9.6%	3.8%
2016	33,406	6.7%	3.6%

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)

2.1 – WHERE IS UTAH'S IT LABOR GROWTH COMING FROM?

Paralleling this profile of strong IT job growth are accounts of companies struggling to find qualified tech workers — and they are not alone. With an unemployment rate below 4 percent since January 2014, many employers in Utah have reported challenges related to hiring. Yet, despite these difficulties, tech has continued to thrive, adding more than 2,000 jobs per year.

- **Where is this Utah IT labor growth coming from?**
- **How does Utah compete against other tech areas?**

Since labor is mobile and not confined to Utah, a national tech evaluation is relevant to any Utah tech-labor understanding. This report will seek to answer these questions by evaluating the flow of tech workers within, to and from the state, and compare Utah's major metropolitan area to other tech hubs in the United States.

2.2 – COMPONENTS OF IT INDUSTRY GROWTH

To understand where Utah's tech growth is coming from, it is important to understand the underlying components of employment change.

Utah's IT industry employment may change in one of the following ways:

- *Current workers may change industries within Utah.* Existing Utah workers may move into the IT industry. Conversely, existing Utah IT workers may move to a different Utah industry.
- *New workers may show up on the Utah IT wage records.* Entrants include first-time workers, unemployed individuals returning to work or hires from out-of-state.
- *Utah IT workers may exit the Utah wage records.* Exits include retirements, deaths, fires/lay-offs or workers leaving the state.

2.3 – IN-MIGRATION

This study measured the number of individuals coming into Utah's core IT industry from out-of-state between 2013 and 2016. It was undertaken using the Utah Department of Workforce Services' Unemployment Insurance (UI) system. Employment records are updated quarterly as employers report their employee information. The available data covers "more than 95 percent of U.S. jobs"[9] — with agriculture and self-employment the primary exceptions.[10] With such high coverage, the UI records provide a virtual census of Utah employers and their workers.

To identify as an in-migrant, tech hires from out-of-state must meet both of the following criteria:

- *Individuals that newly show up in the Utah wage records and do not appear in any Utah wage records prior to the quarter of interest — dating back to the first quarter of 2000.* If the quarter of interest is 2013 Q1, a worker meets this criterion if no record exists for them between 2000 and the fourth quarter of 2012.
- *Not born in Utah.* Because new labor-entrant Utah residents (like graduating students) would be included under the first criteria, these individuals were removed by identifying them with the Utah-specific Social Security area code. Between 1973 and 2011, the Social Security Administration assigned Social Security numbers according to state of birth. As a result, individuals born in Utah can be identified. While this method cannot identify those under the age of 6 or over the age of 44, its usefulness in filtering first-time and high-school age workers remains valuable.

[9] U.S. Bureau of Labor Statistics: https://www.bls.gov/cew/cewover.htm

[10] Many non-profit businesses are also exempt.

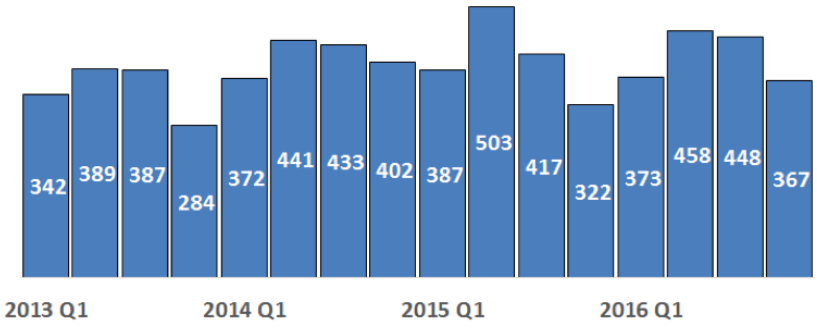
2.4 – LIMITATIONS

The above criteria is deficient in identifying some groups — particularly Utah residents with non-Utah SSNs and no Utah UI history. We believe this group to be relatively small given our narrow industry scope. Also, origin and destination state are not known through the UI system, nor is demographic information or the reason for the move.

2.5 – RESULTS

The number of individuals moving to Utah and obtaining core IT industry employment has climbed gradually over the past several years.[11] In 2013, slightly more than 1,400 individuals moved to Utah and obtained core IT employment. The following three years registered 1,648, 1,629 and 1,646 respectively. As illustrated in Chart 1, the flow of workers into the state is somewhat seasonal — with significantly fewer hires in the first and fourth quarters, perhaps due to fewer moves during the winter and school year. There are highs and lows across this series, yet there is an underlying theme of in-migration consistency.

Chart 1: Hired from Out-of-State – Software Publishing and Computer Systems Design



Source: Workforce Services UI wage records.

2.6 – OUT-MIGRATION

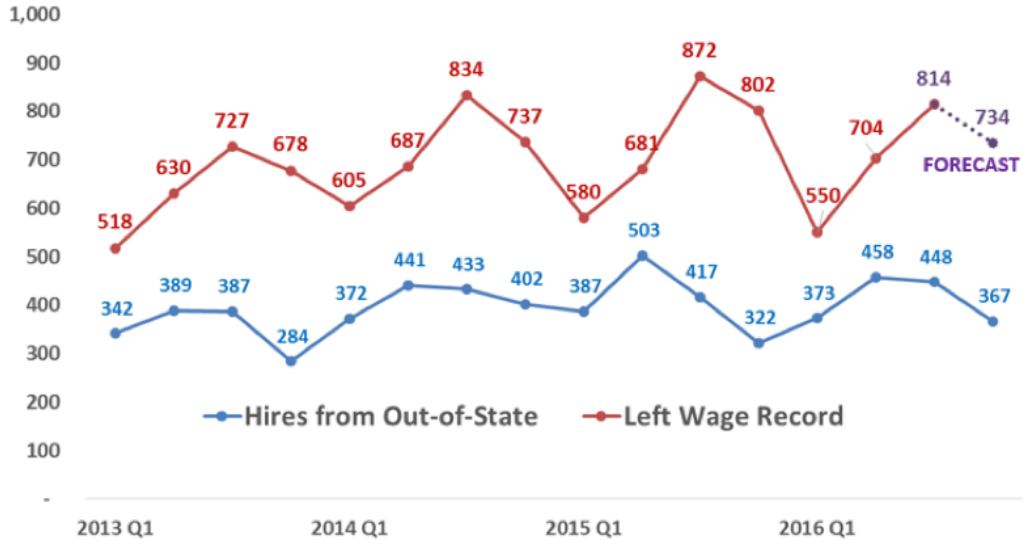
While a strong economy attracts new workers, it also becomes a catalyst for labor mobility. As workers gain confidence in the economy, sensing increasing job and wage opportunities, they become active in switching jobs. While this may involve changing employers or industries within Utah, others may leave the state.

A measurement method is to identify the number of individuals who disappear from all future Utah wage records (i.e., UI records) after the quarter of interest. This will capture those who moved out-of-state, but will also include those who retired, passed away or left the labor force for other reasons. Due to these inclusions, this metric is merely a measure of those leaving the wage records and cannot account for out-migration only.

Chart 2 compares workers leaving the core IT industry to the hires data from Chart 1. In every quarter, the number of departures surpassed out-of-state hires. This is expected, given the unavoidable inclusion of records over-and-above out-migration. Another complementary out-migration measure will be discussed in Section 3.2 and will offer additional insight on out-migration.

[11] This is all IT jobs, not just the coding jobs.

Chart 2: Out-of-State Hires v. IT Workers Leaving Wage Records

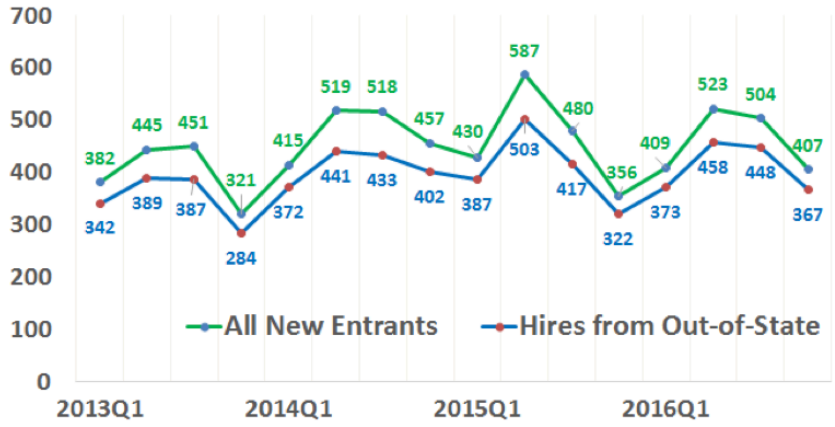


Source: Workforce Services UI wage records.

2.7 – RESIDENT NEW HIRES

Flows from other states are just one portion of new entrants into the core IT industry. Utah residents who have not worked in any industry prior to obtaining IT work are another. This group consists primarily of recent high school or college graduates obtaining their first Utah job.

Chart 3: Out-of-State Hires v. All New IT Erants



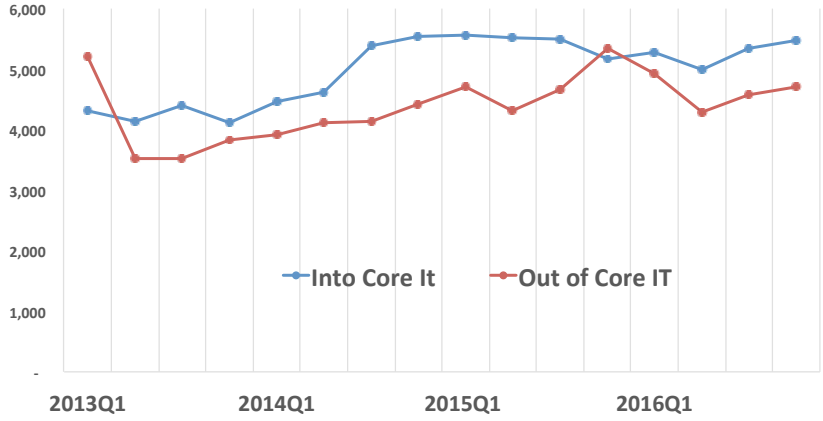
Source: Workforce Services UI wage records.

Out-of-state IT hires account for the vast majority of all core IT workers not previously seen on a Utah wage record. We will see shortly though, that these "new-face" hires are a minimal component within the Utah core IT hire landscape.

2.8 – INDUSTRY SWITCHERS

Lastly, there are current Utah workers who transfer into Utah's IT industry. Chart 4 shows between 2013 and 2016, the number of workers switching into core IT has consistently been above those switching out. This is expected given the robust overall Utah core IT employment growth.

Chart 4: Utah Workers Moving In and Out of Software Publishing and Computer Systems Design



Source: Workforce Services UI wage records.

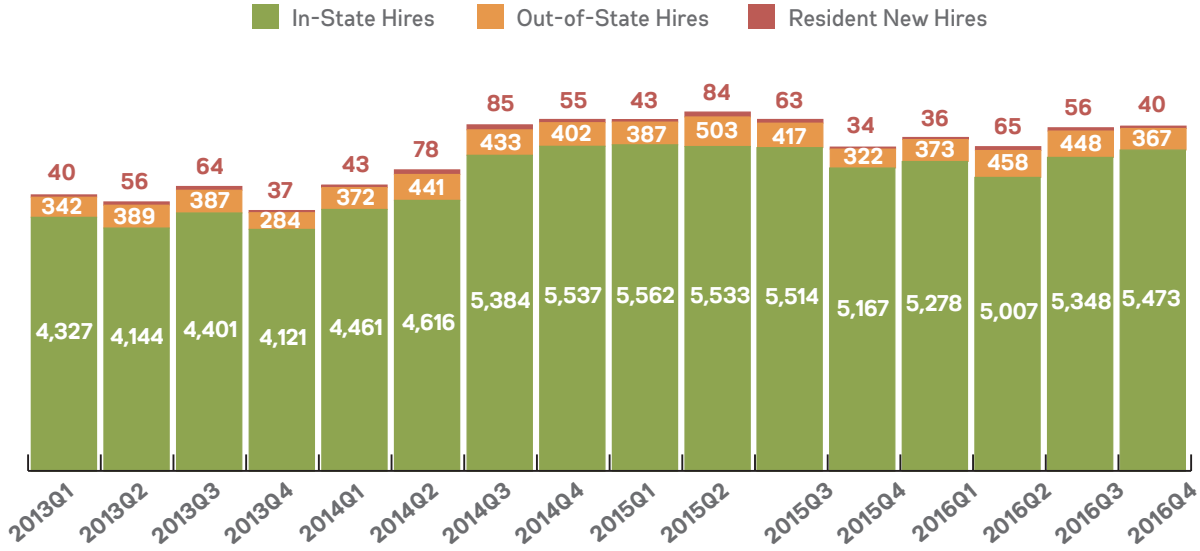
It is important to note that Chart 4 speaks only to the volume of switching and does not provide information on origin or destination occupations. An occupation title is not required within the UI system. The metric simply counts the number of people in the quarter of interest that obtained a job in core IT and worked in a non-tech industry the previous quarter — regardless of occupation.

2.9 – GROSS JOBS ADDED BY COMPONENT

Chart 5 combines the core IT workers added from industry switching, out-of-state hires and resident new hires. An average of 92 percent is attributed to internal-Utah industry switching. While the state attracts new out-of-state employees and first-time workers, the majority of the employment growth stems from employed Utah workers leaving non-tech industries for core IT.

To this juncture, the UI database has quantified the components of employment growth in Utah's core IT industry. It does not reveal these workers occupation titles or education attainments. This information is unnecessary for the administration of the UI system and is therefore not reported. To gain insight into these informing characteristics, we turn to the U.S. Census Bureau's American Community Survey.

Chart 5: Gross Jobs Added by Component– Software Publishing and Computer Systems Design



Source: Workforce Services UI wage records.

3.1 – AMERICAN COMMUNITY SURVEY

Yearly, the U.S. Census Bureau conducts the American Community Survey (ACS), a sampling of millions of U.S. households. The ACS provides ongoing estimates for many of the detailed characteristics previously available only through the Decennial Census' Long Form. The ACS profile details are available through the Census' Public Use Microdata Sample (PUMS). Effectively, PUMS contains individual but anonymous survey responses that can be extrapolated to generate research estimates and profiles. Through PUMS, we gain insight into the characteristics of Utah's core IT in- and out-migrants.

As a household survey, the ACS measures are based on where individuals live at the time the sample is conducted. Determining migration between states is accomplished by seeing if individuals lived in a different state in the prior year. This allows for identifying Utah worker in-and out-migration.

3.2 – CHARACTERIZING TECH MIGRATION

According to the ACS, 6,852 individuals moved to Utah between 2013 and 2016 to work in core IT. For comparison, the UI records showed an inflow of 6,325 individuals. While the numbers vary slightly — due to methodology differences — the relative agreement in volume gives confidence to use the ACS to provide insights not attainable from the UI database.

The following are highlights regarding workers hired into Utah's core IT industry from out-of-state between 2013 and 2016.

Of the 6,852 individuals entering Utah:

- **51 percent** reported having a bachelor's degree or higher.
- **30 percent** reported having a 4-year degree in a science/engineering field (as defined by the National Science Foundation).
- Computer and mathematical occupations, which include software development and other coding jobs, accounted for **49 percent** of the in-migrating labor's landing point.

In regard to out-migration, ACS provides a count of new core IT hires in other states that lived in Utah before their move. For the years 2013 through 2016, an estimated 4,632 workers left Utah to work for out-of-state tech firms.

Of the 4,632 individuals leaving Utah:

- **75 percent** reported having a bachelor's degree or higher.
- **50 percent** reported having a 4-year degree in a science/engineering field (as defined by the National Science Foundation).
- Computer and mathematical occupations, which include software development and other coding jobs, accounted for **67 percent** of the occupations where this out-migrating labor landed.

This illustrates a difference in the education of workers coming to Utah versus those leaving.[12] In general, inbound IT workers have less education and are less likely to work in coding occupations.

It is important to note that the above data include all occupations in software publishing and computer systems design. This means everything from an accountant to a salesperson may be included. While these occupations contribute to the overall IT industry growth, they are not the foundational coding/design occupations.

Coding/design occupations, as used in this study, include software developers (applications), software developers (systems), computer programmers and computer systems analysts. When narrowed to these four occupations, core IT out-migration measures slightly above the overall core IT inflow between 2013 and 2016. Specifically, 2,530 out-of-state coders entered Utah IT while 2,571 left.

3.3 – MIGRATION OF WORKERS IN CODING OCCUPATIONS

While our study has focused primarily on the core IT industry and the occupational flow within, worker migration impacts all Utah industries utilizing coders. The ACS shows Utah employed nearly 29,000 in our identified coding occupations in 2016 — with 38 percent being in the core IT industry. This all-industry use of coders necessitates expanding the coding migration analysis across all industries, as the core IT industries compete for these coders.

According to 2013-2016 ACS data (Table 4), an average of 1,052 individuals came to Utah into these coding occupations per year. In contrast, 1,505 left the state, for an average net outflow of 453 each year.

While Utah has overall IT employment in-migration, much of this is not coders. The state is a net exporter of computer coding talent. We will next explore possible factors.

[12] While the inflow numbers are roughly equal between the ACS and UI, outflow is significantly different from that seen in Section 2.6. According to the UI system, Utah has an outflow from the core IT industries — while the ACS implies an inflow. This discrepancy is the unavoidable inclusion of non-migratory factors in the UI methodology. Due to these inclusions, our study will utilize the ACS for estimates of out-migration.

Table 4: Average Annual In-flow, Out-flow and Net Flow of Coders, 2013-2016

STATE	CODERS IN	CODERS OUT	NET FLOW OF CODERS
California	13325	8835	4491
Washington	5644	3282	2363
Alaska	2245	465	1780
Colorado	3400	1688	1712
Texas	7040	5522	1518
North Carolina	4091	2637	1453
Nevada	1437	550	887
Massachusetts	4125	3308	817
Oregon	1825	1171	654
Arizona	2249	1914	334
South Dakota	506	291	215
Maine	449	276	173
Delaware	804	683	121
Oklahoma	450	342	108
Idaho	412	308	104
Minnesota	1712	1618	95
Kentucky	654	587	67
South Carolina	599	542	57
West Virginia	202	150	52
Arkansas	461	422	39
Montana	152	119	34
District of Columbia	1031	1010	21
Wisconsin	1924	1928	-4
Vermont	192	221	-29
Wyoming	89	190	-101
Nebraska	420	523	-103
Hawaii	342	452	-111
New Hampshire	849	966	-118
Virginia	4403	4537	-134
Rhode Island	329	470	-142
Maryland	2739	2892	-153
Tennessee	1052	1218	-166
Alabama	559	746	-187
North Dakota	255	463	-209
Kansas	913	1129	-217
Georgia	3017	3240	-224
Louisiana	226	451	-225
Mississippi	217	521	-304
New Mexico	400	708	-308
Connecticut	1592	1943	-351
Iowa	811	1198	-387
Utah	1052	1505	-453
Ohio	2075	2534	-459
Missouri	1255	1795	-540
Michigan	1818	2361	-543
Florida	3407	3974	-567
Indiana	1115	2099	-984
Pennsylvania	3212	4675	-1463
Illinois	3685	5482	-1797
New Jersey	3254	5266	-2012
New York	4480	6959	-2479

Source: Census American Community Survey (Workforce Services Calculations)

4.1 – TECH CITY COMPARISONS

Many countries in the Western world and Asia have a thriving IT industry. Some cities have been anointed as "tech cities." We selected prominent cities for comparison against the Salt Lake/Provo area:

- San Francisco/San Jose
- Raleigh
- Austin/Round Rock
- Seattle
- New York City

4.2 – EDUCATIONAL ATTAINMENT

To evaluate education, we classify workers in our coding/design occupations into three categories:

1. ***Workers without a bachelor's degree.***
   This category includes holders of associate degrees and certificates. This group includes the self-taught.

2. ***Workers who possess non-science/engineering (Non-STEM)[2] university degrees.***
   This group includes holders of bachelor's to PhD's. The rationalization is that these workers were "converted" to computer science workers during the course of their professional career.

3. ***Workers with science/engineering (STEM) degrees as defined by the National Science Foundation.***
   This group includes recipients of bachelor's, master's and doctoral degrees as well as holders of postgraduate certificates.

Table 5 shows workers in core IT by education category as a percentage of the total core IT workforce in each city. This illustrates a significant difference between education in Salt Lake/Provo and the other areas. In particular, Salt Lake/Provo has the highest percentage of workers with less-than-a-bachelor's degree, and a significantly lower share of those with a STEM degree.

Table 5: Core IT Workers by Educational Attainment – 2016 ACS[13]

	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	RALEIGH	AUSTIN	SEATTLE	NEW YORK
Below Bachelor's Degree	44%	7%	15%	26%	14%	16%
Non-STEM Degrees	11%	12%	14%	14%	11%	20%
STEM Degrees	46%	81%	71%	60%	74%	65%

The lesser education of Salt Lake/Provo stands out. The other cities' coding/design occupations are heavily populated with four-year-degree or higher workers, with most holding STEM degrees.

[13] The "core IT" coder definition is the Utah profile as presented in Table 2.

4.3 – MIGRATION RATIOS

Table 6 lists the worker in- and out-flow in coding/design occupations, regardless of education. For comparative purposes, data are presented for all industries (core IT is not the only employers of coders) and for software publishing and computer systems design (i.e., core IT).

Table 6: Migrants and Migration Ratio of Workers in Coding Occupations 2013 – 2016 Annual Average

	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	AUSTIN	RALEIGH	SEATTLE	NEW YORK
ALL INDUSTRIES						
In-Migration	841	10,249	2,605	1,517	7,775	3,734
Out-migration	1,216	2,386	707	533	2,456	3,852
Migration Ratio	**0.69**	**4.30**	**3.68**	**2.85**	**3.17**	**0.97**
CORE IT						
In-Migration	618	5,213	1,308	820	4,764	1,062
Out-migration	535	1,215	377	266	1,243	1,453
Migration Ratio	**1.15**	**4.29**	**3.47**	**3.09**	**3.83**	**0.73**

Source: Bureau of Labor Statistics. Census Bureau PUMS (Workforce Services Calculations).

Table 6 implies that Salt Lake/Provo is a net exporter of coding talent across all industries, all education. When narrowed to our two core-IT industries, the migration ratio leans toward in-migration — yet falls significantly below the other tech cities except New York.

Why do Salt Lake/Provo and New York have significantly lower levels of in-migration relative to other tech cities? One possible answer lies in wages.

4.4 – WAGES

As workers make a decision about which jobs to accept and where, they evaluate wages. Wages are higher in Seattle and San Francisco/San Jose compared to Salt Lake/Provo, but so are their costs of living. A straight wage comparison needs to be adjusted to account for these different costs of living.

This is accomplished using the U.S. Bureau of Economic Analysis' Regional Price Parity (RPP) index. Calculated annually, the RPP indexes cost-of-living differences across metropolitan areas. The U.S. all-city average is 100. As a result, the RPP index value can be used to adjust and standardize each city's wages.

Table 7: Regional Price Parity by City (2016)

	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	AUSTIN	RALEIGH	SEATTLE	NEW YORK
Regional Price Parity	98.8	123	99.5	95.8	109.4	121.9

Table 8 is U.S. Bureau of Labor Statistics occupational wage measures adjusted using each city's RPP index from Table 7. Table 8 shows adjusted 2016 median wages for our specified coding occupations.

Table 8: Median Wage Rates for Software Developers, Computer Programmers and Computer Systems Analysts Adjusted for Cost-of-Living[14]

OCCUPATION	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	AUSTIN	RALEIGH	SEATTLE	NEW YORK
Computer Systems Analysts	$40.39	$43.39	$40.57	$44.56	$42.15	$38.82
Computer Programmers	$38.01	$39.96	$38.66	$42.80	$53.96	$31.68
Software Developers, Applications	$47.14	$49.45	$50.80	$47.94	$56.24	$41.39
Software Developers, Systems	$47.72	$53.98	$47.63	$52.87	$51.10	$44.77

Source: Bureau of Labor Statistics, Bureau of Economic Analysis.

Salt Lake/Provo wages are generally below competitor cities. While it may cost more to live in Seattle or San Francisco, the wages more than compensate when compared to Salt Lake/Provo.

To summarize the impact of wages on migration, we compared the average adjusted wage across the four coding occupations to migration ratios for each city's tech sector.[15] Table 9 shows the average wage and migration ratios (Table 6 core IT).

Table 9: Migration Ratio for Workers in Software Publishing and Computer Systems Design vs. Average Adjusted Wage of Programming Jobs[16]

	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	RALEIGH	AUSTIN	SEATTLE	NEW YORK
Wages	$43.32	$46.70	$44.42	$47.04	$50.86	$39.17
IT Coders	1.15	4.29	3.47	3.09	3.83	0.73

Source: Bureau of Labor Statistics. Census Bureau PUMS (Workforce Services Calculations).

[14] This is all coding occupations across the entire industrial scope, not just the core IT industry.

[15] Based on 2016 wage data. Due to changing methodology across the BLS data series, a multi-year average was not used.

[16] This is core IT coding occupations regardless of education level.

Statistical measures show a significant relationship between wages and migration.[17] The higher the adjusted wage, the greater the degree of in-migration and vice versa. This finding is consistent with economic theory and implies that people move to jobs that support a better economic reward.

Individuals may also move for job opportunities. More specifically, individuals look at the availability of jobs that match their skills and education level.

In their report, "Scoring Tech Talent in North America 2017," CBRE — a large real estate and investment services firm — estimated a "brain drain" of workers from Salt Lake over the past few years.[18] Their calculation compares the number of "tech degrees" (i.e., bachelor's or higher) awarded at in-state higher education institutions to the number of "tech jobs" added over a comparable period. The difference is the estimated flow of workers. Simply stated, CBRE finds that Salt Lake educates more tech individuals with bachelor's degree or higher than the area is gaining in tech jobs.

Table 10: Tech Degrees Awarded vs. Tech Jobs Added by City

MARKET	TECH DEGREES (2011-2015)	TECH JOBS ADDED (2012-2016)	BRAIN GAIN OR DRAIN?
San Francisco	28,804	109,280	80,476
Seattle	12,043	34,260	22,217
New York	60,678	74,209	13,531
Raleigh	13,738	20,660	6,922
Austin	9,660	15,170	5,510
Salt Lake	13,155	9,900	-3,255

Source: CBRE Research, U.S. Bureau of Labor Statistics, National Center for Education Statistics.

In line with CBRE's findings, ACS estimates imply an annual net outflow of higher-educated coders from Salt Lake/Provo. Table 11 shows the migration ratio for STEM-educated coders (i.e., bachelor's or higher) across all industries and in core IT. (Note: Table 11 ratios differ from Table 6 ratios, as Table 11 is only STEM-educated coders).

Table 11: Migration Ratio by City for STEM-Educated Coding Workers – 2013 - 2016 Annual Average

	EMPLOYED IN ALL INDUSTRIES			EMPLOYED IN CORE IT		
	INFLOW	OUTFLOW	MIGRATION RATIO	INFLOW	OUTFLOW	MIGRATION RATIO
Salt Lake/Provo	292	766	**0.38**	248	290	**0.85**
San Francisco/San Jose	8,603	1,581	**5.44**	4,348	585	**7.43**
Raleigh	1,153	448	**2.57**	714	252	**2.83**
Austin	1,954	389	**5.02**	1,105	173	**6.38**
Seattle	6,287	2,045	**3.07**	3,651	1,128	**3.24**
New York	2,338	2,369	**0.99**	568	945	**0.60**

Source: Census Bureau ACS PUMS 2013 - 2016.

[17] Pearson's Correlation Coefficient. r = 0.849, critical value of 0.811 with 5% significance and df = 4.

[18] https://www.cbre.us/research-and-reports/Scoring-Tech-Talent-2017. Table 10 includes only those cities targeted in this report.

Table 12: Purchasing Power Adjusted Core IT Occupation Wages by Education[19] – 2016 American Community Survey

	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	RALEIGH	AUSTIN	SEATTLE	NEW YORK
Below Bachelor's	$84,390	$112,056	$97,701	$90,707	$62,174	$62,378
Non STEM Degrees	$75,023	$97,761	$115,043	$76,523	$128,440	$101,293
STEM	$92,172	$110,419	$126,159	$117,442	$126,420	$102,082

Migration levels are associated with wages. With the exception of wages for non-university degree workers in Seattle and New York, Salt Lake/Provo wages rank low in nearly every education category when placed against our comparative areas. Table 12 suggests that greater compensation for higher-educated IT workers is often found elsewhere.

The CBRE study suggests a Salt Lake brain drain based solely upon volume disparity between education output and tech job creation. Our findings suggest that if a brain drain is occurring, it is probably influenced by the general type of IT work done elsewhere and the compensation that goes with it.

By tracking the migration ratios as worker-education increases, Table 13 compliments the CBRE findings. The first ratio set is for all core IT industry occupations. Remember, all core IT industry occupations include more than just coding/design. This can include accountants, HR, purchasing, etc. Table 1 showed these other occupations make up 52 percent of Salt Lake/Provo core IT industry employment. For core IT migration, regardless of occupation or education, the net migration ratio is 1.44 (44 percent more in than out). The other observed cities have higher ratios, except for New York.

Table 13: Migrants and Migration Ratio of Workers in Software Publishing and Computer Systems Design; 2013 – 2016 Annual Average

	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	AUSTIN	RALEIGH	SEATTLE	NEW YORK
ALL INDUSTRIES						
In-Migration	1,415	9,914	3,528	1,863	8,585	3,486
Out-migration	982	2,498	1,395	648	2,607	4,125
Migration Ratio	**1.44**	**3.97**	**2.53**	**2.88**	**3.29**	**0.85**
ALL CORE-IT CODING WORKERS						
Migration Ratio	**1.15**	**4.29**	**3.47**	**3.09**	**3.83**	**0.73**
CORE-IT CODING WORKERS WITH STEM DEGREES						
Migration Ratio	**0.85**	**7.43**	**2.83**	**6.38**	**3.24**	**0.60**

Source: Census Bureau ACS PUMS 2013 – 2016.

[19] All jobs, not just coders.

Next we isolate only the computer and mathematics occupations — the core-IT coders/designers. This is the second set of ratios and is transplanted from Table 6. It consists of only degree-holding workers. Notice the Salt Lake/Provo ratio has gone down, while the other city ratios have gone up (except New York).

Let's restrict this further and just look at core IT coding workers who have a four-year-or-higher STEM degree. This is the third set of ratios and is transplanted from Table 11. The Salt Lake/Provo ratio drops noticeably to out-migration. Some city ratios rise considerably, particularly the Bay Area and Raleigh. These areas are attracting top IT talent.

The trend is that as the skill/credential requirements of the IT occupations increase, the Salt Lake/Provo migration ratio swings from in- to out-migration. In contrast, the Bay Area begins with a high in-migration ratio, but its ratios get even higher as the job and skill requirements become loftier (as does Raleigh). This compliments the findings of Section 3.2, which displayed that Utah IT imports more workers with lesser education, and exports workers with higher education.

4.5 – COMPARATIVE IT COMPOSITION

Information technology is a fast-developing industry. New products, ideas, and ground-breaking technologies come about quickly, and in some cases disrupt or displace existing products, ideas and technologies. Facebook and Uber are recent examples of "0 to 60" companies that have rapidly displaced existing markets and roiled traditional business models. Artificial Intelligence and machine coding are current ones on the horizon.

Other IT companies like Adobe or Oracle have a well established library of innovative stage work and operate in a mature IT segment. They thrive by operating an existing IT product at the lowest cost.

Metropolitan markets themselves can be summarized by their general IT profile. Technological groundbreaking has always been the face of Silicon Valley. Austin and Raleigh also have their scientific IT DNA. The Salt Lake/Provo core IT market is generally characterized as building new business applications upon existing IT technologies, or what a recent Harvard Business Review (HBR) article would call "sustaining innovation."[20]

A company may develop a business idea where information technology changes how a market interacts. Instead of a product running through a middleman or agent, the buyer and seller are directly connected via information technology. This is business innovation. But is it technology innovation? The coders who made this work did not have to break coding horizons to accomplish this. There are available coding libraries/platforms within which they wrote custom code to produce this business innovation. This did not require pathbreaking coding innovation, and it may not have required a bachelor's degree or higher to write the code.

A 2013 McKinsey Global Institute report noted that some technologies "have the potential to disrupt the status quo, alter the way people live and work, rearrange value pools, and lead to entirely new products and services."[21] The scientific, or as the HBR article labled "basic research," markets are the conduits of this change. High levels of research and development are the defining trait. The potential for new IT inroads and considerable profits make these markets highly competitive for IT workers. Labor that invents and revolutionizes the IT needle is generally highly educated and amply compensated.

The inference is that it is more demanding to revolutionize IT and develop scientific breakthroughs than to create business innovations using existing IT technology. The former generally requires higher educated labor resulting in higher worker compensation.

[20] https://hbr.org/2017/06/the-4-types-of-innovation-and-the-problems-they-solve

[21] https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/disruptive-technologies

5.1 – SUMMARY AND THOUGHTS

We return to Forbes magazine:

> "*Unlike Silicon Valley, the wave of entrepreneurial talent here [Silcon Slopes] comes largely from people who are native Utahns or those with ties to the state from college at the University of Utah or Brigham Young. Utah's culture remains relatively insulated, and the location has been a tough sell to senior-level tech and engineering workers, who have the option of living in San Francisco or Seattle.*"[22]

Our findings align with the tech world's anecdotal evaluations. It is helpful to analyze data and quantify outcomes than to singularly rely upon commentary.

Table 5 reveals that close to half of Utah's tech workforce have been educated to the certificate, vocational training and associate degree levels. (Appendix C offers even broader occupational measures.) Yet the Utah core IT market is a fast-growing and highly successful market. It is thriving with labor that is partially of a lesser education level than other successful IT markets. Economic theory suggests that a market will operate with a labor-education level that best harmonizes with its business needs.

Since much of Utah's core IT labor force is educated in Utah, and the vocational level is a big part of the Utah core IT coding-occupation labor composition, an appropriate appreciation of this education segment benefits the Utah IT market.

Though Utah's IT environment may not be the "top tier," it still provides great benefit to the Utah economy. As Table 12 shows, the core IT industry pays well, even if it does pay lower than our comparison cities. There are not a lot of occupational pathways that yield such a high average wage with education below a bachelor's degree. The broader Utah economy benefits when lesser-educated workers have occupational avenues that deliver middle-income earnings.

5.2 – INTERNAL EDUCATION IS THE GROWTH ENGINE OF UTAH IT

The initial inquiry that spawned this study desired to gather an appreciation for labor in-migration's contribution to the Utah IT environment. As Chart 5 conveys, it turns out that component is not a significant Utah IT labor-supply segment. It has its place, but it is generally below 10 percent of all new core IT hires. The vast majority come from Utah resident workers channeling into core IT from other industries. This implies that Utah's core IT industry's labor comes from Utah education, and nearly half of that labor has credentials below a bachelor's degree (Table 5).

[22] https://www.forbes.com/sites/amyfeldman/2017/04/03/silicon-slopes-vs-silicon-valley-four-tech-unicorns-thousands-of-startups-no-frenzy/#4ab3dd7e3922

5.3 – MIGRATIONS EFFECT IS IN EDUCATION EXCHANGE, NOT IN NET VOLUME CHANGE

Both Workforce Services' UI system and the Census Bureau's ACS data suggest that, in volume, Utah IT labor in-migration largely matches Utah IT labor out-migration — implying negligible net labor migration. Where migration does have its impact is the net education transfer. Utah tends to have core IT labor in-migration of a lesser education level than the credentials of its core IT labor out-migration (Section 3.2).

This is further illustrated by the migration ratios of Table 11. That table speaks to coding workers with STEM four-year-or-higher degrees. Whether it is STEM coders in all Utah industries or STEM coders in our core IT industry, Utah exports more STEM coders than it draws. This implies the overall IT environments elsewhere attract and compensate higher-education coding/design occupations more than the Utah IT market.[23]

5.4 – UTAH IT – ITS LABOR

Utah's IT sector is a rapidly-growing industrial segment. It is also a well-paying industrial segment — within Utah. Bachelor's degree and higher labor is used, but it appears that much of Utah's IT industry thrives with labor of a lesser credential.

5.5 – QUESTIONS TO PONDER

- If Utah educated more IT workers to the bachelor's degree level, would that labor be absorbed by the Utah IT market?
- Could that transform the Utah IT market to a scientific market? Is that a desired, achievable or necessary transformation?
- Would additional Utah STEM-educated IT workers become additional labor available to the Seattles and San Joses of the IT world?
- Would that matter if education is dispensed for the benefit of a Utah citizen, regardless of career location?
- Given our observed Utah IT labor profile, and by extension, assuming the Utah IT industry's satisfaction with the existing lesser-educated labor profile, would Utah be augmented to enlarge the certification, associate degree or vocational training pathways leading to IT employment?
- What does Utah desire and what can it achieve?

[23] Note: The Table 11 migration ratios are not net migration ratios between those comparison cities; they are net-migration ratios, period.

APPENDIX A – 2016 LARGEST EMPLOYERS IN SOFTWARE PUBLISHING AND COMPUTER SYSTEMS DESIGN

COMPANY NAME	NAICS	EMPLOYMENT RANGE
ADOBE	511210	1000-1999
OPTUM SERVICES	511210	500-999
DOMO	511210	500-999
INSTRUCTURE	511210	500-999
ORACLE	511210	500-999
XACTWARE	541512	500-999
SOLUTIONREACH	541511	500-999
HENRY SCHEIN PRACTICE SOLUTIONS INC	511210	250-499
EMC CORPORATION	541512	250-499
ADP ADVANCEDMD	541511	250-499
3M HEALTH INFORMATION SYSTEMS	541512	250-499
BOOSTABILITY	541511	250-499
INSIDESALES.COM	541519	250-499
WORKFRONT	541511	250-499
SORENSON COMMUNICATIONS	511210	250-499
NOVELL	511210	250-499
CONTROL4 CORPORATION	541511	250-499
LANDESK SOFTWARE	541511	250-499
SLASHSUPPORT	541511	250-499
ARKONA	541511	250-499
SECURITYMETRICS	541511	250-499
SPILLMAN TECHNOLOGIES	511210	250-499
MASTERCONTROL	541511	250-499
WORKDAY	541511	100-249
INFOSYS LIMITED	541512	100-249
THUMBTACK	541511	100-249
IMAGINE LEARNING	511210	100-249
BAMBOO HR	541511	100-249
NUVI	541512	100-249
SIRSI CORPORATION	511210	100-249
BLUE COAT SYSTEMS	541512	100-249
STORAGECRAFT TECHNOLOGY CORPORATION	511210	100-249

COMPANY NAME	NAICS	EMPLOYMENT RANGE
PROOFPOINT	541511	100-249
TOMAX CORPORATION	541512	100-249
IDAHO TECHNOLOGY	541511	100-249
SOFTWISE INC	541511	100-249
SOFTWARE TECHNOLOGY GROUP	541512	100-249
ARROWPOINT SOLUTIONS	541512	100-249
RAKUTEN MARKETING	541511	100-249
MOBILE PRODUCTIVITY	511210	100-249
EMC CORPORATION	541512	100-249
MONEYDESKTOP	511210	100-249
NOVARAD CORPORATION	541511	100-249
DEALERTRACK	541511	100-249
SYMANTEC CORPORATION	511210	100-249
LUCIDCHART	541511	100-249
INTERACTIVE STUDIOS GROUP	541511	100-249
FLEX	511210	100-249
NORTHROP GRUMMAN	541511	100-249
WATERFORD RESEARCH INSTITUTE	511210	100-249
FIREEYE	541519	100-249
PRIORITY DISPATCH	511210	100-249
LEGATO SYSTEMS	541512	100-249
APPLIED SIGNAL TECHNOLOGY	541511	100-249
FISERV SOLUTIONS	541511	100-249
CAPITIVA SALT LAKE	541512	100-249
INFOTRAX SYSTEMS	541511	100-249
FISHBOWL INVENTORY	541511	100-249
FORCEPOINT	541511	100-249
PURE STORAGE	541511	100-249
COGNIZANT TECHNOLOGY SOLUTIONS	541511	100-249
MOZY	511210	100-249
GENESYS	511210	100-249

APPENDIX B – INDUSTRIES EMPLOYING CODERS BY CITY

Table 14 shows the distribution of coding jobs across the economy for the selected cities. The table illustrates the share of jobs in each NAICS category.

Table 14: Distribution of Coding Jobs by Industry

	SALT LAKE/ PROVO	SAN FRANCISCO/ SAN JOSE	AUSTIN	RALEIGH	SEATTLE	NEW YORK
Sector 31-33: Manufacturing	8%	11%	8%	12%	8%	2%
Sector 44-45: Retail	5%	3%	4%	4%	5%	4%
Sector 51: Information	9%	11%	10%	9%	2%	12%
Sector 52: Finance	6%	26%	7%	6%	0%	28%
Sector 54: Professional Svcs	45%	45%	55%	52%	73%	41%
Sector 61: Education	6%	1%	3%	2%	1%	2%
All Other Sectors	21%	3%	12%	14%	11%	11%

Source: Census Bureau ACS PUMS 2016 (Workforce Services Calculations).

Most, or a plurality, of coding jobs are concentrated in the professional services sector, specifically in computer systems design and related services. This industry sector is the highest in each city. San Francisco and New York also have an international finance footprint, and this deep-pocketed industry adds additional wage pressure when competing for coding workers.

Salt Lake/Provo differs somewhat from other areas. The share of jobs in the "other sectors" category is large. These are largely in education, administrative support/waste management and real estate.

APPENDIX C – EDUCATIONAL ATTAINMENT BY COMPUTER OCCUPATIONAL TITLE

This is all computer occupations across all industrial sectors.

United States Data

		PERCENTAGE OF WORKERS HOLDING THIS EDUCATION								
SOCCODE	SOCTITLE	LESS THAN HIGH SCHOOL DIPLOMA	HIGH SCHOOL DIPLOMA OR EQUIVALENT	SOME COLLEGE, NO DEGREE	ASSOCIATE'S DEGREE	TOTAL OF LESS THAN BACHELOR'S DEGREE	BACHELOR'S DEGREE	MASTER'S DEGREE	DOCTORAL OR PROF. DEGREE	TOTAL OF BACHELOR'S DEGREE OR HIGHER
15-1100	All Computer Occupations	0.5%	5.2%	16.0%	10.0%	31.8%	45.1%	20.5%	2.6%	68.2%
15-1111	Computer and Information Research Scientists	0.4%	4.9%	2.5%	0.3%	8.1%	34.8%	33.0%	24.0%	91.8%
15-1121	Computer Systems Analysts	0.5%	4.6%	13.4%	7.8%	26.3%	47.4%	23.4%	2.9%	73.7%
15-1122	Information Security Analysts	0.7%	4.5%	16.8%	10.4%	32.4%	42.9%	22.4%	2.3%	67.6%
15-1131	Computer Programmers	0.6%	4.6%	12.9%	8.7%	26.8%	50.9%	19.7%	2.8%	73.4%
15-1132	Software Developers, Applications	0.4%	2.1%	8.2%	4.8%	15.5%	50.3%	30.3%	3.9%	84.5%
15-1133	Software Developers, Systems Software	0.4%	2.1%	8.2%	4.8%	15.5%	50.3%	30.3%	3.9%	84.5%
15-1134	Web Developers	0.6%	4.8%	15.5%	9.7%	30.6%	54.0%	13.8%	1.6%	69.4%
15-1141	Database Administrators	0.7%	5.7%	12.5%	8.8%	27.7%	45.1%	24.2%	3.0%	72.3%
15-1142	Network and Computer Systems Administrators	0.4%	7.2%	23.3%	15.1%	46.0%	40.7%	12.0%	1.2%	53.9%
15-1143	Computer Network Architects	0.5%	5.8%	22.3%	12.7%	41.3%	40.0%	16.9%	1.8%	58.7%
15-1151	Computer User Support Specialists	0.6%	8.9%	25.3%	16.0%	50.8%	37.4%	10.5%	1.2%	49.1%
15-1152	Computer Network Support Specialists	0.6%	8.9%	25.3%	16.0%	50.8%	37.4%	10.5%	1.2%	49.1%
15-1199	Computer Occupations, All Other	0.8%	7.5%	20.6%	14.7%	43.6%	39.2%	15.7%	1.4%	56.3%

Data Source: 2015 and 2016 American Community Survey Public Use Microdata, U.S. Department of Commerce, U.S. Census Bureau

Utah Data

		PERCENTAGE OF WORKERS HOLDING THIS EDUCATION								
SOCCODE	SOCTITLE	LESS THAN HIGH SCHOOL DIPLOMA	HIGH SCHOOL DIPLOMA OR EQUIVALENT	SOME COLLEGE, NO DEGREE	ASSOCIATE'S DEGREE	TOTAL OF LESS THAN BACHELOR'S DEGREE	BACHELOR'S DEGREE	MASTER'S DEGREE	DOCTORAL OR PROF. DEGREE	TOTAL OF BACHELOR'S DEGREE OR HIGHER
15-1100	All Computer Occupations	0.8%	6.7%	28.5%	12.5%	48.5%	37.2%	12.6%	1.7%	51.5%
15-1111	Computer and Information Research Scientists	-	-	-	-	-	39.7%	27.3%	33.0%	100.0%
15-1121	Computer Systems Analysts	-	6.8%	19.5%	6.9%	33.2%	45.6%	19.9%	1.3%	66.8%
15-1122	Information Security Analysts	-	12.1%	19.4%	27.5%	59.0%	9.7%	31.2%	-	41.0%
15-1131	Computer Programmers	0.8%	4.4%	25.1%	14.9%	45.3%	41.2%	11.0%	2.5%	54.7%
15-1132	Software Developers, Applications	1.1%	2.7%	21.4%	6.8%	32.0%	51.4%	16.3%	0.4%	68.0%
15-1133	Software Developers, Systems Software	1.1%	2.7%	21.4%	6.8%	32.0%	51.4%	16.3%	0.4%	68.0%
15-1134	Web Developers	-	4.1%	26.3%	10.0%	40.4%	42.9%	15.1%	1.6%	59.6%
15-1141	Database Administrators	0.7%	23.4%	40.8%	2.1%	67.0%	27.1%	6.0%		33.0%
15-1142	Network and Computer Systems Administrators	-	7.3%	23.4%	15.8%	46.5%	33.3%	16.7%	3.5%	53.5%
15-1143	Computer Network Architects	9.1%	4.7%	42.7%	8.3%	64.8%	20.4%	7.9%	6.9%	35.2%
15-1151	Computer User Support Specialists	0.8%	10.1%	40.6%	22.1%	73.7%	21.6%	3.9%	0.9%	26.3%
15-1152	Computer Network Support Specialists	0.8%	10.1%	40.6%	22.1%	73.7%	21.6%	3.9%	0.9%	26.3%
15-1199	Computer Occupations, All Other	-	12.0%	40.5%	12.7%	65.2%	24.9%	9.9%	-	34.8%

Data Source: 2015 and 2016 American Community Survey Public Use Microdata, U.S. Department of Commerce, U.S. Census Bureau

COMPUTER CODING IN UTAH

APRIL 2018

Contributors:

Mark Knold, *Supervising Economist*

Scott Smith, *Regional Economist*

Cory Stahle, *Regional Economist*

WORKFORCE SERVICES
RESEARCH & ANALYSIS