

Research Brief

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Summary Economic Impacts of Utah's Tech Industry

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The Utah State Legislature appropriated fiscal year 2019 funding to the Kem C. Gardner Policy Institute for a first-of-its-kind economic study of Utah's innovation economy. The Gardner Policy Institute convened its Tech Industry Advisory Council, with participation from three Utah trade associations—Silicon Slopes, Utah Technology Council (UTC), and Women Tech Council (WTC)—as well as the Utah Governor's Office of Economic Development (GOED) and Economic Development Corporation of Utah (EDCUtah).

This document and the companion Industry Snapshot present preliminary findings from the Gardner Policy Institute's research program for 2018 and 2019 on Utah's innovation economy. In them, we provide statewide employment and earnings for the tech industry in 2017. To show how the industry affected Utah's economy more broadly, we also provide economic impact results. We are preparing a more comprehensive report for release in July 2019, once we have company data for 2018.

Summary of Results

Utah's tech industry made significant contributions to the state's economy during 2017.

- With over 116,000 Utah jobs, the tech industry was similar to the real estate industry in terms of employment.
- Average annual compensation was \$102,000 in the tech industry, 75 percent higher than the \$58,400 per job in other industries.
- In-state spending by tech companies and workers supported nearly 186,000 Utah jobs outside the tech industry.
- Total economic impacts during the year exceeded 302,000 jobs at companies that paid \$20.1 billion in earnings and generated \$29.9 billion in GDP.
- Tech companies directly and indirectly supported more than one in seven Utah jobs (15.2 percent) and over one-sixth of state GDP (17.6 percent).

What counts as a tech company?

The Gardner Policy Institute incorporated best practices for identifying tech companies. We evaluated industry definitions from GOED and EDCUtah; CompTIA, a nationwide trade association for tech; the Bureau of Labor Statistics, U.S. Census Bureau, and National Science Foundation; and the U.S. Cluster Mapping Project at Harvard Business School's Institute for Strategy and Competitiveness. They helped us develop conventions for the detailed economic data and models available for this study. WTC, UTC, and Silicon Slopes reviewed our approach and brought to our attention companies missing from our initial list.

Table 1: Utah Tech Industry Definition, 2017

Industry	NAICS Code
<i>Manufacturing</i>	
Semiconductor machinery	333242
Computer and peripheral equipment	333316 and 334100
Instruments and devices	334512–5 and 334519
Communications equipment	334200 and 334310
Electronic components and media	334400 and 334613–4
<i>Trade</i>	
Computer and software wholesale	423430
E-Commerce wholesale	425000
E-Commerce retail	454000
<i>Information</i>	
Software	511210
Telecommunications	517000
Data processing and hosting	518210
Internet publishing	519130
<i>IT support</i>	
Custom computer programming	541511
Computer systems design	541512
Systems management and support	541513 and 541519
Computer training	611420
Electronics repair and maintenance	811200

Note: Several of the higher-level industries with NAICS codes ending in zero include more than one of the 42 detailed industries in the tech industry. Apart from these complete industries, the definition includes 61 manually selected establishments similar to other tech companies.
Source: Kem C. Gardner Policy Institute.

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Table 2: Utah Employment in the Tech Industry, 2017

Category	Companies with Employees		Jobs	Self-Employment	Total Employment	
	Establishments	Jobs		Jobs	Jobs	Share
Manufacturing	230	9,772		490	10,262	8.8%
Trade	1,021	15,616		13,255	28,871	24.9%
Information	1,531	26,576		3,772	30,348	26.1%
IT Support	3,374	30,662		15,993	46,655	40.2%
Total	6,156	82,626		33,510	116,136	100.0%

Source: Utah Department of Workforce Services and Bureau of Economic Analysis..

This analysis covers tech companies from 42 industries in the North American Industry Classification System (NAICS) (Table 1). The tech industry develops digital platforms that enable the ubiquitous information economy. Tech companies provide software for many applications. They manufacture and distribute computers and devices used by individuals and organizations. The industry also encompasses e-commerce and IT support.

Most companies, economy-wide, rely on information systems and innovative technology in their business processes. Besides using technology internally, companies in the tech industry generally provide tech capabilities for other companies and for personal use. We do not include tech workers, such as in-house programmers and IT support specialists, at companies whose main product and service offerings are not among the functions in Table 1.

How many Utah jobs do tech companies provide?

Based on our industry definition, direct employment in Utah's tech industry exceeded 116,100 full-time and part-time jobs in 2017 (Table 2). Of these, over 82,600 jobs (71 percent) were for employees of companies, an average of 13 jobs per establishment.¹ Self-employed workers in partnerships or sole proprietorships held the remaining 33,500 jobs (29 percent).

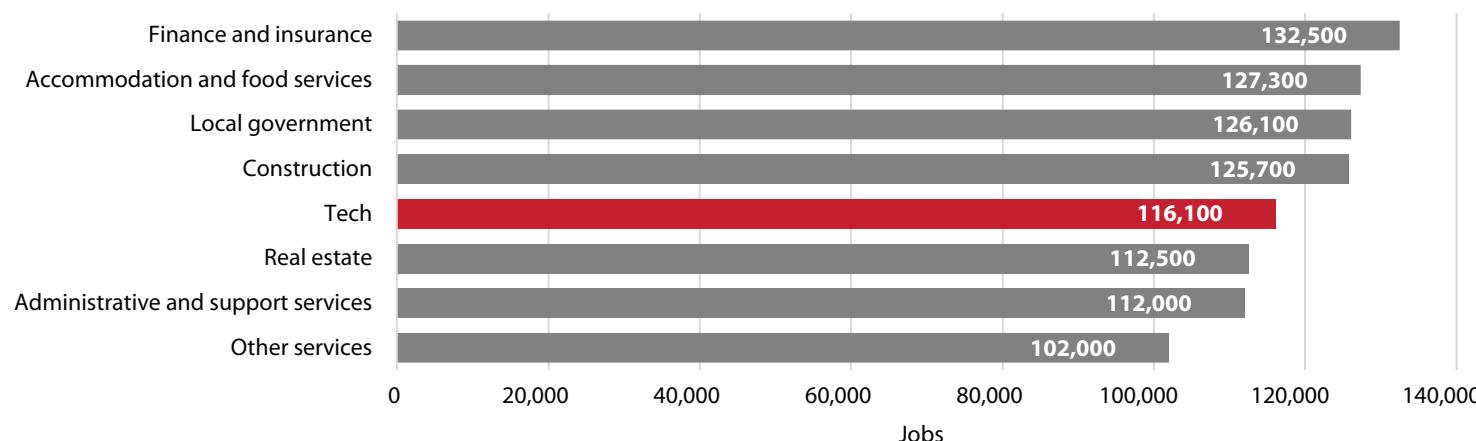
Of the four tech industry components, IT support had the most Utah jobs, 40 percent of the industry total. Its nearly 46,700 jobs

were mostly in computer programming and systems design. The information and trade categories each accounted for about one-fourth of tech industry employment in the state, with just under 28,900 jobs and over 30,300 jobs, respectively. Almost 9 percent of tech employment was in manufacturing, nearly 10,300 jobs.

Placed alongside 21 major sectors in Utah's economy, nine of which overlap it, the tech industry had the ninth highest direct employment. Figure 1 shows the seven sectors with employment levels closest to tech, those with 100,000 to 140,000 jobs. At 116,100 jobs, tech was 3.7 percent larger than administrative and support services, 3.2 percent larger than real estate, and 7.6 percent smaller than construction.

For this analysis, the Utah Department of Workforce Services (DWS) responded to our request for granular data on employment and payroll at tech companies. DWS manages Utah data from the Quarterly Census of Employment and Wages (QCEW). QCEW reporting requirements apply to almost every employer in the country. We selected the most recent full year of QCEW data available, 2017. DWS provided aggregate data for over 6,100 private sector establishments with employees in Utah's tech industry. Comparable data for 2018 should be available in April 2019.

QCEW data does not include all tech companies. In particular, self-employed owners (proprietors) work in companies without employees. The Bureau of Economic Analysis (BEA) tracks pro-

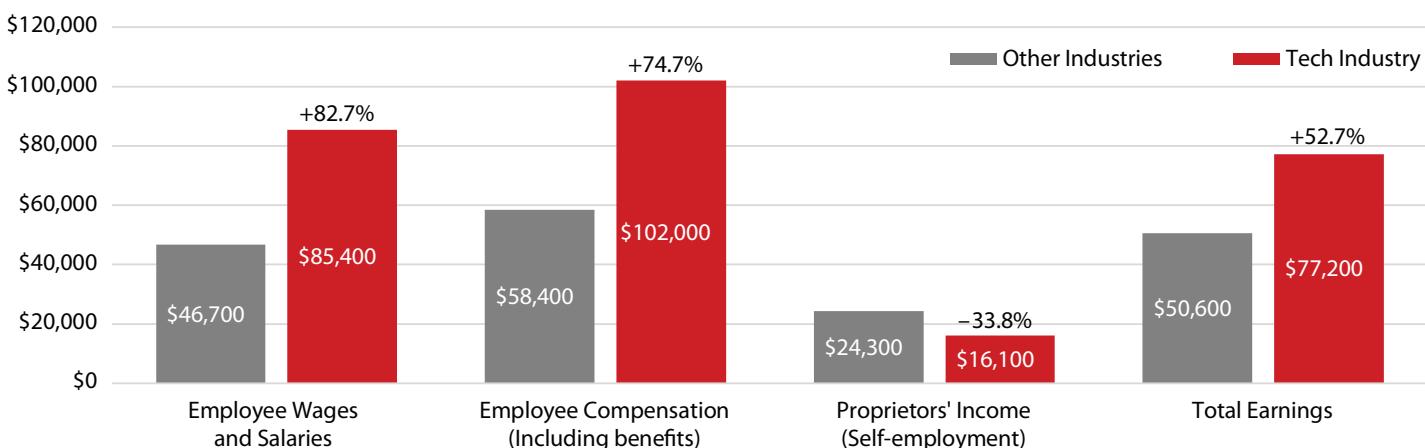
Figure 1: Utah Employment in Tech and Selected Other Industries, 2017

Note: Employment rounded to the nearest hundred for the tech industry and 7 of 21 major sectors within 20,000 jobs of tech. The tech industry, which spans many sectors, makes up less than 3 percent of employment in real estate, administrative and support services, and other services.

Source: Utah Department of Workforce Services and Bureau of Economic Analysis.

Figure 2: Average Annual Earnings per Job in Utah's Tech Industry, 2017

(2018 Dollars)



Note: Compensation equals employee wages and salaries plus benefits. Compensation and proprietors' income add up to earnings. We adjusted dollar amounts for inflation based on the U.S. consumer price index from the Bureau of Labor Statistics.

Source: Utah Department of Workforce Services and Bureau of Economic Analysis.

prietors and certain other workers missing from QCEW data. BEA provides information for multi-industry sectors in Utah's economy, but not for the detailed NAICS industries in our definition. The Gardner Policy Institute estimated employment and income for companies not included in QCEW data using BEA industry averages together with DWS's detailed response.

How much do workers in Utah's tech industry make?

Tech companies in Utah reported paying \$7.1 billion in employee wages and salaries, excluding benefits, during 2017, an average of \$85,400 per job in inflation-adjusted dollars, almost 83 percent more than other industries (Figure 2).

Including benefits, total tech industry compensation was \$8.4 billion, 9.1 percent of all compensation in Utah, during 2017. We estimated benefits from the ratio of compensation to wages and salaries in each sector where tech companies operated. Average compensation per job was \$102,000 in the tech industry, nearly 75 percent higher than other industries in Utah, which averaged \$58,400.

Turning to self-employed workers, proprietors' income in Utah's tech industry was an estimated \$0.5 billion in 2017. BEA does not separate their benefits from self-paid wages and salaries. Average proprietors' income in the tech industry was \$16,100, just below two thirds of the average in other industries in the state. While proprietors' income was low, many self-employed workers were also employees in companies or had other sources of income. Many tech proprietorships are in an early growth phase where investments are high and revenue is low. Later successes as established companies with employees reward strategic risk-taking by small entrepreneurs and compensate for their (often temporary) initial losses.

Employee compensation and proprietors' income add up to earnings of \$9.0 billion.² Average earnings for all workers in the tech industry were \$77,200 in 2017, 52.7 percent higher than earnings outside the industry.

How do we model the effect of tech on other industries?

Utah's tech industry affects individuals and organizations outside the industry itself. So far, we have focused on employment and earnings within the tech industry. Now we add economic activity it supports in other industries, guided by the counterfactual, "What would Utah's economy look like without its tech industry?"

Total economic impacts include direct, indirect, and induced impacts. Direct impacts are from companies within Utah's tech industry, while indirect and induced impacts are from companies outside the industry. Tech companies spend money on payroll and purchases of inputs.³ Indirect economic impacts result from spending by the in-state companies from which tech companies purchase inputs. We estimate what portion of the activity at non-tech companies happens because of tech company purchases. Induced economic impacts result from in-state personal spending by workers who earn income from tech companies or their suppliers. We estimate what portion of activity at in-state companies happens because of these workers' consumer spending. Most induced activity supports companies that are neither tech companies nor their suppliers.

Virtually all tech industry activity can be considered an economic impact for one of two reasons. First, sales by Utah tech companies to buyers in other states and countries bring outside money into Utah's economy. Second, in-state sales are a direct substitute for tech goods and services that Utah buyers would otherwise purchase from outside the state. In-state sales prevent a loss of resources from Utah's economy.

Part of the tech industry's direct activity does not generate indirect and induced economic impacts. Neither reason applies to certain telecommunications companies based on fixed wired and wireless communications infrastructure. Their cable, telephone, and fiber optic lines and their transmission and switching facilities are permanent installations that serve local customers. With some

Table 3: Tech Industry Economic Impacts in Utah, 2017

(Billions of 2018 Dollars)

Category	Direct	Indirect and Induced	Total	Share of Utah Economy
Employment	116,136	185,917	302,053	15.2%
Earnings	\$9.0	\$11.1	\$20.1	19.4%
Personal Income			\$18.2	13.1%
GDP	\$12.9	\$17.0	\$29.9	17.6%

Note: Shares equal total Utah tech economic impacts divided by total employment, earnings, personal income, and GDP in the state. We adjusted dollar amounts for inflation based on the Bureau of Labor Statistics' U.S. consumer price index.

Source: Kem C. Gardner Policy Institute analysis of data from the Utah Department of Workforce Services and Bureau of Economic Analysis using the REMI PI+ economic model.

exceptions, such as near state borders, telecommunications services from Utah cannot be exported to subscribers in other states. And in the absence of Utah's tech industry, Utahns would generally be unable to import telecommunications services from other states.

We include all telecommunications operations in the tech industry's direct and total economic impacts, but we add indirect and induced impacts only for satellite telecommunications (NAICS 517410), which primarily relies on mobile devices and untethered satellites that may not exclusively serve Utah. We find no compelling rationale for estimating additional economic activity resulting from the operations of telecommunications carriers (NAICS 517311–2) or the telecommunications resellers that depend on those carriers (NAICS 517911). Regardless of their appropriate treatment in economic impact analyses, companies in all of these categories are indispensable for communication among tech companies, other organizations, and individuals.

To establish direct economic impacts, we used DWS and BEA data on tech companies' operations in Utah during 2017. To estimate the indirect and induced impacts that resulted from this direct activity, we customized an economic impact model for Utah. REMI PI+ v2.2, developed by Regional Economic Models, Inc., is a dynamic, multiregional simulation model that estimates economic, population, and labor market impacts of specific economic changes. The analytical framework incorporates input-output relationships, general equilibrium effects, economic geography, and econometrics.

REMI's most detailed model for Utah aggregates to 70 economic sectors with two- to four-digit NAICS codes made up of multiple six-digit industries. The 12 sectors with tech companies also contain companies outside the tech industry. These sectors are not 100 percent tech. In terms of the average profile of intermediate goods tech companies purchase, we assume they are similar to other companies in their sectors. Likewise, for our GDP estimates, we assume tech companies have similar value added per worker as other companies in their sectors.⁴ In terms of worker earnings, we are able to calibrate the model to reflect pay for the specific tech companies in our definition, without relying on sector averages.

We adjusted our model to avoid double counting in cases where tech companies buy inputs from other tech companies. For example, software companies may contract with other Utah firms for custom programming and buy computers from in-state vendors. We subtract out the indirect and induced impacts of such activity, because our industry definition already counts all tech company activity in direct, indirect, and induced impacts. For the 12 sectors with tech companies, we assume the value of transactions between tech companies in different sectors is proportional to the tech industry's share of each sector.

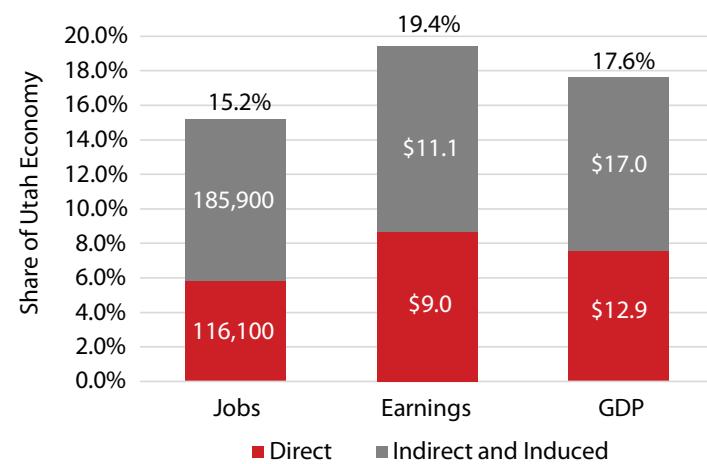
How much economic activity in Utah depends on the tech industry?

In 2017, economic impacts in Utah from the tech industry included 302,053 jobs, \$20.1 billion in earnings, \$18.2 billion in personal income, and \$29.9 billion in GDP, adjusted for inflation (Table 3).⁵ These results include direct economic activity within the industry, as well as indirect and induced activity tech companies and workers generated in other industries.

Utah's tech industry powered more than one-sixth of state GDP in 2017. Total direct, indirect, and induced impacts were 15.2 percent of Utah employment, 19.4 percent of its earnings, 13.1 percent of its personal income, and 17.6 percent of its GDP (Figure 3). For example, 19.4 percent of all earnings by Utah workers that year came either from tech companies or from companies outside the tech industry that were supported by purchases tech companies and workers made.

Figure 3: Utah Tech Industry Economic Impacts, 2017

(Billions of 2018 Dollars)



Note: Employment includes full-time and part-time jobs, rounded to the nearest hundred. Earnings equal employee compensation (including benefits) plus proprietors' income. We adjusted dollar amounts for inflation based on the U.S. consumer price index from the Bureau of Labor Statistics.

Source: Kem C. Gardner Policy Institute analysis of data from the Utah Department of Workforce Services and Bureau of Economic Analysis using the REMI PI+ economic model.

Plans for the full report this summer

The Gardner Policy Institute is sharing findings from its two-year research program on Utah's innovation economy in three documents. Our capstone report on the tech industry will expand on the preliminary, summary-level results in this Research Brief and the corresponding Industry Snapshot. We invite further input from Tech Industry Advisory Council members in the next few months as we prepare the following for the report:

- Local findings, such as employment by county
- Economic impact results updated from 2017 to 2018 with industry detail added
- Fiscal impacts—tax revenue generated in Utah
- Comparisons between Utah and other states in terms of employment and wages
- Industry growth trends for Utah and the U.S.
- STEM employment in the tech industry for Utah demographic groups
- A narrative history of the state's tech industry

Endnotes

- 1 An establishment is a business location. Since many companies have more than one in Utah, there are fewer tech companies than tech establishments.
- 2 Rounding explains the apparent discrepancy in total earnings and its components: compensation of \$8.43 billion and proprietors' income of \$0.54 billion, both of which round down, add to \$8.97 billion, which rounds up.
- 3 Tech companies' inputs are the goods and services they buy from suppliers and use to create tech products and services. Inputs here exclude the in-house services of tech employees and proprietors.
- 4 Gross domestic product (GDP) is a measure of total economic activity in a region. GDP captures the value added by companies, net of the intermediate inputs they use to produce their products and services.
- 5 Like earnings, personal income includes employee compensation and proprietors' income. Unlike earnings, personal income includes other sources of income and subtracts contributions for government social insurance. Personal income is reported by place of residence (for workers who live in Utah, even if they work in another state), whereas employment, earnings, and GDP are reported by place of work (where a company operates, even if some workers commute across state lines).

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