Saskatchewan Technology Sector Labour Market and Economic Impact Initiative

Final Report

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Contents

Executive Summary

In view of a rapidly changing global technology sector (described further in Section 2), SaskInteractive (on behalf of its partners) commissioned Nordicity to prepare the first-ever labour market and economic impact analysis of Saskatchewan's Tech Sector. This benchmarking analysis serves to address three principal needs:

- **Identifying the Tech Sector in Saskatchewan** starting with defining the limits of the sector. The report also provides benchmarking information regarding the size, location and other details about Saskatchewan's "Tech Companies."
- **Analyzing the Tech Sector's Labour Force** that feeds into the Tech Sector in Saskatchewan. The report provides a detailed analysis of the Tech Sector's labour market – not only within Tech Companies, but throughout the provincial economy.
- **Assessing the Tech Sector's Economic Impact** on the provincial economy. The report provides a benchmark for the Sector's impact on provincial Gross Domestic Product, employment, and tax revenue.

To fulfil the mandate described above, Nordicity employed a **dynamic mapping** (described in Section 1.2) approach that starts by defining tech occupations which informs the definition of the Tech Sector. In simple terms, this methodology involves analyzing census data to determine the industries in which employment of Tech Workers is most prevalent. To convey the results generated by this approach, Nordicity developed three bespoke definitions that are used throughout the report (illustrated in Section 4.1):

- In this report, the *Tech Sector* is understood to include all employees (including both tech and non-tech occupations) in the Tech Industries, as well as all employment in Tech Occupations (including in non-tech industries).
- When this report invokes *Tech Workers*, it refers to all workers employed in Tech Occupations (including both Tech Industries *and* non-tech industries).
- When this report refers to workers at *Tech Companies*, it includes all companies in the Tech Industries.

Saskatchewan's Tech Sector

Saskatchewan's Tech Sector is operating in a global market seeking to capitalize on the opportunities presented by a technological disruption. This reality means that the meaning of 'Tech Companies' is evolving with increasing technological disruptions across different industries.

There are more than 5,000 Tech Companies in Saskatchewan operating mainly (64%) in Saskatoon and Regina. In terms of size, these companies employ an average of 13 persons, though more than half are without employees. Roughly three quarters of Tech Companies earn less than $500,000 though there are more than 500 of those that earn more than $2M. The top three industries which make up 53% of Tech Companies are *Architectural, engineering and related services, Health and personal care stores* and *Computer systems design and related services.*

Speaking to employment and compensation, Nordicity estimates that the sector employed 52,300 workers, including 31,700 workers at Tech Companies, and another 20,700 Tech Workers in other industries. The three industries described above account for over half of the workforce. *NAICS 4461 – Health and personal care stores* and *NAICS 5415 – Computer systems design*, drove job growth near 20%, adding a combined 1600 jobs since 2015. As a sector, there the number of Tech Occupations grew 3% in the same time period. The average employment income of workers in the sector was $76,000 – about 43% more than in other sectors. Although San Francisco was frequently cited for offering Tech Workers significantly higher wages (154% higher for software engineers), alongside a higher cost of

living, Nordicity's analysis found that software engineers in Saskatoon and San Francisco have a similar proportion of income left over after living expenses. Within Canada too, a higher cost of living leaves less disposable income in workers' pockets despite higher wages. For example, Tech Workers in Toronto earn 16% higher wages than those in Regina, but on average have $4,000 less surplus at the end of the year compared to workers in Regina.

When focusing analysis specifically on the 'core Tech Sector' (*NAICS 5415 - Computer systems design and related services*), Nordicity estimates that this burgeoning cluster of Tech Enterprises contributed more than half a billion dollars to Saskatchewan's GDP in 2018. The sector has grown 38% since 2010 and a further 19% since 2015. In 2018, it generated nearly $124M in fiscal (tax) impact, including more than $50M for the province of Saskatchewan. That said, this rate of growth is not without pains; *NAICS 5415* companies reported that it typically takes from 4 to 12 weeks to hire a new employee and Nordicity estimates that there were, on average, 63 concurrent job postings for positions at any given time during 2019. While a shortage of labour can be a damper on growth, it also makes it more attractive (relative to the alternative of hiring) to nurture the skills of companies' existing workforce. Nordicity estimates that companies in *NAICS 5415* spent a total of $3.7 million per year (averaging $982 per employee) on employee training and professional development and $13.0 on capital expenditures in 2019. Moreover, Nordicity estimates that these companies earned 84% of their revenues from outside of Canada.

Saskatchewan's smaller sized tech sector (sixth largest provincial Tech Sector in Canada[1]) presents challenges for companies in the sector to find, attract and retain tech talent at all levels of experience. Most Tech Companies are focusing on building sustainable business models before actively seeking public funding or investment. These companies cite encouraging growth in private equity activity and strong support from organizations like National Research Council of Canada (NRC) Industrial Research Assistance Program (IRAP), as well as growth in provincial support. Those that are actively seeking investment are most likely to use it to hire more staff both for business development and production expansion. Tech Companies expressed optimism for the future with opportunities to galvanize a strong Tech Sector through further coordination and government support.

Saskatchewan's Tech Workforce

Saskatchewan's tech labour force has its peak in the 25-39 age group and has a high proportion (48%) of workers with post-secondary credentials. While the provincial distribution is similar, Saskatchewan's average age (40.7) in the Tech Sector is slightly lower than that observed in other provinces. Within the province, Saskatoon skews younger than in Regina, which reflects sentiments that Regina's Tech Sector is known to be employed in government, crown corporations, and government contractors. 63% of the sector is male and a similar imbalance is found in other jurisdictions.

Visible minorities are relatively well represented amongst Tech Workers, especially for those employed in the Tech Industries (17%), as compared to 11% in the overall Saskatchewan workforce. Lower participation by Indigenous workers in Tech Occupations in Regina and Saskatoon suggests that Indigenous participation in the Tech Sector is most prevalent in non-tech occupations outside of urban centres. On average, Tech Workers had eight years of experience. In 2015, 12% of the workforce had moved to Saskatchewan within the past five years. The largest cohort of newcomers came from outside of Canada (33%) followed by a fifth coming from Alberta and Ontario respectively.

Saskatchewan's Tech Sector is showing growth in new Tech Workers - both in terms of recent graduate-aged as well as older workers. This reflects that the talent supply issues are largely related to

[1] https://www.statista.com/statistics/723991/canada-ict-sector-output-by-province/

the global tech talent crunch, as opposed to a lack of available labour. Gender distribution of new Tech Workers entering the sector from 2010 to 2015 was essentially the same as the current demographics of the sector. About three fifths of Saskatchewan Tech Workers pursued their highest level of educational attainment in the province.

Speaking to the supply of labour many suggested that junior resources are available while senior resources remain difficult to source for a variety of reasons. As a result, many of the more specialized roles are being outsourced. At the same time, it is hard to source those with the right mix of soft and technical skills. To attract labour from Canada and internationally, many are using Saskatchewan's lifestyle and affordability case. While opportunities exist to source labour from elsewhere, many in the sector expressed a preference for using personal recommendations and networks.

16% of Saskatchewan Tech Companies' existing workforce was hired within the last 12 months. Of these new hires, 75% were sourced from the province's local talent pool. The number of Tech Graduates increased by 14% between 2009 and 2016, compared to only a 12% increase in all other fields. Tech Student enrollments in Saskatchewan saw a 24% increase between 2009 and 2016, in contrast to only 7% growth in all other fields of study.

Mitacs is a national, not-for-profit organization that facilitates publicly supported internships for post-secondary students in innovative fields. Speaking specifically to Mitacs registration, the number of internship units in Saskatchewan have more than doubled in the last four years. However, Saskatchewan had comparatively low participation in terms of Tech Sector interns per Tech Students relative to other provinces in 2016 and 2017.

Looking forward, respondents of the industry survey indicated that they expect to add an average seven people to their headcount in the next 24 months. More specifically, Tech Companies are likely to open two technologist and technician occupations and one managerial and administrative position in the two years to come. As the sector grows stakeholders are looking to universities and experiences like co-ops or Mitacs internships to develop the local talent supply that is needed to sustain the growth. Looking to specific future occupation growth, IT and health specializations represent significant growth opportunities. The three IT occupations that made it onto the top ten list[2] are collectively forecast to increase by 827 employees (15.1% growth from 2018 to 2022).

While jobs do exist in the sector, many working in the sector expressed that there were limitations in the type of jobs and means for being aware of existing opportunities indicating a need for more coordination. In terms of job satisfaction, 91% of respondents reported being satisfied with their career and 81% see potential for growth in years to come. Half of survey respondents indicated that the inability of local companies to offer competitive wages was a key challenge for them. On the positive side, affordable housing was a key benefit, as was intangible benefits such as a tight-knit communities and strong social safety net.

Economic Impact of Saskatchewan's Tech Sector

An economic impact assessment was conducted based on the activity associated with Tech Companies (including non-tech as well as Tech Workers) and Tech Workers employed in non-tech industries. While some estimates (such as the one conducted for *NAICS 5415 – Computer systems design and related services* earlier in this report) use Input-Output modelling to estimate the spin-off effects, this assessment is limited only to the direct economic impacts of the Tech Sector. This

[2] IT occupations in the top ten list include *NOC 2174 – Computer programmers and interactive media developers*, *NOC- 2171 Information systems analysts and consultants*, and *NOC - 0213 Computer and information systems managers*

methodological decision was to avoid the possibility of double counting as a result of purchases between companies within the sector.[3]

Based on Nordicity analysis, the average (aggregate) profitability of Tech Companies in Saskatchewan is 7.05%. On $10.2 billion in revenue, this yields an aggregate operating surplus of $0.7B. Nordicity estimates that Saskatchewan's Tech Sector generated direct GDP of $4.7 billion in 2018, which represents 5.6% of Saskatchewan's total GDP. Based on this economic activity, Nordicity estimates that the Saskatchewan Tech Sector contributed $550M to provincial and municipal tax coffers, and $791 in federal taxes in 2018.

[3] Input-Output models estimate the downstream economic and employment impacts of purchases made from supplier industries. For example, consider a Saskatchewan software company buying computer equipment from a Saskatchewan computer retailer; an Input-Output model could be used to calculate the small amount of "indirect" GDP and employment at the computer retailer that was attributable to that purchase. If, however, one performed an economic impact study on software companies *and* computer retailers, the direct impact would already include the entire GDP and employment at the computer retailer. The indirect impact of that purchase by the software company would therefore be double counted in direct and indirect impacts.

1. Introduction

1.1 Report Objectives

With the rapid global growth of the technology sector and looming advancements in automation and artificial intelligence, Tech Industries around the world are poised to continue to profoundly reshape our economy and workforce. In this context, Saskatchewan's provincial Tech Sector includes its workforce, educational institutions, R&D infrastructure and innovative companies, each with unique strengths/specializations that are different from those in other jurisdictions. As this report shows, these components, and their unique characteristics, contribute to a vibrant local Technology Sector – one that is well positioned to take advantage of these (and other) emerging opportunities.

To do so, however, the scope and nature of Saskatchewan's Tech Sector must be keenly understood. Beyond the more commonly referenced (or, 'core') Technology Industries (such as computer software design), Saskatchewan's Tech Sector comprises a variety of parts of the provincial economy (as will be expanded upon in Sections 3 and 4). Moreover, as these tendrils grow, they will need to be continuously supplied with their primary resource: skilled labour.

It is for these reasons that SaskInteractive (on behalf of its partners) commissioned Nordicity to prepare the first-ever labour market and economic impact analysis of Saskatchewan's Tech Sector. This benchmarking analysis serves to address three principal needs:

1. **Identifying the Tech Sector in Saskatchewan:** In order to conduct any analysis on a sector, one must first define the limits of that sector (i.e. which types of companies are included). Given the pervasive nature of the Tech Sector, this process is a challenging one. For this reason, Nordicity undertook an innovative dynamic mapping approach to identifying Saskatchewan's Tech Sector. Having done so, this report also provides benchmarking information regarding the size, location and other details about Saskatchewan's "Tech Companies."
2. **Analyzing the Tech Sector's Labour Force:** The core of the research presented in this study is the analysis of the labour market feeding the Tech Sector in Saskatchewan. From the supply of talent from Post-Secondary Institutions (PSIs) in the province to prevailing hiring practices to pertinent salary information, this report provides a detailed analysis of the Tech Sector's labour market – not only within Tech Companies, but also those employed in Tech Occupations throughout the provincial economy.
3. **Assessing the Tech Sector's Economic Impact:** Like any sector, Saskatchewan's Tech Sector bears significant impact on the provincial economy. This report provides a benchmark for the Sector's impact on provincial Gross Domestic Product, employment, and tax revenue.

Crucially, the information presented in this report is intended to form a baseline against which future studies can be measured. Given the data included here, such comparisons can be made at the macro-level or against very specific measurements. For example, efforts to improve alignment between PSI output and industry needs can be (in part) evaluated by analyzing changes to the placement rate of graduates in the Tech Sector. From a wider perspective, the combined efforts to grow or improve the sector's performance can be informed by changes to the Sector's economic impact.

It is for this reason that Nordicity has (where possible) opted to draw upon resources that can be queried again in the future (e.g., statistical databases). Moreover, the dynamic mapping approach to identifying the Tech Sector is an adaptable approach that will allow future studies to be conducted without re-defining the Sector. Rather, as new parts of Saskatchewan's economy become reliant on technology, the model will adapt to incorporate them into the Tech Sector.

In broad terms, this study seeks to quantify and understand dynamics that affect the (economic) value of the sector, inform business decisions, and support the sector's efforts to advocate for investment in cases where such intervention is aligned with public policy goals.

The main limitation of this approach is simply that it has not been done before. As such, not all the data that would ideally have been included was available. Where this type of data limitation was encountered, Nordicity has provided a suggestion as to how such data *could* be provided. In this way, the next analysis of Saskatchewan's Tech Sector will have an even more robust slate of sources to draw upon.

1.2 Summary of Methodologies Used

This section briefly describes the analytical methodologies used to meet the reporting objectives of this engagement. Each element described in this section is described in more detail in Appendix A.

To complete this engagement, Nordicity conducted a **thorough analysis of statistical data sources** and a **broad primary research program**, including a survey of workers and companies, roundtables, and one-on-one interviews. The online survey garnered **185 complete responses,** of which 30% were from respondents representing a company. Of the respondents not representing a company, the majority (80%) were full time employees of a Tech Company. Stakeholder engagement also included **four roundtable sessions** (two in Saskatoon and two in Regina) and **over 35 one-on-one interviews** with key individuals representing companies, industry organizations and post-secondary institutions.

This study is conceptually anchored on an analytical approach called dynamic mapping. The basic premise for this methodology is that one can define a sector by establishing a set of occupations and identifying associated industries which employ an unusually high number of those occupations. This approach has been used extensively in the cultural, creative and technology sectors in recent years – each of these sectors is well-suited to this approach because they are more effectively defined in terms of their reliance on a very specific type of worker.

Dynamic mapping can be summarized as a two-step process:

1. **Define occupations:** A group of relevant workers is defined in terms of occupational characteristics. The definition of relevant occupations may be based on (a) a pre-existing list or (b) a set of criteria which is then tested against all occupations, depending on a study's research objectives. The approach set out in this document employs two tests – the first test is based on pre-existing lists, and the second test uses criteria to identify occupations that are actively involved in the technology value chain, including product/service development, production, and implementation.
2. **Define industries:** The second step in the process is to identify industries that employ a high concentration of Tech Workers. Industries with the highest concentration of tech occupations are thus designated as tech industries. Because industries' designation is based on the local concentration of workers (at a provincial level, for the purposes of this study), industries considered to be Tech Industries may vary from jurisdiction to jurisdiction and may change dynamically over time (as suggested by the name 'dynamic mapping').

Occupational definitions are the only subjective inputs into this study's methodology. For the purpose of this engagement, Nordicity worked with stakeholders to establish two tests used to qualify occupations as tech occupations. In order to qualify, each occupation would need to pass at least one criterion associated with each test.

1. **Test 1 – STEM occupations or technological skills:** This test is intended to round up a shortlist of potentially relevant occupations for a more detailed assessment in Test #2. To pass this test, an occupation must be included on one of the following two lists.
    a. **Criterion 1.1 – STEM occupations:** Nordicity used a list of STEM occupations produced by the SOC Policy Committee in the US. This definition has been used by the Bureau of Labor Statistics (BLS) in its research on High-Tech Industries.
    b. **Criterion 1.2 – Technology skills:** Nordicity drew from the methodology used in the Brookfield Institute's *Who are Canada's Tech Workers* to identify non-STEM occupations that require a high proficiency with technology. This process relied on O*NET, a database which scores the importance and level of occupational skills, knowledge, and work activity (among other occupational characteristics).
2. **Test 2 – Technological outputs, innovation, or implementation:** These criteria are intended to filter the list produced in Test #1 down to those occupations that contribute to the development, production and/or deployment of new technologies. To pass the second test, an occupation must satisfy one of the following two criteria.
    a. **Criterion 2.1 – Technological outputs:** This criterion identifies occupations that directly contribute to the output of technological goods or services.
    b. **Criterion 2.2 – Innovation and implementation:** To take a broader view of the tech value chain, this criterion identifies occupations that achieve a goal or solve a problem through the development or implementation of new technology. This criterion allows the definition of tech occupations to include basic research and support/maintenance technicians.

Tech intensity measures tech employment as a percentage of each industry's workforce. This value is calculated for each industry based on four-digit NAICS codes. This analysis is based on a custom order of Statistics Canada's Census of Population 2016 data, which breaks out industries in the North American Industry Classification System (NAICS) at the four-digit level, and occupations in the National Occupational Classification (NOC) at the four-digit level.

Tech Industries are then defined as those industries that exceed a *tech intensity threshold*. Nordicity set the tech intensity threshold by performing a *Tukey test*, a simple statistical test for outliers. Industries whose tech intensity (i.e., Tech Workers as a percentage of the total workforce) exceeds the tech intensity threshold are considered to be Tech Industries. The industrial definition accounts for sampling error by calculating the probability that a given industry has been correctly classified as tech or non-tech. All subsequent analysis of Tech Industries, including employment and company counts, is factored down using this probability.[4]

Employment, demographics and income estimates were developed using custom tabulations from Statistics Canada's Census of Population 2016. Estimates for 2018 are subject to adjustments to account for changes in employment and income growth observed in the period from 2015 to 2018 through Statistics Canada's Labour Force Survey (LFS), and the Survey of Employment, Payrolls and Hours (SEPH). To the extent possible, these adjustments were performed at the level of four-digit

[4] Note that this methodology uses partial inclusions of certain industries, depending on (a) the industry's total employment (which was used to infer the sample size based on the sampling methodology for the long-form census), and the difference between the industry's tech intensity and the tech intensity threshold. Consult Appendix A for a more detailed account of these calculations.

NAICS codes, however, two- and three-digit codes were mapped to the four-digit level for cases in which data was suppressed at the provincial level.

Company data was obtained through custom tabulations from Statistics Canada's Business Register. This source provides establishment counts by employment ranges at the six-digit level of NAICS, and by revenue ranges at the three-digit level of NAICS.

Tech Students were defined using a vocational perspective. The analysis employed a mapping process based on the field of study that tech and non-Tech Workers pursued at their highest level of educational attainment. For each field of study, Nordicity calculated the likelihood that students were destined for employment in Tech Occupations. For example, 57% of Saskatchewan Tech Workers reported studying Computer Science at their highest level of educational attainment. Therefore, Nordicity included 57% of enrolment and graduates in Computer Science in the analysis of Tech Students.

Administrative data are drawn from Mitacs (a non-profit organization that facilitates public-private funded innovation-focused internships) and VanHack (a global online platform of more than 200,000 tech workers) to supplement the findings presented in this study. When these sources are used, Nordicity explains how these sources may differ from the systematic definitions applied to other statistical sources.

1.3 About this Report

This body of this report is organized into the following five sections (with the list numbering corresponding to section numbers in the report):

2. **The Global Tech Sector** – This section situates Saskatchewan's Tech Sector in a global context.
3. **Saskatchewan's Tech Sector** – This section lays out the definition used to research the Tech Sector and assesses the industry from the perspective of Tech Companies in the province.
4. **Saskatchewan's Tech Workforce** – This section provides a detailed view of Tech Workers in Saskatchewan, and addresses tech education in the province.
5. **Economic Impact of Saskatchewan's Tech Sector** – This section assesses the economic impact of the Saskatchewan Tech Sector as a whole.
6. **Key Observations** - In the final report, this section will summarize the major findings from throughout the report.

2. The Global Technology Sector

> "The number of tech-adjacent industries is growing so rapidly, it will be crazy in the future not to think of insurance mining companies as digital companies – there is so much technology involved in their operations."
>
> Tech Sector Entrepreneur

Today, organizations around the globe are increasingly using technological applications that transcend and transform traditional industry lines. Trends such as the growing integration of connectivity into consumer products (i.e., Internet of Things), advanced analytics enabled by big data, artificial intelligence, quantum computing, robotics and automation are rapidly transforming many sectors across the Canadian economy. As a result, technology-intensive sub-segments have emerged across the board, including BioTech, AgTech, FinTech, Advanced Manufacturing and CleanTech, as evidence of the wide-ranging and influential impact of technological advancement.

These trends have resulted in some job categories facing the threat of obsolescence, others becoming relevant in industries where they did not previously exist, and still others emerging as entirely new roles. Shifts in technical talent are also occurring in response to various dynamics in individual jurisdictions to varying degrees. In this context, it has become increasingly prevalent to focus on identifying areas of the economy (in terms of industries) in which the employment of workers with tech-related skillsets are exhibiting the greatest growth. It is these concentrations of technology-focused workers and companies which represent the greatest potential to realize the significant economic and other localized (whether municipal, provincial or national) benefits from innovation.

Attracting and retaining the talent required to keep pace with rapid technological change is a key consideration in many sectors around the world. For example, 63% of global executives believed that the talent shortage was their organization's main concern.[5] Moreover, 54% of companies report talent shortages.[6] Looking ahead, the global talent shortage could cost the global economy $8.5 trillion, with more than 85 million jobs going unfilled by 2030.[7]

Technological change is not only changing the demand for talented workers but also the way we work and/or type of companies (i.e., smaller/newer). For example, in Canada, one study found that 69% of technology companies are less than four employees, compared to only 54% in all industries.[8] Technology is also allowing more flexibility which is often sought by talented workers who may be used to or seek opportunities to work as freelancers or on a contract basis (i.e., Work 4.0).[9]

While technology is disrupting sectors and markets across the globe, much of the growth is concentrated in tech hubs around the world. For instance, Brookings Institute estimates that 90% of growth in US high-tech jobs happened in just five metro areas.[10] This concentrated growth has also

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[5] https://www.gartner.com/en/newsroom/press-releases/2019-01-17-gartner-survey-shows-global-talent-shortage-is-now-the-top-emerging-risk-facing-organizations

[6] https://go.manpowergroup.com/talent-shortage

[7] https://www.kornferry.com/insights/articles/talent-crunch-future-of-work

[8] https://brookfieldinstitute.ca/wp-content/uploads/The-State-of-Canadas-Tech-Sector-2016-V2.pdf, p 36

[9] https://ec.europa.eu/epsc/publications/strategic-notes/future-work_en

[10] https://www.brookings.edu/research/growth-centers-how-to-spread-tech-innovation-across-america/

contributed to rising costs of living in major tech hubs[11] generating a push factor for highly mobile technology workers to leave hubs looking for more affordable places to live.

In this context, it is important to understand that dynamics affecting the tech labour market in Saskatchewan reach beyond provincial or national borders, as many companies rely on remote workforces that operate globally. In this sense, Saskatchewan is just one of many nodes in an interconnected global tech ecosystem.

[11] https://www.bbc.com/news/business-50295130

3. Saskatchewan's Tech Sector

This section provides an overview of the Saskatchewan Tech Sector. The section opens with the lens through which the sector was analyzed and introduces key terms used to describe different elements of the sector. The rest of the section presents Nordicity's findings about companies and high-level information about employment in the provincial sector.

Overall, this report takes the overarching view that the Tech Sector is defined by concentrations of Tech Workers. That is, industries that most employ the most Tech Workers (as a percentage of their total workforce) are most likely to show characteristics that have come to be associated with the Tech Industry, such as innovation, increased efficiency, and high growth (potential to scale quickly).

3.1 Defining the Tech Sector

As described in Section 1.2, the conceptual framework for this study is based on a definition of Tech Occupations which are then used to define Tech Industries. Depending on the purpose of a particular analysis in this report, there are certain specific terms used to designate the scope of a discussion. This section summarizes these key terms.

The broadest definition used in this report is the **Tech Sector**, as shown in the following schematic. In this report, the *Tech Sector* is understood to include all employees (including both tech and non-tech occupations) in the Tech Industries, as well as all employment in Tech Occupations (including in non-tech industries). Notably, this definition is the scope of the economic impact assessment and the total employment counts.

Tech Sector	Tech Occupations	Non-tech Occupations
Tech Companies		
Non-tech Companies		
Freelancer/contractor		

In many cases, it is useful to limit an analysis to only **Tech Workers**, as illustrated in the following figure. When this report invokes *Tech Workers*, it refers to all workers employed in Tech Occupations (including both Tech Industries *and* non-tech industries). Notably, this study uses the educational background of Tech Workers as the basis for defining Tech Students.

Tech Workers *(workers in Tech Occupations)*	Tech Occupations	Non-tech Occupations
Tech Companies		
Non-tech Companies		
Freelancer/contractor		

The other commonly used grouping in this study is **Tech Companies**, as illustrated below. When this report refers to workers at *Tech Companies*, it includes all companies in the Tech Industries. Notably, this definition is used as the scope of company counts.

Tech Companies *(companies in Tech Industries)*	Tech Occupations	Non-tech Occupations
Tech Companies		
Non-tech Companies		
Freelancer/contractor		

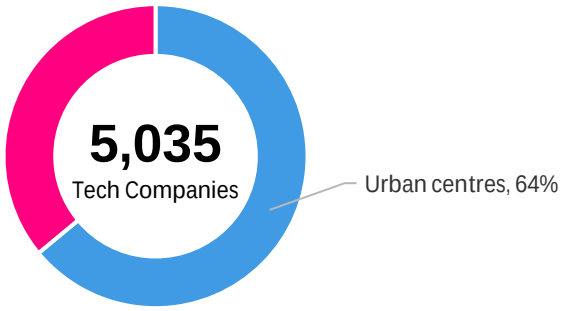
For more detailed descriptions of the methodologies and definitions used in this report (including a list of Tech Occupations and Tech Industries, please consult Appendix A, Subsections A.1 and A.2.

3.2 Tech Company Profile

The sections below describe the Tech Sector in the province that is made up of more than 5,000 Tech Companies. Sections describe company location, employment size, revenues and industry type.

Speaking to the location of **Saskatchewan's 5,035 Tech Companies**, about **two thirds of Saskatchewan Tech Companies are located in Saskatchewan's urban centres**, Regina and Saskatoon.

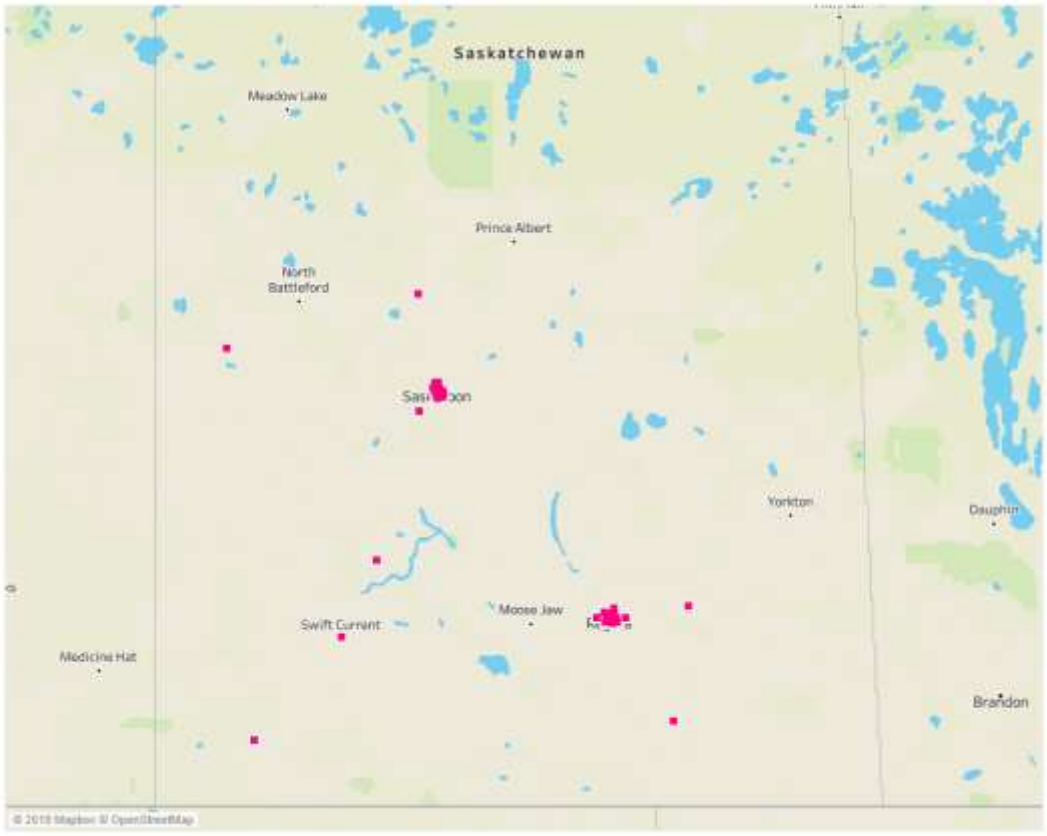
Figure 1: Number of Tech Companies in Saskatchewan



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

As seen in the map below, companies are clustered around Regina and Saskatoon.

Figure 2: Locations of Saskatchewan Tech Companies

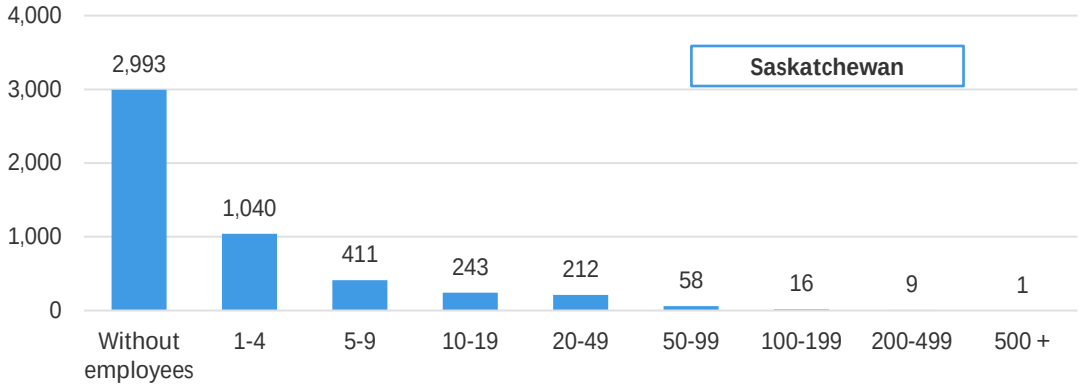


Sources: Nordicity analysis; Administrative data

Breakdown by Employment Size

The following figure shows the breakdown of Tech Companies in Saskatchewan according to Statistics Canada's Business Register. Note that 59% of these companies are "without employees." As described later in this section, Nordicity's analysis suggests that these entities principally consist of contract/freelance workers.

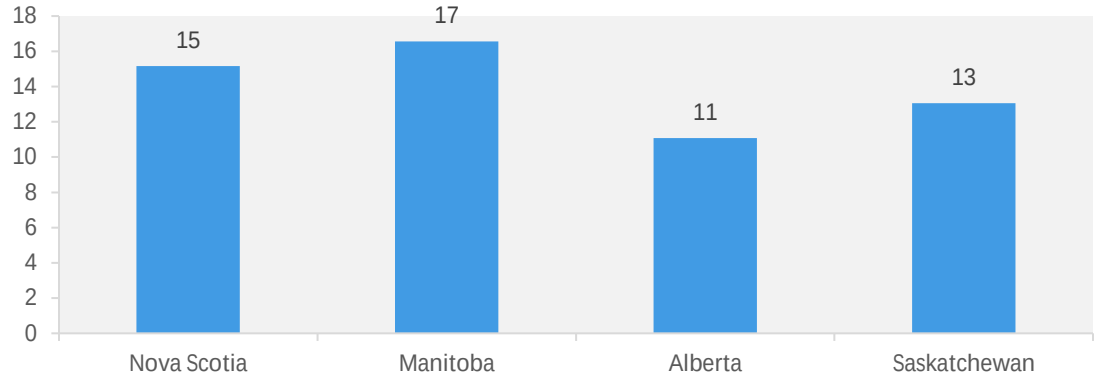
Figure 3: Number of Tech Companies in Saskatchewan in 2018, by employment band



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

Overall, there is not a significant difference between the distribution of company sizes in Regina, Saskatoon, and Saskatchewan as a whole (as illustrated above). Based on this information, Nordicity estimates that the average Tech Company *with employees* employs an estimated 13 persons. The average is similar in other provinces, as seen in the figure below.

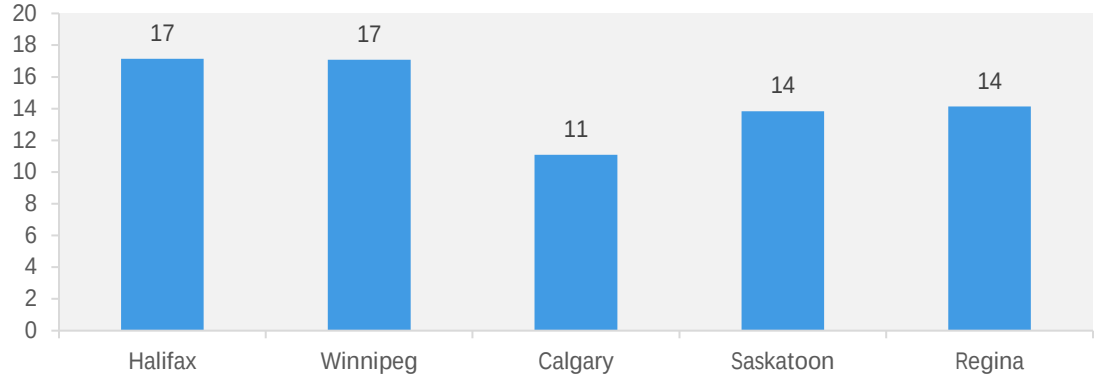
Figure 4: Average number of persons employed by Tech Companies in 2018, by province (estimated)[12]



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

The average number of persons employed by Tech Companies in Nova Scotia and Manitoba is higher than Saskatchewan. Similarly, Tech Companies in Calgary employ 11 persons on average, and those in Halifax and Winnipeg appear to have larger establishments that employ an estimated 17 persons on average.

Figure 5: Average number of persons employed by Tech Companies in 2018, by Census Metropolitan Area (CMA) (estimated)[13]



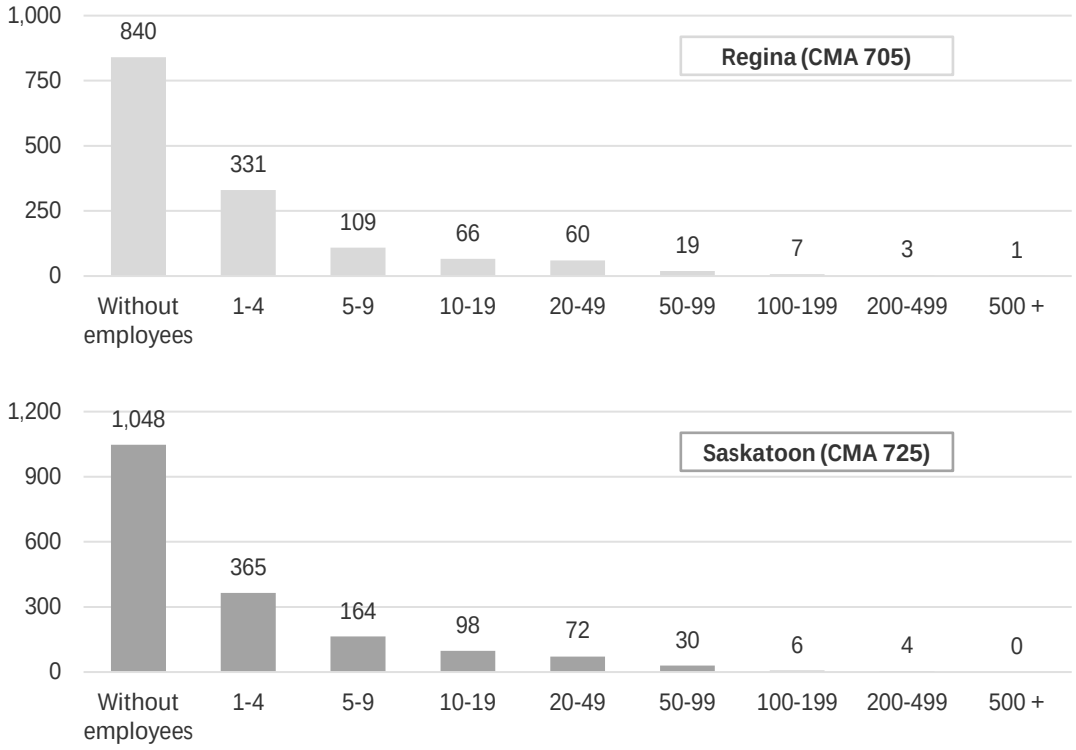
Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

[12] Average is estimated for only those companies that have employees, i.e. average excludes *Companies Without employees.*

[13] Average is estimated for only those companies that have employees, i.e. average excludes *Companies Without employees.*

The following figure shows the breakdown of Tech Companies in Regina, and Saskatoon, according to Statistics Canada's Business Register.

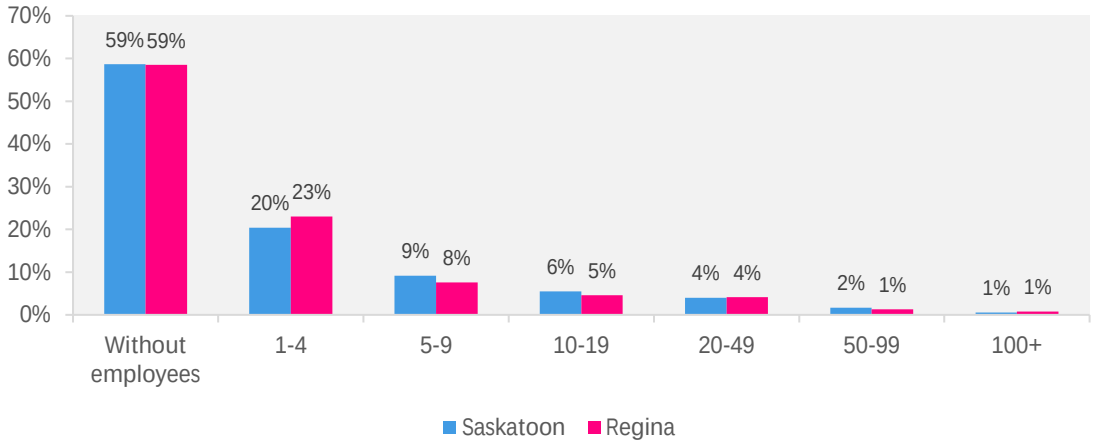
Figure 6: Distribution of Tech Companies by employment size in Regina and Saskatoon



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

On a percentage basis, the distribution is almost identical, except for Regina having a slightly higher concentration of Tech Companies in the 1-4 employee size range, as visualized below.

Figure 7: Distribution of Tech Companies by employment size (% of establishments)



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

Province-wide, 59% of Tech Companies are categorized as being without employees.[14] This compares to 73% in all industries, province-wide. Nordicity performed a review of industries that contribute most to the number of Tech Companies without employees and found them to be most prevalent in the following industries.

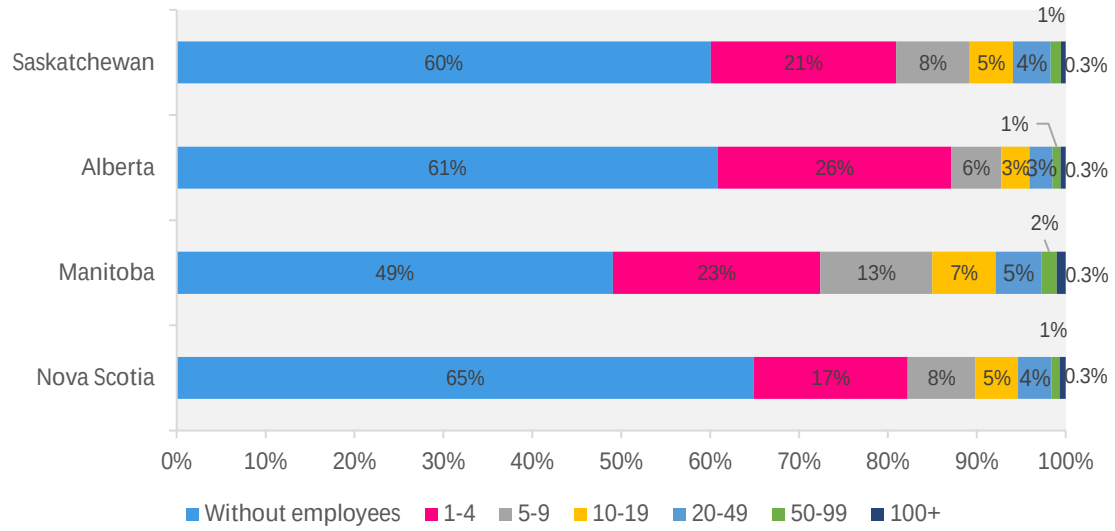
- ***NAICS 5413 – Architectural services*:** This industry group contains a concentration of companies without employees in *NAICS 54133 – Engineering services*. As a profession with strong formal accreditation practices, it is reasonable to expect that this industry would attract a significant number of sole practitioner consultants and contract workers.
- ***NAICS 5415 – Computer systems design and related services*:** This category contains a notable group of establishments without employees in *NAICS 541514 - Computer systems design and related services* (except video game design and development). With a persistent global shortage of experienced software developers, it stands to reason that workers with this skillset might find it advantageous to offer these services on a contract basis.
- ***NAICS 4461 – Health and personal care stores*:** In this category, there is a notable group of companies without employees in *NAICS 446199 – All other health and personal care stores*. This national industry includes businesses such as retailers of prosthetics, disability devices and aids, health appliances, and orthopedic aids. A prevalence of Tech Workers in this industry is consistent with the inclusion of pharmacy and health workers in the STEM occupation list; moreover, note that stores with a significant online presence would likely attract Tech Workers to perform web development.

While other provinces show a similar distribution of Tech Companies by size, Manitoba is estimated to have a lower proportion (49%) of these companies categorized as being without employees than other provinces, which indicates that there are fewer independent contractors.

[14] Companies without employees, as reported in Statistics Canada's Business Register, include all businesses that generated more than $30,000 in revenue. These counts include registered businesses that did not file a T4 and instances in which T1 self-employment revenue reported to the Canada Revenue Agency exceeded $30,000. As such, establishments without employees are understood to represent both contract workers and individual entrepreneurs who earned meaningful income through contract work or a small business. Note that such workers may or may not also hold salaried employment at other companies.

Understood this way, it is important to note that although such companies represent 58% of companies in Saskatchewan, this category likely contributes a relatively small portion of total employment. Assuming, for the sake of illustration, that *all* companies without employees represent one contract worker, and the 42% of companies *with employees* employ an average of 13 employees, companies without employees would account for only ~10% of total Tech Workers.

Figure 8: Distribution of Tech Companies by size, 2018



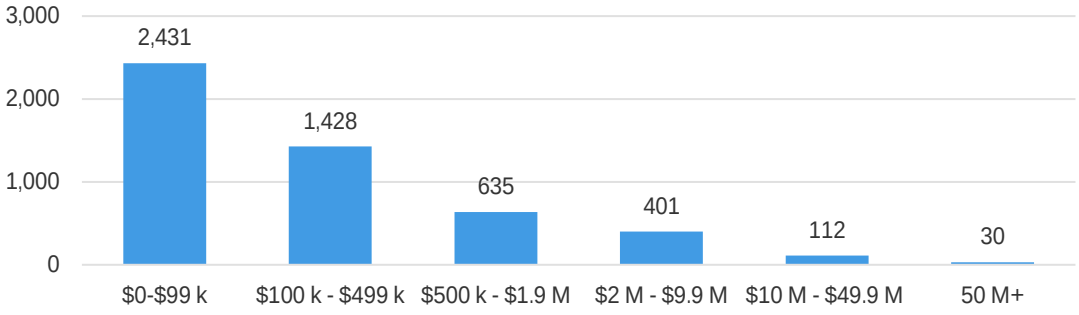
Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

In summary, a significant majority of Saskatchewan's Tech Companies are less than four people, which aligns with national findings highlighted in Section 2 that reveal these companies are much more likely to be smaller than in other sectors. The distribution by size was found to be similar between Regina and Saskatoon.

Breakdown by Revenue

The following chart breaks out the distribution of Tech Companies by revenue bands.[15] About three quarters (77%) of Saskatchewan Tech Companies generated less than $500,000 in revenue in 2018.

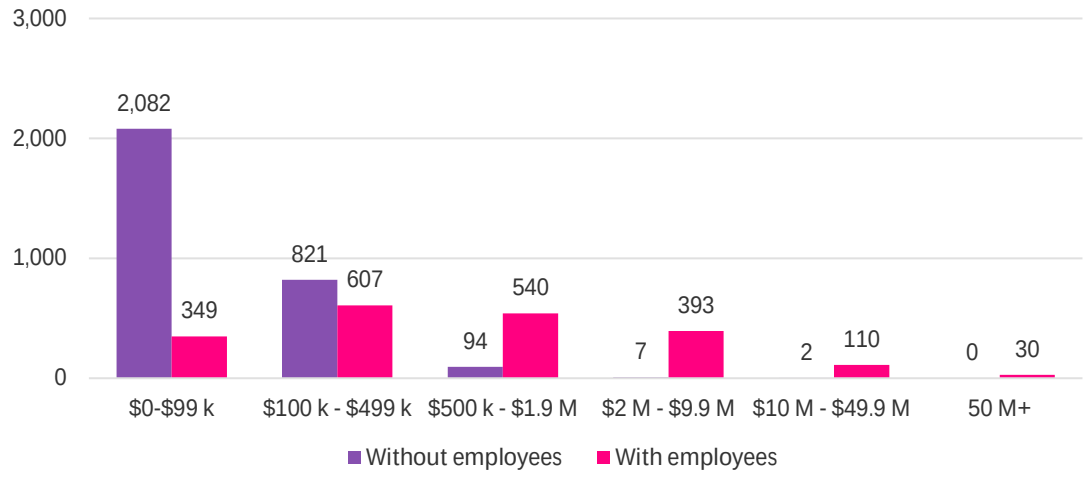
Figure 9: Number of Tech Companies in Saskatchewan in 2018, by revenue band



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

[15] Establishment counts by revenue bands are provided at the level of three-digit NAICS codes at the provincial level. Nordicity performed an analysis to allocate companies based on more granular establishment counts by employment band. This process matched the lowest revenue with the lowest employment companies to allocate tech and non-Tech Companies according to the distribution of tech and non-Tech Companies by employment band within each three-digit NAICS subsector.

Figure 10: Number of Tech Companies in Saskatchewan in 2018, with and without employees

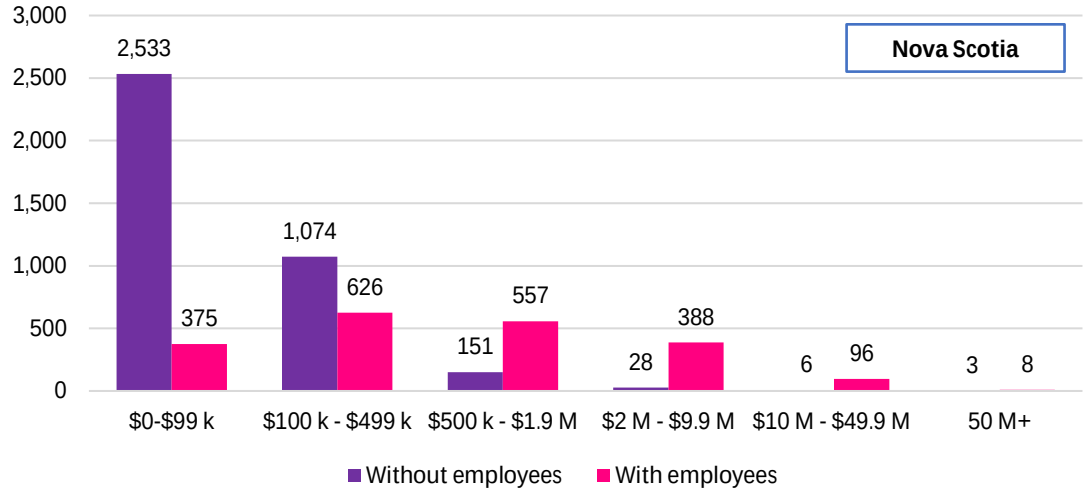


Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

The second chart above breaks out Tech Companies without employees. The relative concentration of companies without employees in low revenue bands (particularly the $0-99 k and $100-499 k bands) supports the preceding analysis asserting that such companies are most likely to be incorporated individual contract workers.

The distribution of Tech Companies is **similar in Nova Scotia**, which shows the same concentration of companies without employees (i.e., which likely represent contract workers), as seen in the figure below.

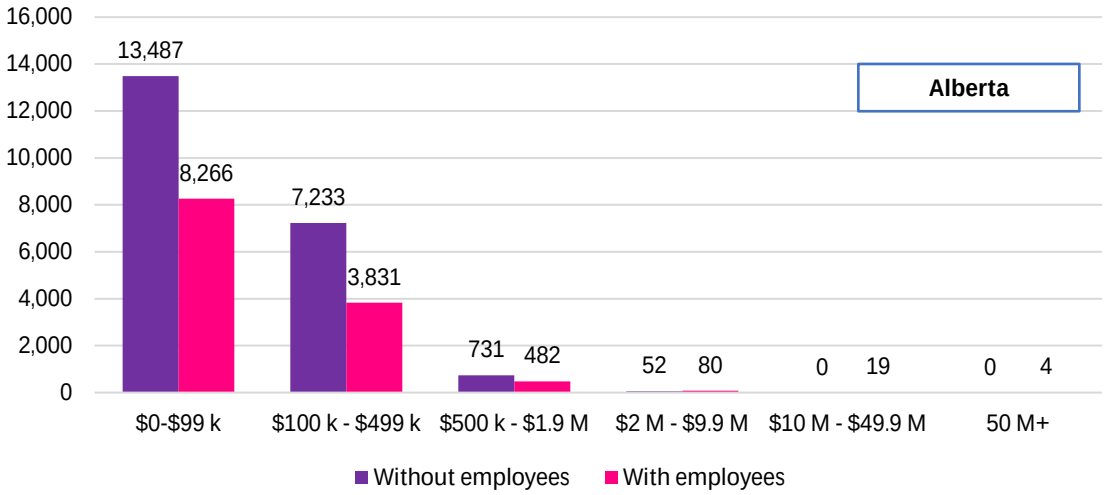
Figure 11: Number of Tech Companies in Nova Scotia in 2018, by revenue band



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

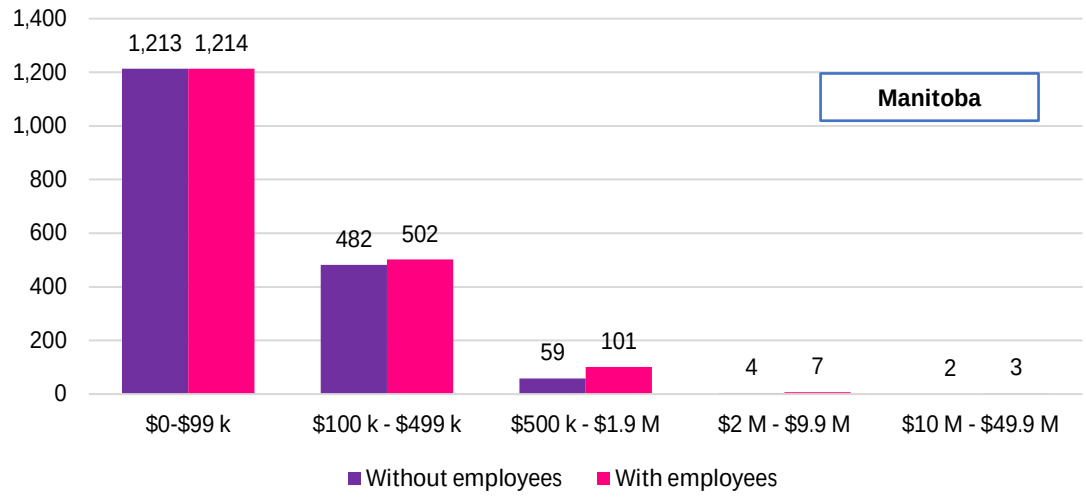
Manitoba and Alberta show more Tech Companies with employment at the lower end of the revenue band, indicating a **higher presence of start-ups** or small companies.

Figure 12: Number of Tech Companies in Alberta in 2018, by revenue band



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

Figure 13: Number of Tech Companies in Manitoba in 2018, by revenue band



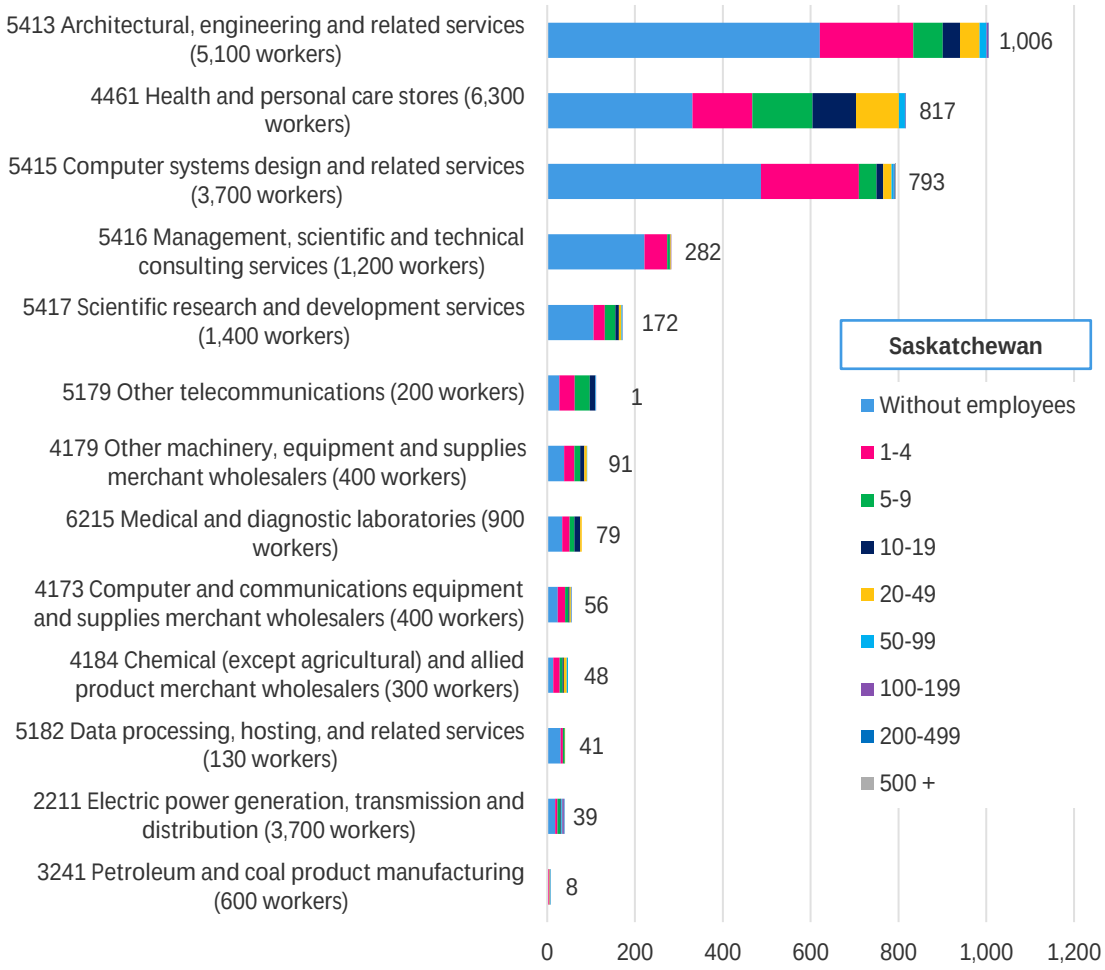
Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Business Register 2018

As illustrated above, 77% of Saskatchewan Tech Companies generated less than $500,000 in revenue in 2018 which also indicated a high proportion of those without employees (likely to be incorporated contract workers). A similar distribution was found in Nova Scotia while Alberta and Manitoba's distribution indicated a likely higher concentration of smaller companies or startups.

Breakdown by Industry Type

The following charts show the top ten industries by establishment count in Saskatchewan, Regina and Saskatoon. To better illustrate the link to employment, the establishment count for each industry is broken out by employment ranges.

Figure 14: Number of Tech Companies, top ten industries in Saskatchewan[16]



[16] The industries illustrated in this chart represent the top ten tech industries by employment. This list was limited to industries that exceeded the tech intensity threshold.

Figure 15: Number of Tech Companies, top ten industries in Regina

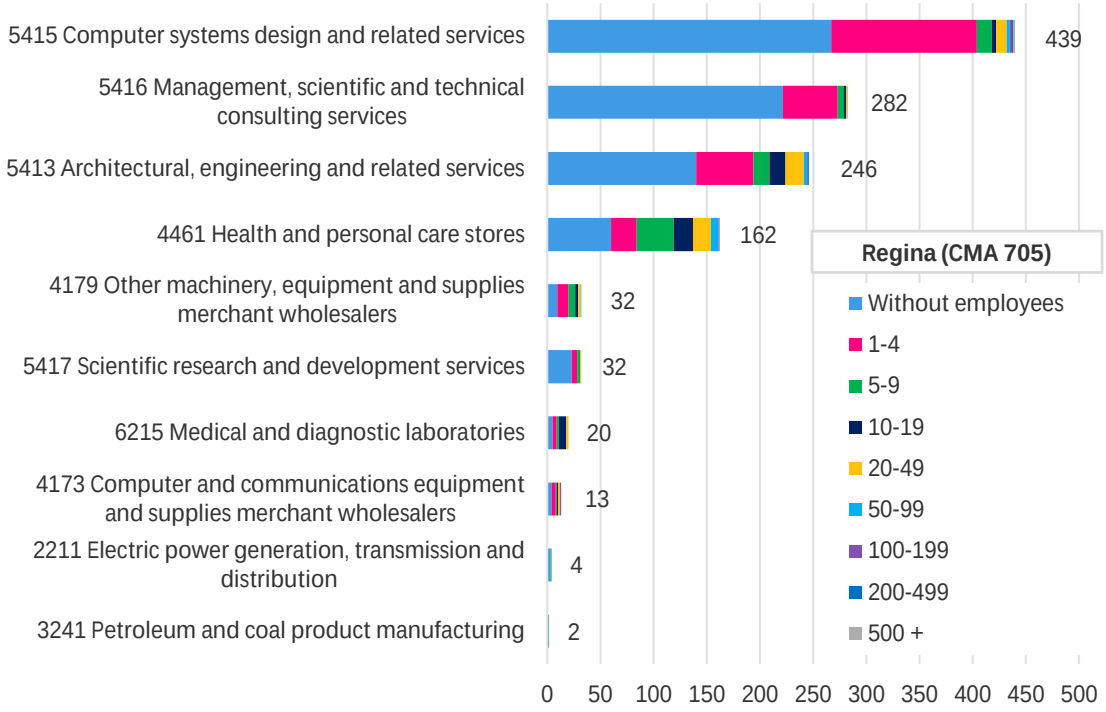
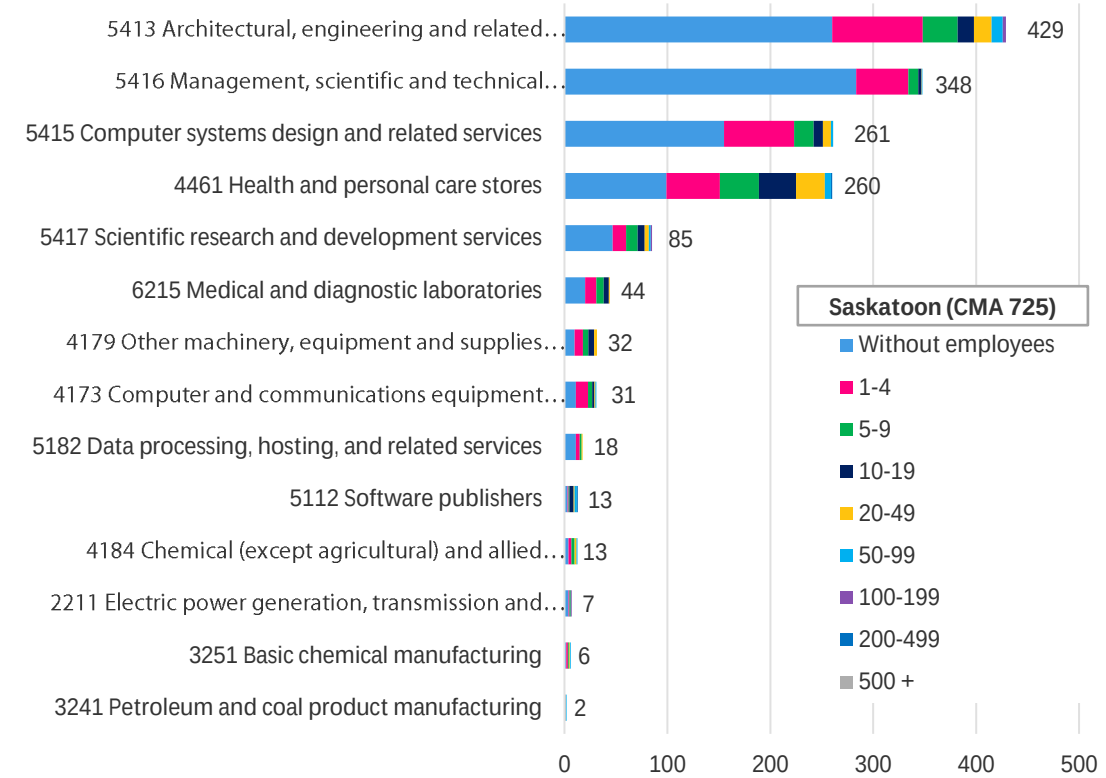


Figure 16: Number of Tech Companies, top ten industries in Saskatoon



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, Business Register 2018

The preceding charts provide several insights into the differences between the characteristics of the Tech Sector in each of Saskatchewan's major urban centres. Interviewees and roundtable participants were fairly unanimous in characterizing the IT industry (referring *to NAICS 5415 – Computer systems design and related services*) in **Regina as dominated by consultancies predominantly servicing government contracts. Saskatoon**, on the other hand, was characterized as hosting Tech Companies focused on **consumer and business markets**. This observation provides a lens through which to interpret some of the differences between the distribution of Tech Companies in each centre.

Several of Saskatchewan's top ten Tech Industries are also in the top ten Tech Industries in Manitoba, Alberta and Nova Scotia, as the table below demonstrates. There is also lower diversification in Alberta, with 85% of Tech Companies belonging to the top three Tech Industries.

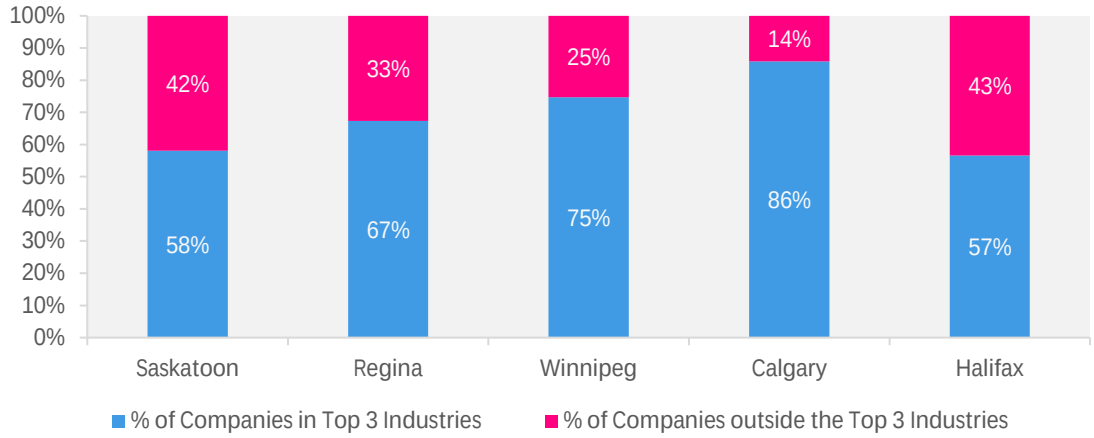
Table 1: Top ten Tech Industries in selected provinces, ranked by establishment counts (industries common to all indicated in green)

Saskatchewan	Manitoba	Alberta	Nova Scotia
Top 3 industries: 53% of Tech Companies	*Top 3 industries: 73% of Tech Companies*	*Top 3 industries:85% of Tech Companies*	*Top 3 industries: 53% of Tech Companies*
5413 Architectural, engineering and related services	5415 Computer systems design and related services	5413 Architectural, engineering and related services	5416 Management, scientific and technical consulting services
4461 Health and personal care stores	4461 Health and personal care stores	5415 Computer systems design and related services	5413 Architectural, engineering and related services
5415 Computer systems design and related services	5413 Architectural, engineering and related services	4461 Health and personal care stores	5419 Other professional, scientific and technical services
5416 Management, scientific and technical consulting services	5417 Scientific research and development services	8112 Electronic and precision equipment repair and maintenance	5511 Management of companies and enterprises
5417 Scientific research and development services	6215 Medical and diagnostic laboratories	5417 Scientific research and development services	5415 Computer systems design and related services
5179 Other telecommunications	5179 Other telecommunications	5179 Other telecommunications	4461 Health and personal care stores
4179 Other machinery, equipment and supplies merchant wholesalers	8112 Electronic and precision equipment repair and maintenance	6215 Medical and diagnostic laboratories	5417 Scientific research and development services
6215 Medical and diagnostic laboratories	6219 Other ambulatory health care services	4173 Computer and communications equipment and supplies merchant wholesalers	5179 Other telecommunications
4173 Computer and communications equipment and supplies merchant wholesalers	4173 Computer and communications equipment and supplies merchant wholesalers	2211 Electric power generation, transmission and distribution	4173 Computer and communications equipment and supplies merchant wholesalers
4184 Chemical	5112 Software publishers	5182 Data processing, hosting, and related services	5269 Other funds and financial vehicles

Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, Business Register 2018

The most visible difference between the Regina and Saskatoon's concentration in the figure below is the overall diversity of the Tech Industries in which Tech Companies are clustered. In Regina, the top three Tech Industries[17] account for 67% of total establishments, whereas the top three Tech Industries in Saskatoon[18] account for only 42% of establishments. Moreover, Saskatoon is less concentrated than other comparable Census Metropolitan Areas (CMA), particularly Calgary in which the top three industries account for 86% of all establishments.

Figure 17: Concentration of Tech Companies from the top three industries by company count, by CMA



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, Business Register 2018

The top three industries in Saskatoon, Regina and other CMAs are largely the same, except for *5416 Management, scientific and technical consulting services*, which does not appear in the top three for Winnipeg and Calgary.

[17] Specifically, the top three Tech Industries in Regina, by establishment count, are: *NAICS 5415 – Computer systems design and related services*; *NAICS 5413 – Architectural, Engineering and related services*; *and NAICS 4461 – Health and personal care stores*, as illustrated in the preceding chart.

[18] Specifically, the top three Tech Industries in Regina, by establishment count, are: *NAICS 5413 – Architectural, Engineering and related services*, *NAICS 5416 – Management, scientific and technical consulting services*, and *NAICS 5415 – Computer systems design and related services*, as illustrated in the preceding chart.

Table 2: The top three Tech Industries in Saskatoon, Regina and comparable CMAs (% of establishments shown in brackets)

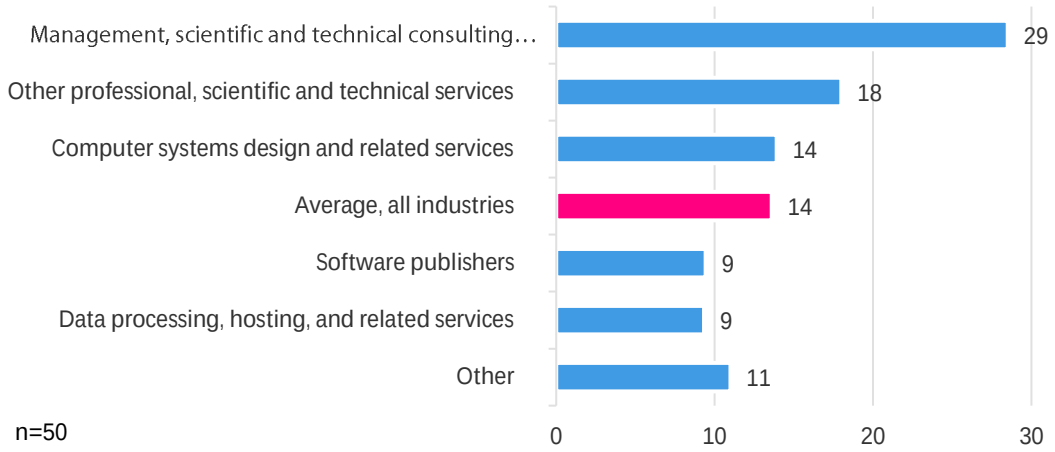
Saskatoon	Regina	Winnipeg	Calgary	Halifax
5413 Architectural, engineering and related services (24%)	5415 Computer systems design and related services (31%)	5415 Computer systems design and related services (30%)	5413 Architectural, engineering and related services (48%)	5416 Management, scientific and technical consulting services (23%)
5416 Management, scientific and technical consulting services (19%)	5416 Management, scientific and technical consulting services (20%)	5413 Architectural, engineering and related services (24%)	5415 Computer systems design and related services (32%)	5413 Architectural, engineering and related services (18%)
5415 Computer systems design and related services (15%)	5413 Architectural, engineering and related services (17%)	4461 Health and personal care stores (21%)	4461 Health and personal care stores (6%)	5415 Computer systems design and related services (16%)

Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, Business Register 2018

Regina and Saskatoon are very similar in terms of the proportion of small Tech Companies which fit the typology of independent consultants/contract workers (i.e., companies without employees and in the 1-4 employee bracket).

Nordicity's survey indicates that the average Saskatchewan Tech Company has been established for 14 years. This average measure of maturity widely varies from one industry to another: tech consultancies reported an average of nearly three decades of experience, while software publishers average nine years. Anecdotally, it was noted by stakeholders that there was a 'first wave' of Tech Companies that have been working in Saskatchewan for a couple of decades. It was also noted by some that this older cohort of companies were spurred alongside the activity generated by the introduction of the Saskatchewan Film Employment Tax Credit in 1998.

Figure 18: Average years of operation, by Tech Industry

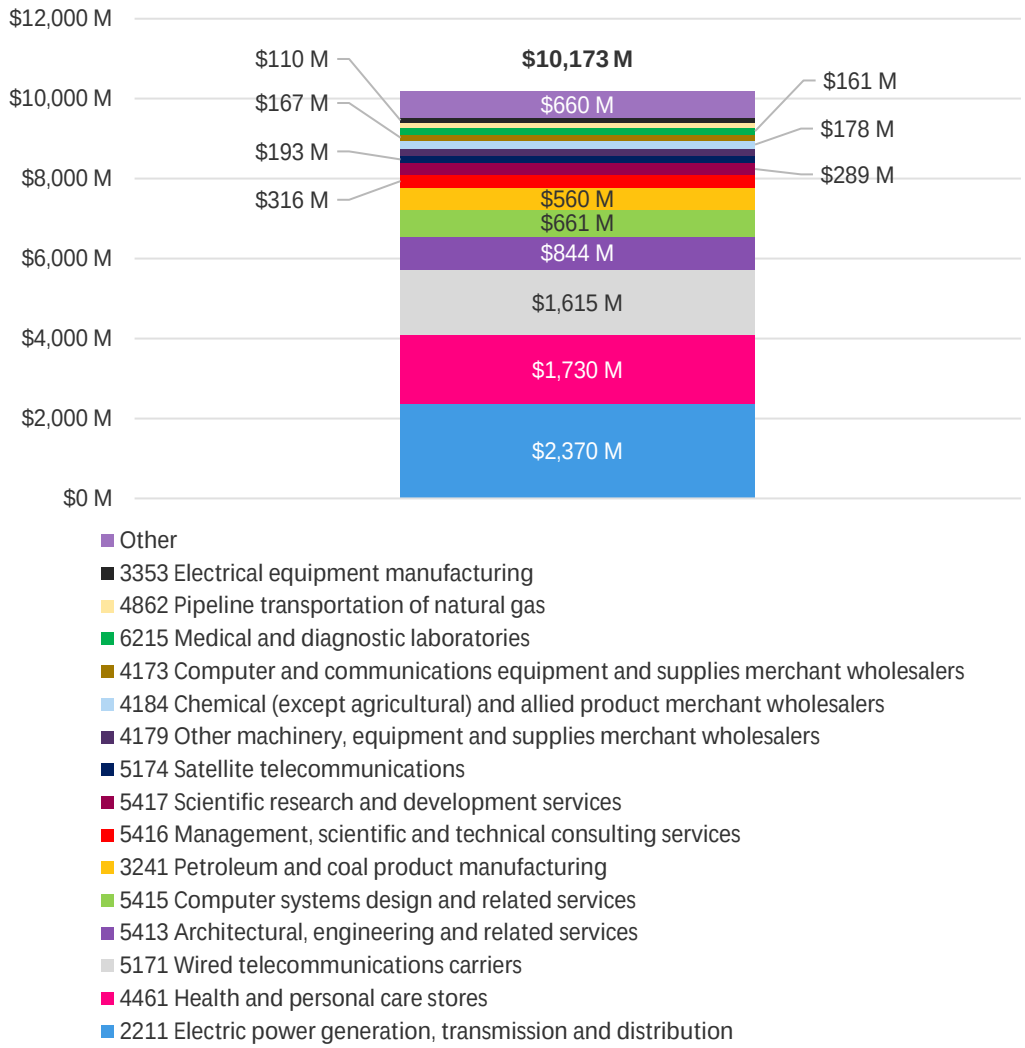


Source: Saskatchewan Tech Sector Industry Survey 2019

Note: This chart shows industries for which the sample was n≥4. Other industries were consolidated in the "Other" category.

In 2018, Nordicity estimates that the Saskatchewan Tech Sector generated $10,173 million in revenue, about one quarter of which was contributed by electric power generation, transmission and distribution. The top three industries accounted for half of the revenue generated by the entire Saskatchewan Tech Sector.

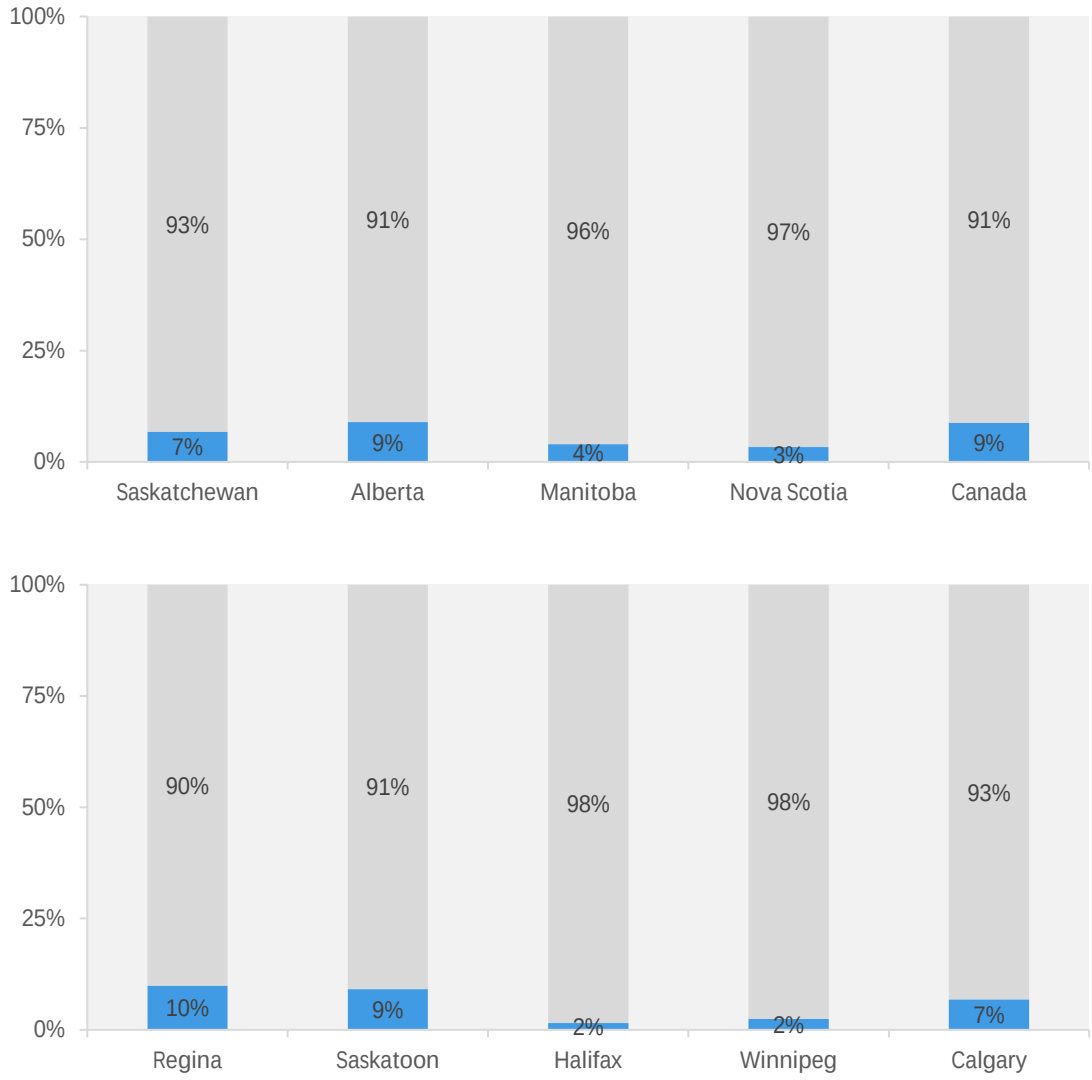
Figure 19: Total Tech Sector revenue, by industry, 2018



Source: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports
Note: Broken out figures may not sum to totals exactly due to rounding.

The following charts compare tech intensities per capita in Saskatchewan and its cities, comparable provinces and Canada overall. The proportion of Tech Workers among the overall working population is lower in Saskatchewan (7%) than the national level (9%).

Figure 20: Tech intensity per capita



Source: Nordicity analysis; Statistics Canada, Census of Population 2016

The figure above indicates that Regina and Saskatoon, however, have a higher concentration of Tech Workers in their workforces, with intensities of 10% and 9% respectively, which is higher than other comparable cities.

To summarize, stakeholder insights were corroborated by statistical findings that Regina's tech sector is made of up consultancies predominantly servicing government contracts while Saskatoon hosts companies focused on consumer and business markets. The average age of Saskatchewan Tech Companies is 14 years, though this varies widely by industry type.

3.3 Employment in Saskatchewan's Tech Sector

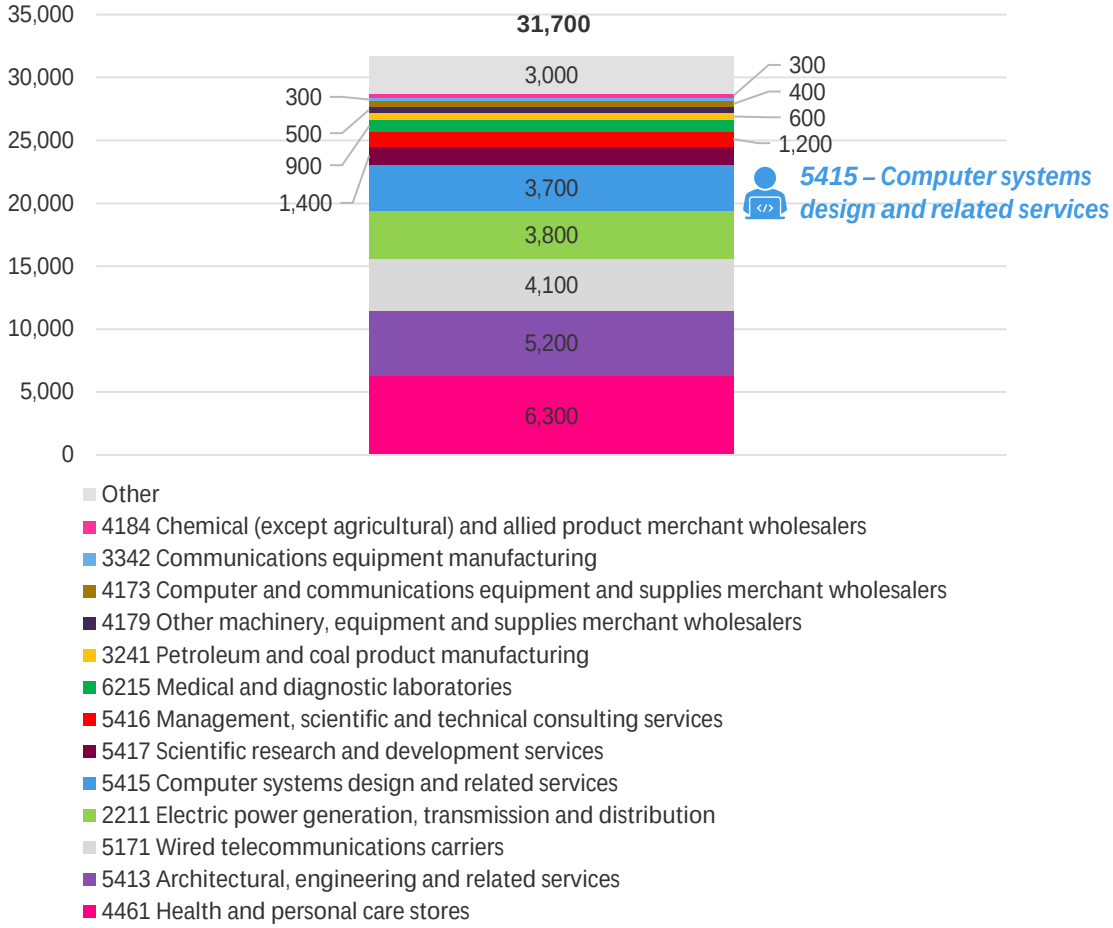
This subsection provides an overview of **employment and compensation from the perspective of companies**. Section 4 provides more detailed information about Tech Worker demographics and migration.

In 2018, Nordicity estimates that Tech Sector in Saskatchewan **employed 52,300 workers,** including **31,700 workers at Tech Companies** and an additional **20,700 Tech Workers in Non-tech Industries**. The largest Tech Industry by employment, *NAICS 4461 - Health and personal care stores*, employed 20% of the total. The **three largest Tech Industries** (*NAICS 4461, 5413 and 5171*) **account for half of the Saskatchewan Tech Workforce**.

Methodological Note

The principal source of data underlying worker information is Statistics Canada's *2016 Census of Population*. The census provides detailed data relating to 2015, which was adjusted to reflect overall changes in employment and earnings in the period from 2015 to 2018. Adjustments were made at the most granular level for which industry-specific data was available in both 2015 and 2018 in Statistics Canada's *Labour Force Survey (LFS)* and the *Survey of Employment, Payrolls and Hours (SEPH)*. See **Appendix A** for a detailed description of the methodology used.

Figure 21: Number of workers by Tech Industry, 2018



Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours
Note: Broken out figures may not sum to totals exactly due to rounding.

As indicated in the table below, several of the industries employing the highest number of Tech Workers are common to Alberta, Manitoba and Nova Scotia, as seen in the table below.

Table 3: Top 15 industries by number of Tech Workers in each province, 2018 (industries in common with Saskatchewan indicated in green, tech industries indicated in bold)

Saskatchewan	Manitoba	Alberta	Nova Scotia
4461 Health and personal care stores	**5415 Computer systems design and related services**	**5413 Architectural, engineering and related services**	**5415 Computer systems design and related services**
5413 Architectural, engineering and related services	6220 Hospitals (6221 to 6223)	**5415 Computer systems design and related services**	6220 Hospitals (6221 to 6223)
5171 Wired telecommunications carriers	**5413 Architectural, engineering and related services**	2111 Oil and gas extraction	**4461 Health and personal care stores**
2211 Electric power generation, transmission and distribution	**4461 Health and personal care stores**	6220 Hospitals (6221 to 6223)	**5413 Architectural, engineering and related services**
5415 Computer systems design and related services	**5171 Wired telecommunications carriers**	**4461 Health and personal care stores**	9111 Defense services
5417 Scientific research and development services	**2211 Electric power generation, transmission and distribution**	2131 Support activities for mining and oil and gas extraction	**5171 Wired telecommunications carriers**
5416 Management, scientific and technical consulting services	9120 Provincial and territorial public administration (9121 to 9129)	**5171 Wired telecommunications carriers**	9120 Provincial and territorial public administration (9121 to 9129)
6215 Medical and diagnostic laboratories	**6215 Medical and diagnostic laboratories**	5416 Management, scientific and technical consulting services	6113 Universities
3241 Petroleum and coal product manufacturing	5241 Insurance carriers	9130 Local, municipal and regional public administration (9131 to 9139)	**5416 Management, scientific and technical consulting services**
4173 Computer and communications equipment and supplies merchant wholesalers	**3364 Aerospace product and parts manufacturing**	**2211 Electric power generation, transmission and distribution**	2211 Electric power generation, transmission and distribution
4179 Other machinery, equipment and supplies merchant wholesalers	9130 Local, municipal and regional public administration (9131 to 9139)	9120 Provincial and territorial public administration (9121 to 9129)	**5419 Other professional, scientific and technical services**
3342 Communications equipment manufacturing	6111 Elementary and secondary schools	6211 Offices of physicians	2382 Building equipment contractors
4184 Chemical (except agricultural) and allied product merchant wholesalers	5416 Management, scientific and technical consulting services	6113 Universities	**6215 Medical and diagnostic laboratories**
8112 Electronic and precision equipment repair and maintenance	2382 Building equipment contractors	**6215 Medical and diagnostic laboratories**	**5417 Scientific research and development services**
5419 Other professional, scientific and technical services	5419 Other professional, scientific and technical services	2382 Building equipment contractors	5614 Business support services

Sources: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

Additionally, Saskatchewan appears to be unique among its peers in that 12 out of its top 15 industries employing Tech Workers are Tech Industries (indicated in bold), which is **more than any of the comparable provinces.** Moreover, Tech Workers in Saskatchewan appear to be more concentrated compared to other provinces, with **the top five industries employing almost three-quarters (73%) of Tech Workers**, as seen in the table below.

Table 4: Number of Tech Workers in Saskatchewan compared with other provinces, 2018

	Total number of Tech Workers	% of Tech Workers in top 5 industries	Tech Intensity
Saskatchewan	35,300	73%	7%
Manitoba	42,300	34%	4%
Alberta	183,900	38%	9%
Nova Scotia	34,600	44%	3%

Sources: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

Manitoba and Alberta appear to have a more distributed tech workforce with the top five industries employing 34% and 38% of the tech workforce respectively. Alberta has the largest tech workforce in absolute figures, as well as in terms of proportion of Tech Workers (9%) in the workforce. Like Alberta, **almost half (46%) of Saskatchewan's tech industries workforce is Tech Workers**. It can be inferred that **Saskatchewan's Tech Industries are more directly involved in technology** and employ fewer workers in non-tech positions such as marketing and administration, compared to Manitoba and Nova Scotia.

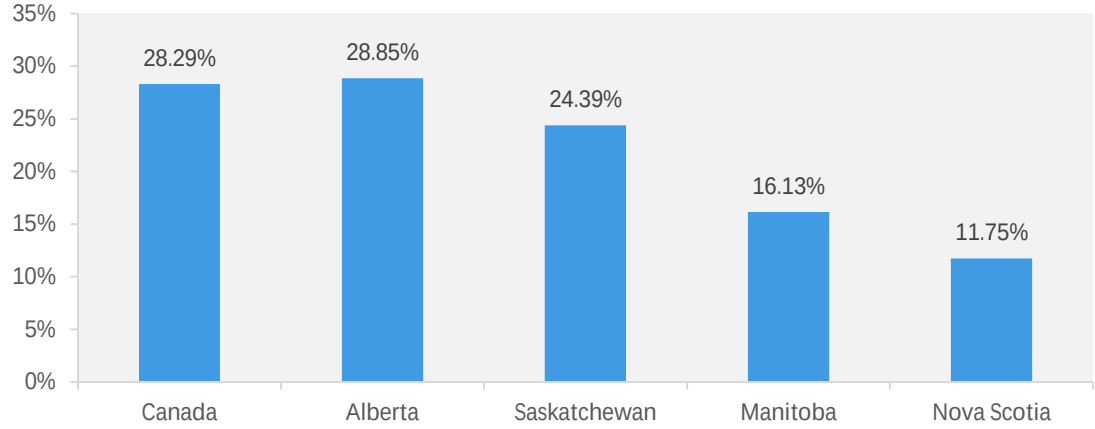
Table 5: Tech Sector breakdown of Saskatchewan compared with other provinces, 2018

	Tech Industries			Non-tech Industries
Province	Tech Workers	Non-Tech Workers	Tech Workers as % of workers in Tech Industries	Tech Workers
Saskatchewan	14,700	17,000	46%	20,700
Manitoba	18,300	51,900	26%	24,100
Alberta	76,800	82,300	48%	107,100
Nova Scotia	16,700	49,700	25%	17,900

Sources: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

The **tech intensity threshold for Saskatchewan as estimated by Nordicity is 24.39%**. This figure is indicative of the relative tech focus of the provincial economy and workforce. Specifically, this metric sets the level of tech employment required for industries to qualify as Tech Industries within each province.

Figure 22: Tech intensity threshold for Saskatchewan, Canada and comparable provinces



Sources: Statistics Canada, Census of Population 2016

While Saskatchewan's economy is not as tech focused as Alberta's or the country's, it does have a notably higher tech focus than its provincial peers, Manitoba and Nova Scotia.

The figure below presents the industries that saw a change of at least ± 15 individual Tech Workers over the 2015-2018 period in Saskatchewan. *NAICS 4461 – Health and personal care stores and NAICS 5415 – Computer systems design*, two of the largest Tech Industries, also experienced the largest nominal growth, **adding a combined 1,600 workers to their headcount**.

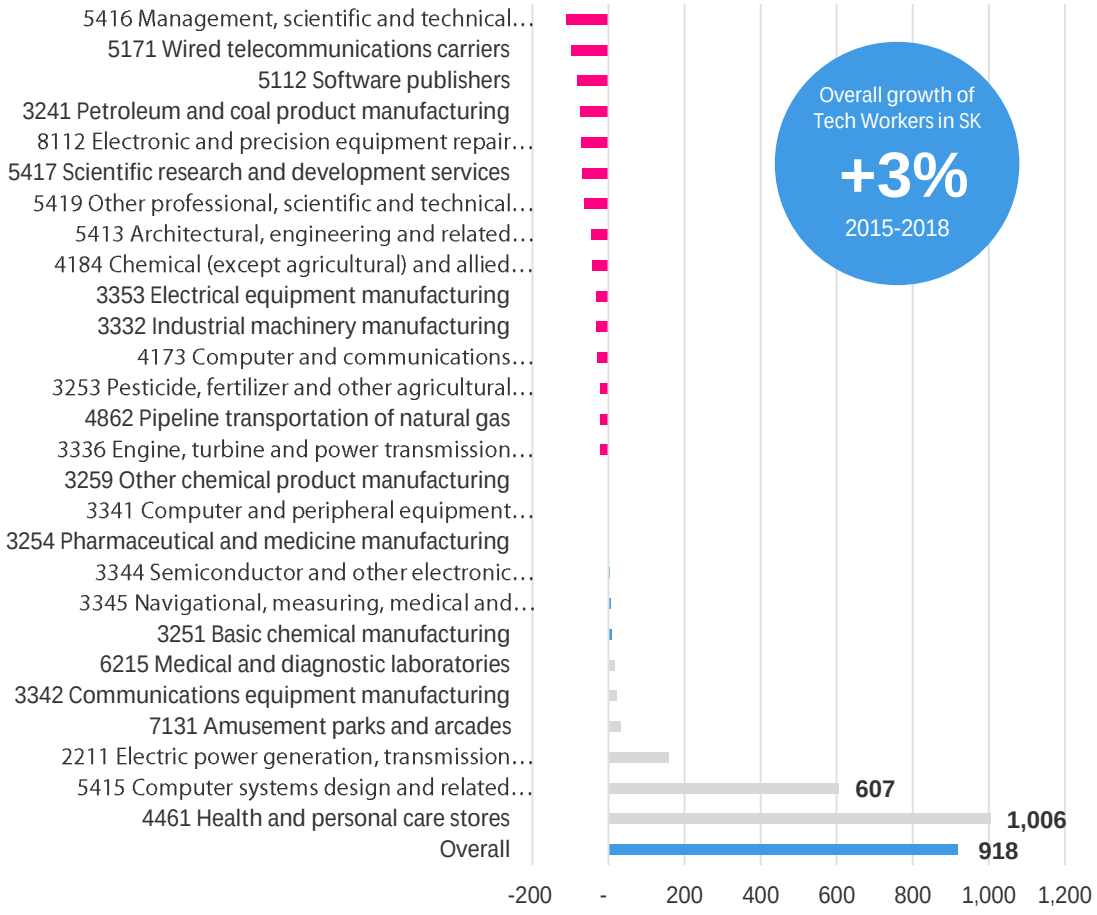
Figure 23: Increase in Tech Workers in Industries from 2015-2018

+19.0% (1,006 jobs)
Health and personal care stores

+19.4% (607 jobs)
Computer systems design and related services

Overall, the Saskatchewan Tech Sector gained a net 900 employees, a 3% growth from 2015.

Figure 24: Employment growth over the 2015-2018 period, by industry



Sources: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

As indicated in the table below, the growth industries for Tech Workers in Saskatchewan differ from the other provinces, with only two industries common (health and computer systems design) across comparable jurisdictions.

Table 6: Top ten industries (all industries) by employment growth over the 2015-2018 period (industries in common indicated in green)

Saskatchewan	Manitoba	Alberta	Nova Scotia
4461 Health and personal care stores	5415 Computer systems design and related services	5171 Wired telecommunications carriers	5415 Computer systems design and related services
5415 Computer systems design and related services	5171 Wired telecommunications carriers	4461 Health and personal care stores	4461 Health and personal care stores
2211 Electric power generation, transmission and distribution	4461 Health and personal care stores	5415 Computer systems design and related services	6220 Hospitals (6221 to 6223)
7131 Amusement parks and arcades	5413 Architectural, engineering and related services	6113 Universities	2373 Highway, street and bridge construction
3342 Communications equipment manufacturing	5419 Other professional, scientific and technical services	6220 Hospitals (6221 to 6223)	5419 Other professional, scientific and technical services
6215 Medical and diagnostic laboratories	6220 Hospitals (6221 to 6223)	6213 Offices of other health practitioners	9111 Defense services
3251 Basic chemical manufacturing	5614 Business support services	4861 Pipeline transportation of crude oil	3366 Ship and boat building
3345 Navigational, measuring, medical and control instruments manufacturing	6241 Individual and family services	5616 Investigation and security services	6215 Medical and diagnostic laboratories
3344 Semiconductor and other electronic component manufacturing	4172 Construction, forestry, mining, and industrial machinery, equipment and supplies merchant wholesalers	4862 Pipeline transportation of natural gas	6113 Universities
3254 Pharmaceutical and medicine manufacturing	2122 Metal ore mining	2211 Electric power generation, transmission and distribution	5417 Scientific research and development services

Sources: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

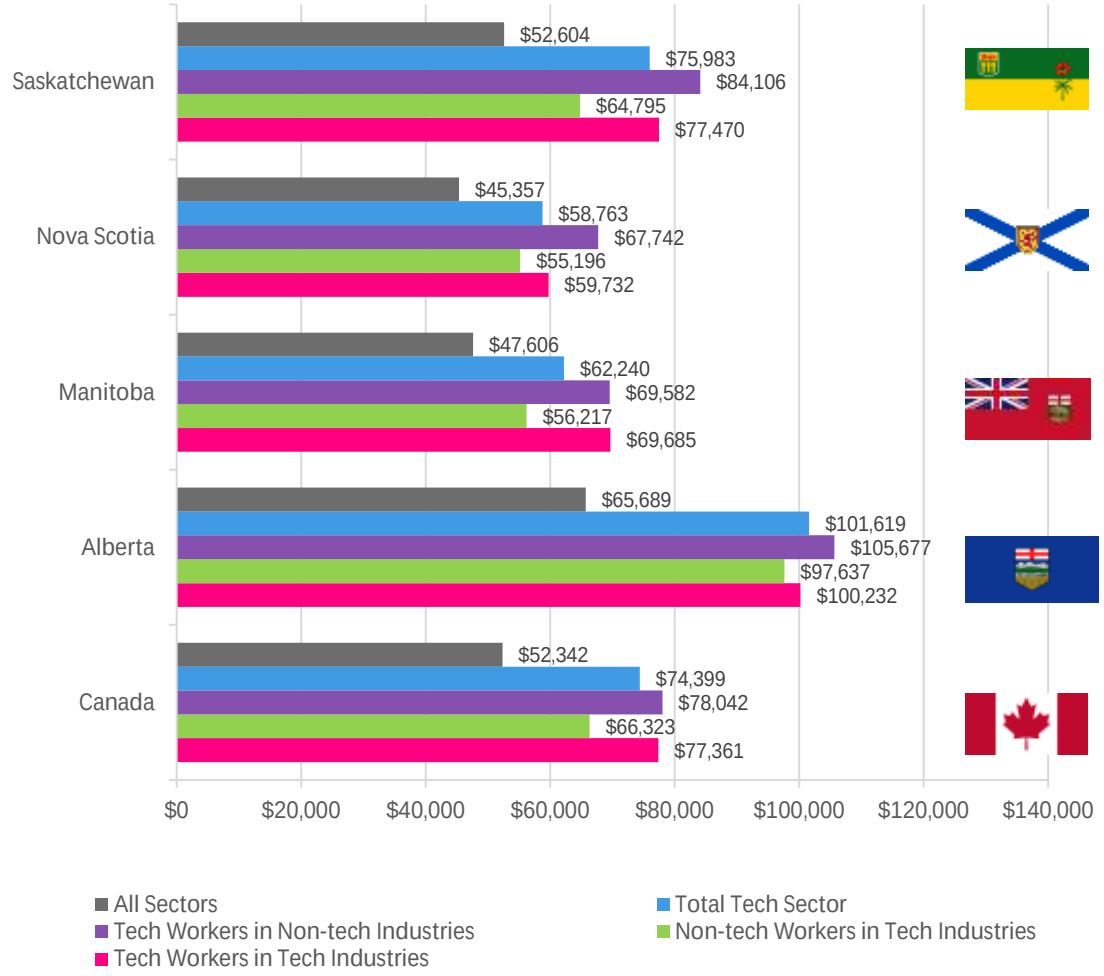
As seen in the preceding table, the number of Tech Workers grew in a range of industries, from *7131 Amusement parks and arcades* in Saskatchewan to *5616 Investigation and security services* in Alberta and *3366 Ship and boat building* in Nova Scotia.

As shown in Figure 25, Tech Workers – in Saskatchewan or Canada – **earn about 43% more than the average employment income for all workers in the province**. One notable divergence between Saskatchewan and national figures is that Tech Workers in non-tech industries earn more in Saskatchewan; this finding could be explained by the prevalence of union jobs at large crown corporations, a major source of employment outside of the Tech Industries for Saskatchewan Tech Workers.

Average employment income in Saskatchewan Tech Sector

Alternatively, Saskatchewan's relatively small population means that there is a smaller pool of specialized workers to hire from, so companies looking for very specific skill sets may find it more difficult to find qualified applicants locally.

Figure 25: Average employment income, by category, 2018



Sources: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

Despite minor differences, Saskatchewan Tech Workers are largely compensated in line with national averages. It is important to note, however, that the **tech labour market is far from uniform**. For example, *NOC 2173 – Software engineers and designers* earned an average of $90,754 per year in Canada in 2015, whereas the same occupation earned an average of $68,738 per year in Saskatchewan.

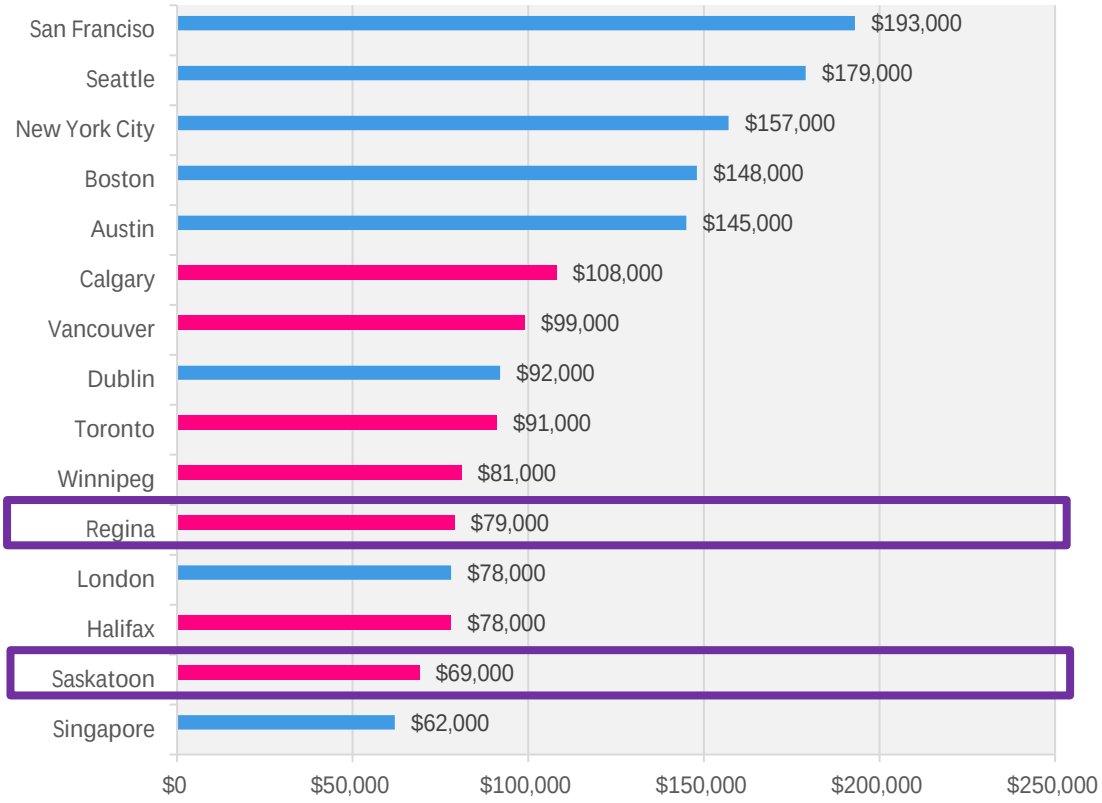
As visualized in the figure above, Tech Sector workers in Alberta earn on average $101,619 in employment income, which is 55% higher than the average for all sectors. Nova Scotia has the smallest Tech Sector premium, with workers in the sector earning 30% over the provincial average. Across all jurisdictions, Tech Sector average incomes are higher than the overall average for all sectors.

The difference in pay level at the occupational level (such as that noted for software engineers) may represent a competitive advantage for Saskatchewan Tech Companies that are more reliant on specific occupations. For example, it was noted by more than one stakeholder that it is possible to hire multiple developers in Saskatchewan for the price of one developer in Silicon Valley. However, from the perspective of workers in those occupations, their lower earning potential in Saskatchewan may exacerbate Saskatchewan Tech Companies' oft cited concerns about the difficulty of attracting experienced talent in the province.

A comparison[19] of wages earned by Tech Workers in Tech hubs around the world is provided in Figure 26 below. As visualized, **Calgary and Vancouver have higher average wages** for software engineers than other cities in Canada (Canadian cities are shown in fuchsia). While San Francisco and Seattle have the highest average wage, workers in these cities incur a much higher cost of living compared to those in Saskatchewan.

[19] Average annual wage data has been adjusted by inflation where data for 2018 was unavailable. The chosen occupation for each jurisdiction (apart from Canada) was one that closely resembled Canadian *NOC 2173 - Software Engineers and Designers*. Annual expenses were estimated as the sum of average rent for a one-bedroom apartment in city centre and average expenses for a single-person household.

Figure 26: Average annual wage (CAD) earned by software engineers in cities across the world (Canadian cities indicated in pink), 2018

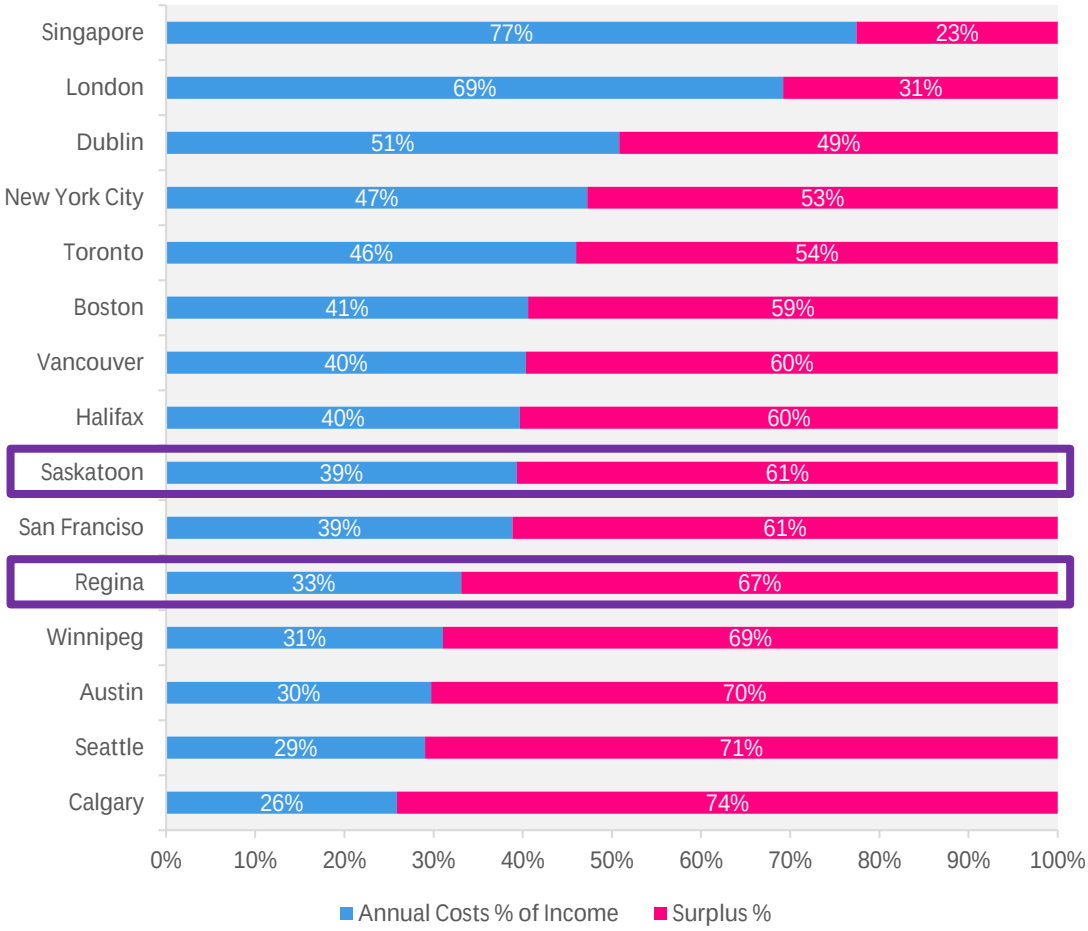


Sources: Statistics Canada, Census of Population 2016 for Canadian cities; IIA11: Median Earned Income by County, Detailed Occupational Group and Year, Central Statistics Office (Ireland); May 2018 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates, U.S. Bureau of Labor Statistics; Earnings and hours worked, region by occupation by four-digit SOC: ASHE Table 15, Office for National Statistics (United Kingdom);Median Monthly Basic And Gross Wages Of Selected Occupations Within Each Major Occupational Group By Industry, June 2018, Ministry of Manpower (Singapore)

Figure 27 below illustrates the cost of living in terms of annual expenses and surplus income[20] is visualized in the figure below. While the average wage for **software engineers in Saskatoon is 36% of that in San Francisco, workers have a similar proportion of income left over at the end of the year**. As a software engineer, it is cheaper (lower costs as a percentage of income) to live in Regina and Saskatoon than in Dublin and London. Within Canada too, a higher cost of living leaves less money in workers' pockets despite higher wages. For example, Tech Workers in Toronto earn 16% higher wages than those in Regina, but on average have $4,000 less surplus at the end of the year compared to workers in Regina.

[20] Surplus income is calculated as annual wages less annual expenses including rent.

Figure 27: Annual expenses and surplus income as a percentage of annual wages earned by software engineers in cities across the world, 2018



Sources: Statistics Canada, Census of Population 2016 for Canadian cities; IIA11: Median Earned Income by County, Detailed Occupational Group and Year, Central Statistics Office (Ireland); May 2018 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates, U.S. Bureau of Labor Statistics; Earnings and hours worked, region by occupation by four-digit SOC: ASHE Table 15, Office for National Statistics (United Kingdom);Median Monthly Basic And Gross Wages Of Selected Occupations Within Each Major Occupational Group By Industry, June 2018, Ministry of Manpower (Singapore); numbeo.com for cost of living data.

As tabulated below, the average wages for software engineers are higher in Winnipeg and Calgary than in Regina and Saskatoon, allowing Tech Workers in those cities to have more surplus income. This data supports insights collected from Saskatchewan Tech Companies who noted through stakeholder engagement on numerous occasions that salaries are far lower in the province (detailed further in Section 4).

Nordicity

Table 7: Cost of living and wages earned in Tech Hubs around the world (sorted by Annual Costs as % of Wages)

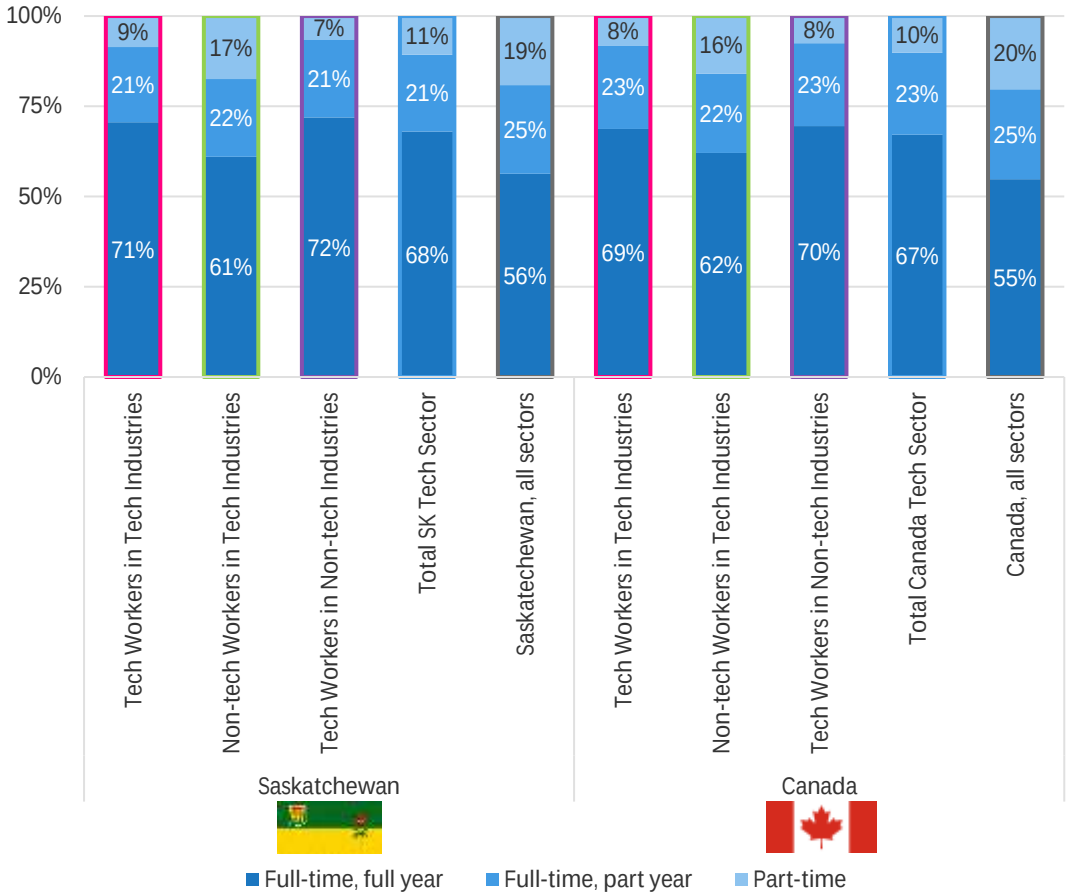
Country	City	Cost of Living Index	Average Annual Costs (CAD)	Average Annual Wage (CAD)	Annual Costs as % of Wages
Canada	**Calgary**	64.91	$28,000	$108,000	26%
United States	**Seattle**	83.87	$52,000	$179,000	29%
United States	**Austin**	66.81	$43,000	$145,000	30%
Canada	**Winnipeg**	60.44	$25,000	$81,000	31%
Canada	**Regina**	64.46	$26,000	$79,000	33%
United States	**San Francisco**	87.8	$75,000	$193,000	39%
Canada	**Saskatoon**	63.88	$27,000	$69,000	39%
Canada	**Halifax**	67.86	$31,000	$78,000	40%
Canada	**Vancouver**	69.71	$40,000	$99,000	40%
United States	**Boston**	82.34	$60,000	$148,000	41%
Canada	**Toronto**	74.01	$42,000	$91,000	46%
United States	**New York City**	100	$74,000	$157,000	47%
Ireland	**Dublin**	76.2	$47,000	$92,000	51%
United Kingdom	**London**	78.65	$54,000	$78,000	69%
Singapore	**Singapore**	78.04	$48,000	$62,000	77%

Sources: Statistics Canada, Census of Population 2016 for Canadian cities; IIA11: Median Earned Income by County, Detailed Occupational Group and Year, Central Statistics Office (Ireland); May 2018 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates, U.S. Bureau of Labor Statistics; Earnings and hours worked, region by occupation by four-digit SOC: ASHE Table 15, Office for National Statistics (United Kingdom);Median Monthly Basic And Gross Wages Of Selected Occupations Within Each Major Occupational Group By Industry, June 2018, Ministry of Manpower (Singapore); numbeo.com for cost of living data

Figure 28 below shows the **distribution of employees in each segment**, by mode of work. This analysis reveals similar profiles between Saskatchewan Tech Workers and the national distribution. In the Tech Sector, more than two thirds of employees were full-time employees during the entire year in 2018. Less than 10% of Tech Workers employed in Tech Industries held a part-time position.

Note, non-Tech Workers' mode of work more closely resembles that of all sectors – that is, this observation suggests that the occupational characteristics of Tech Workers are distinct from non-tech occupations, even within Tech Companies. In other words, **Tech Occupations appear to most commonly befit full-time employment.**

Figure 28: Mode of work, by category, 2018

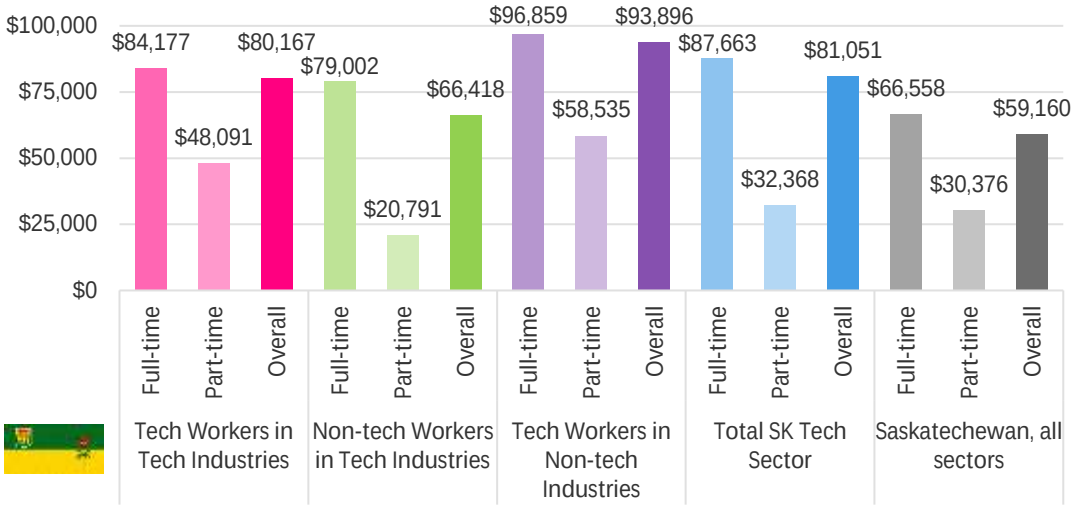


Source: Statistics Canada, Census of Population 2016
Note: Broken out figures may not sum to totals exactly due to rounding.

Figure 29 breaks out workers' total income (from all sources) by mode of work. Paralleling the overall higher employment income found in Saskatchewan's Tech Sector, the gross income of workers in the Saskatchewan Tech Sector lies slightly above national Tech Sector average (+2.4%), and well above the overall national average (+37%).

Part-time Tech Workers in Saskatchewan (in both non-tech and Tech Companies) **earn more than any other segment of part-time workers** as illustrated in the following charts, earning at least $48k a year. More broadly, part-time workers in the Saskatchewan Tech Sector earn slightly less than the national average, largely due to the contribution of lower income of non-Tech Workers employed in the Tech Industries in Saskatchewan.

Figure 29: Total income, by mode of work and category, 2018[21]



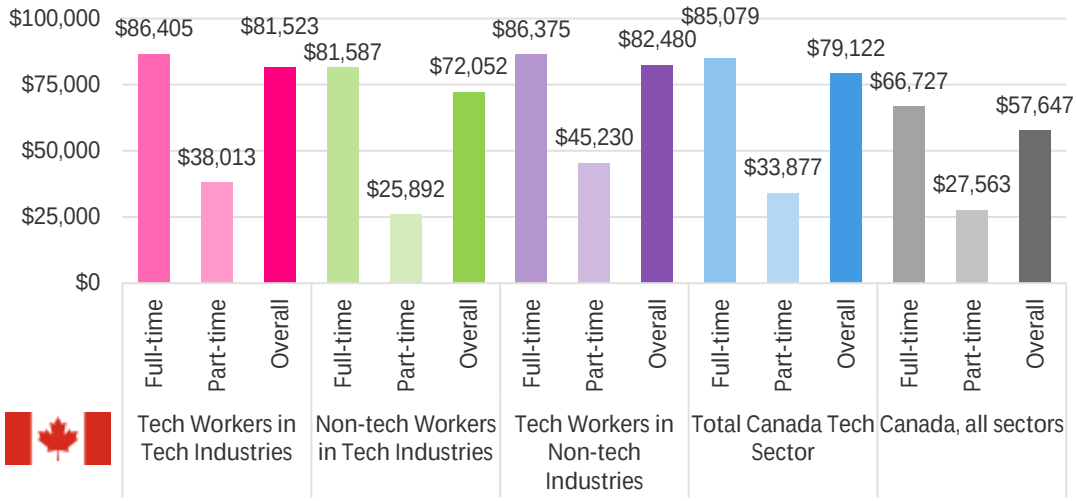
[21] The analysis of income by mode of work is based on workers' total gross income (i.e., from employment as well as all other sources) because the census employment income variable exhibited poor data quality when broken out by mode of work in Saskatchewan. To provide some insight on why we would encounter poor data quality, Statistics Canada explains: "global non-response rate (GNR) is an indicator of data quality which combines complete non-response and partial non-response to the survey. A smaller GNR indicates a lower risk of non-response bias, i.e., a lower risk of lack of accuracy. Global non-response rates are determined for each of the NHS geographic areas. These areas are flagged on the database according to the non-response rate." Based on their GNR analysis, Statistics Canada suppresses data that is not statistically meaningful when it reports on results.

Although these GNR flags are not provided with data that is delivered for custom tabulations from Statistics Canada, it is important to evaluate the extent to which data quality issues may impact an analysis that is based on data aggregated from thousands of small slices of census data. Specifically, data used in this analysis was broken down first by industry and occupational classifications, then by mode of work, and finally by each of several income variables; as such, there were thousands of data points in each calculation that could be affected by data suppression. Nordicity assessed the quality of income data by aggregating the most granular data used in the analysis and comparing the result to aggregated provincial figures that were also included in the dataset.

In the case of data underlying the income-by-mode of work analysis, Nordicity calculated the weighted average incomes of Saskatchewan workers by mode of work at the four-digit level of NAICS and NOC classifications and compared the result with the provincial average. For the Total Income variable, the reconciliation provided an overall average income within 1% of the provincial average. Taking into account that some variance is expected due to Statistics Canada's randomized rounding practices, this outcome is as good as an exact match for practical purposes. For the Employment Income variable (which is nested within total income and would likely have a lower response rate), the result of this comparison differed from the provincial average by 9%, which indicates that the data associated with this variable was incomplete. This analysis was the only instance in which poor data quality limited Nordicity's ability to report on a finding in this engagement.

In the Tech Sector, employment income accounted for 94% of workers' total income, and that figure rises to 95% among Tech Workers in Saskatchewan. Overall, employment income accounted for 88% of total income among the working-age population of Saskatchewan. Note that employment income represented 38% of total income for part-time workers in the Saskatchewan Tech Sector vs. 70% nationally. Although this observation is based on a limited sample (due to suppression at this level of granularity in census data), the data suggests that Tech Workers in Saskatchewan earn less from tech employment than their national peer group.

Figure 29 (continued)



Sources: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

To summarize, the sector is estimated to employ more than 31,000 persons in Tech Companies, and an additional 20,700 Tech Workers in other industries. The top three Tech Industries by employment in Saskatchewan account for over half of the workforce in the Tech Industries. *Health and Computer systems design* drove job growth near 20%, adding a combined 1600 jobs since 2015 while total tech sector occupations grew 3% in the same time period. The average employment income of workers in the sector was $76,000, of which workers retain more than 60% as surplus income.

3.4 Focus on *Computer systems design and related services* (*NAICS 5415*)

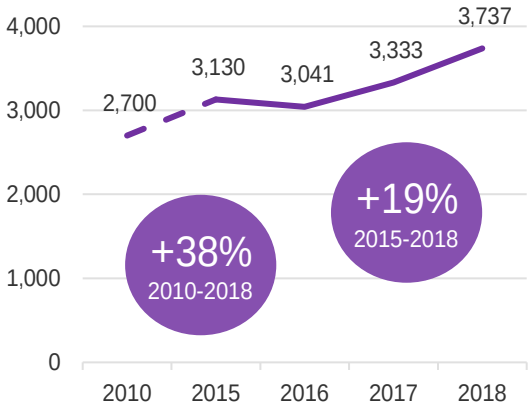
Nordicity encountered considerable enthusiasm about the perception that there is a **burgeoning cluster of successful enterprises and talent emerging in Saskatchewan's 'core' Tech Sector**. To the stakeholders in question, 'core tech' refers to *NAICS 5415 – Computer systems design and related services* (essentially, software development companies), which was proposed to have high potential to build talent, drive innovation and increase labour productivity in tech-adjacent industries. To better understand this industry's past and prospective contribution to economic growth in Saskatchewan, Nordicity was asked to provide a more detailed assessment of this segment of the Saskatchewan Tech Sector.

Statistics Canada defines *NAICS 5415* as follows:

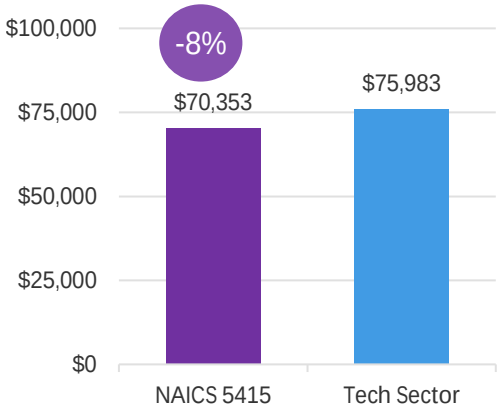
> *This industry group comprises establishments primarily engaged in providing expertise in the field of information technologies through one or more activities, such as writing, modifying, testing and supporting software to meet the needs of a particular customer, including custom video design and development and Internet webpage development; planning and designing computer systems that integrate hardware, software and communication technologies; on-site management and operation of clients' computer and data processing facilities; providing advice in the field of information technologies; and other professional and technical computer-related services, such as training and support after sales.*

The Figure below highlights the rapid growth in the number of workers within *NAICS 5415*. **With 600 new workers over three years (+19% from 2015),** *NAICS 5415* experienced the largest rate of employment growth (and was second only to *NAICS 4461 - Health and personal care stores* in terms of actual number of workers added). However, Census data suggests that workers within this industry earn about 8% less than the average Tech Worker in Saskatchewan. This comparison is important to make because the definition of the overall Tech Sector **includes not only other Tech Industries but also technical workers in tech-adjacent industries**; as such, this comparison suggests that the **compensation available to Tech Workers outside of *NAICS 5415* may be more attractive**. In turn, this observation may explain some of the talent shortage reported by companies in this industry.

Figure 30: Number of workers, and average income, *NAICS 5415*

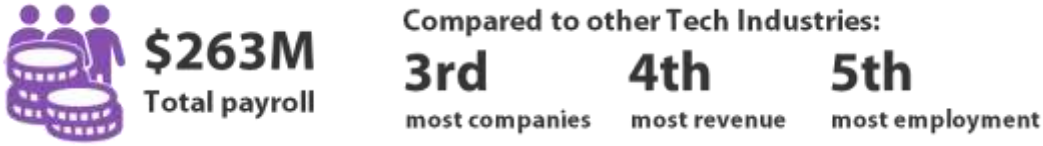


Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours



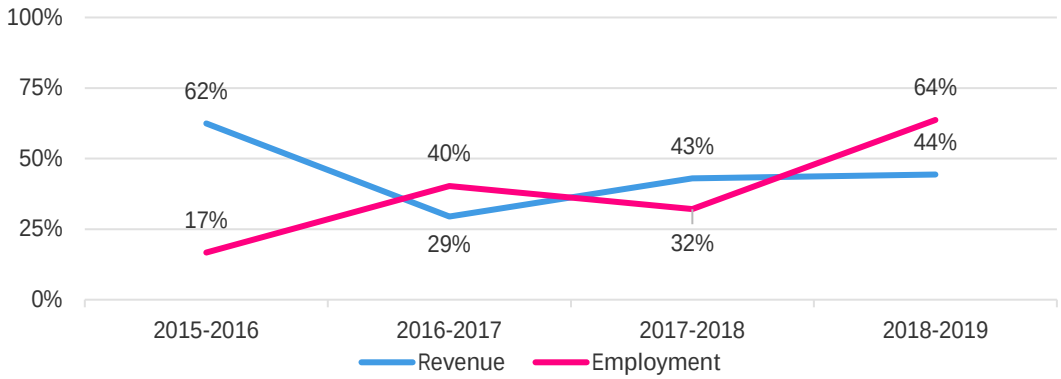
Source: Statistics Canada, Census of Population 2016

NAICS 5415 in Saskatchewan: Quick Facts



The 19% growth observed over the 2015-2018 period (Fig. 30), to some extent, is attributable to the success story of a group of high-growth companies within the *NAICS 5415* industry. Although such companies remain a modest portion of the industry by 2019, their impact stands to increase over time. To illustrate this fact, Nordicity reached out to a select group of Tech Companies that have realized high growth rates in employment and revenue in recent years to provide a narrower and even brighter picture of the growing impact contributed by software development companies. Figure 31 presents year-over-year growth rates of employment and revenue for five Tech Companies within the *NAICS 5415* industry that experienced tremendous growth. Overall, these companies saw a 330% increase in revenue and a 250% increase in employment.

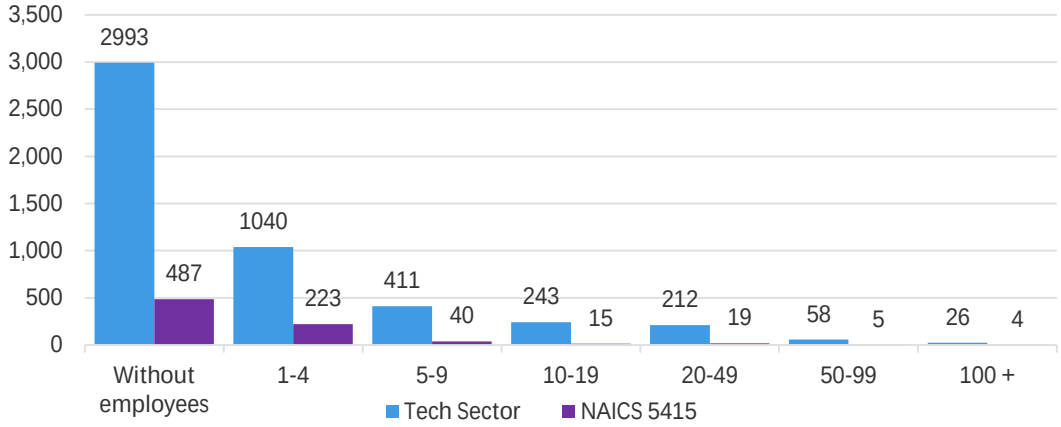
Figure 31: Year-over-year employment and revenue growth rates for high-growth 5415 company sample



Source: Company data

In terms of number of companies, *NAICS 5415* is the third largest industry within the Saskatchewan Tech Sector with about 800 companies. The following Figure shows the distribution of companies by number of employees. 61% of companies are identified as "without employees." As highlighted in Section 2 and further in Section 4, the persistent global shortage of experienced software developers may be a reason that workers with a technical skillset might find it **advantageous to offer their services on a contract basis**.

Figure 32: Number of Tech Companies, by employment band



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, Business Register 2018

Based on interviews with companies in *NAICS 5415*, Nordicity found that companies typically require between 4-12 weeks to hire new employees. Respondents reported that the most difficult positions to fill were programmers, technical support and technicians. Specifically, respondents noted that software developers, programmers (front end, back end, full-stack), and IT support specialists were the most difficult to recruit, especially those in senior positions. Another theme that emerged from interviews was that employees hired for sales and marketing positions are difficult to find and retain because these positions require strong communication and organizational skills in addition to a high degree of technical knowledge. Roles that are more difficult to hire were noted to take (in some cases significantly) longer to hire than the average. Based on the data collected from these companies, Nordicity estimates that there were, on average, **63 concurrent job postings for jobs at *NAICS 5415* companies** across Saskatchewan at any given time in 2019.

Interviews also found that Saskatchewan companies in *NAICS 5415* invest, on average, $982 per employee on employee training and professional development. With 3,740 employees in *NAICS 5415*, in 2019, Nordicity estimates that these companies spent a total of **$3.7 million per year on employee training and professional development**.

Nordicity estimates that *NAICS 5415 – Computer systems design and related services* contributed slightly more than **half a billion dollars to Saskatchewan's GDP in 2018**. This estimate includes a direct impact of $389 million in GDP, $61 million in indirect GDP relating to the industry's purchases from supplier industries, and $60 million in induced GDP relating to the re-spending of labour income earned from *NAICS 5415* companies as well as from attributable expenditures to supplier industries.

Table 8: Economic impact of *NAICS 5415 - Computer systems design and related services* in Saskatchewan

Economic impact	Direct impact	Indirect impact	Induced impact	Total impact
Employment (FTEs)	3,740	550	450	4,740
Labour income ($000s)	262,932,000	30,862,000	23,790,000	317,584,000
Gross domestic product ($000s)	388,716,000	61,228,000	59,764,000	509,708,000

Source: Nordicity MyEIA Model; Statistics Canada, federal and provincial government accounts; Statistics Canada Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports

Nordicity further estimates that the economic activity outlined above corresponds to the following fiscal (tax) impacts.

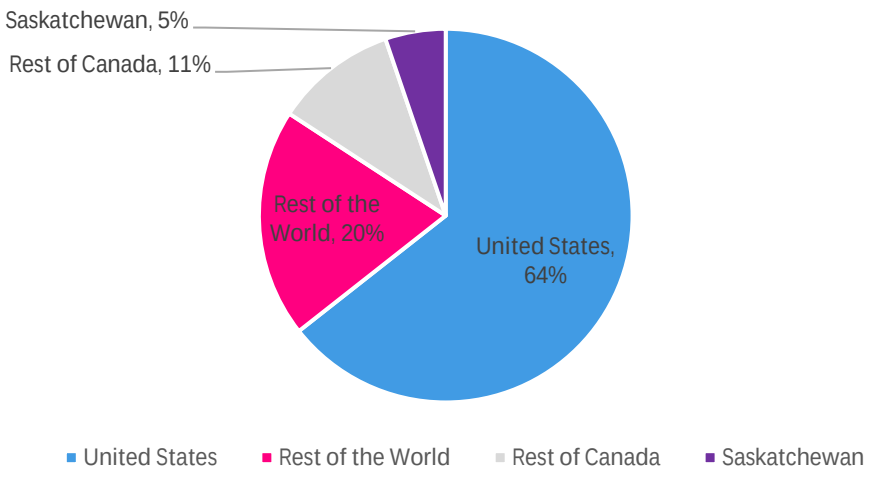
Table 9: Fiscal (tax) impact of *NAICS 5415 - Computer systems design and related services* in Saskatchewan

Fiscal Impact	Federal	Provincial	Total
Personal income taxes	53,074,000	25,258,000	78,332,000
Corporation income taxes	8,030,000	1,680,000	9,710,000
Consumption taxes	11,127,000	13,762,000	24,889,000
Local property taxes and other fees		11,019,000	11,019,000
Total	**72,231,000**	**51,719,000**	**123,950,000**

Source: Nordicity MyEIA Model, Statistics Canada, federal and provincial government accounts; Statistics Canada Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports

Not only does *NAICS 5415* drive a significant and growing economic/tax impact in Saskatchewan, much of the revenue which allows companies to grow employment, GDP, and (by extension) the tax base in the province comes from outside of Saskatchewan. In fact, the following chart shows that 95% of these companies' total revenues are from outside of Saskatchewan, and 84% are from outside of Canada.

Figure 33: Exports of Saskatchewan *NAICS 5415* Companies



Source: Nordicity interviews with *NAICS 5415* companies

Moreover, the *NAICS 5415* companies interviewed as part of this engagement spend an average of 1.97% of gross revenue on capital expenditures. Based on the aggregate $661 million of revenue earned by *NAICS 5415* companies in Saskatchewan, Nordicity estimates that *NAICS 5415* companies had aggregate capital expenditures of $13.0 million. Using the economic impact estimates presented in Table 8, this level of capital expenditures amounts to 3.4% of NAICS 5415's direct GDP in Saskatchewan. Economy wide, Canada's total capital expenditures were 12.2% of GDP 2016, which indicates that tech industries are less capital intensive than average (which would include very capital-intensive industries such as manufacturing and resource extraction).[22]

To put this finding in context, it is worthwhile to compare these amounts with an objective relating to capital expenditures for the Saskatchewan Commercial Innovation Incentive (SCII). One of the non-mandatory criteria (e.g., the criterion requires that applicants choose any two of five economic benefits) to qualify for the SCII is to demonstrate the ability to achieve $10 million in cumulative capital expenditures *over any period of time*. While this tax incentive is not limited to companies in *NAICS 5415*, the $10 million target appears to be well calibrated to balance incremental growth with achievability relative to the level of capital expenditures estimated in this industry. The incentive itself extends over 10 years, so an average capital investment of $1 million per year over this period would constitute a material boost to the industry's aggregate capital expenditures.

3.5 Operating in Saskatchewan's Tech Sector

The sections below highlight key findings from engagement with Tech Sector companies (see Appendix A.4 for summary of stakeholder engagement).

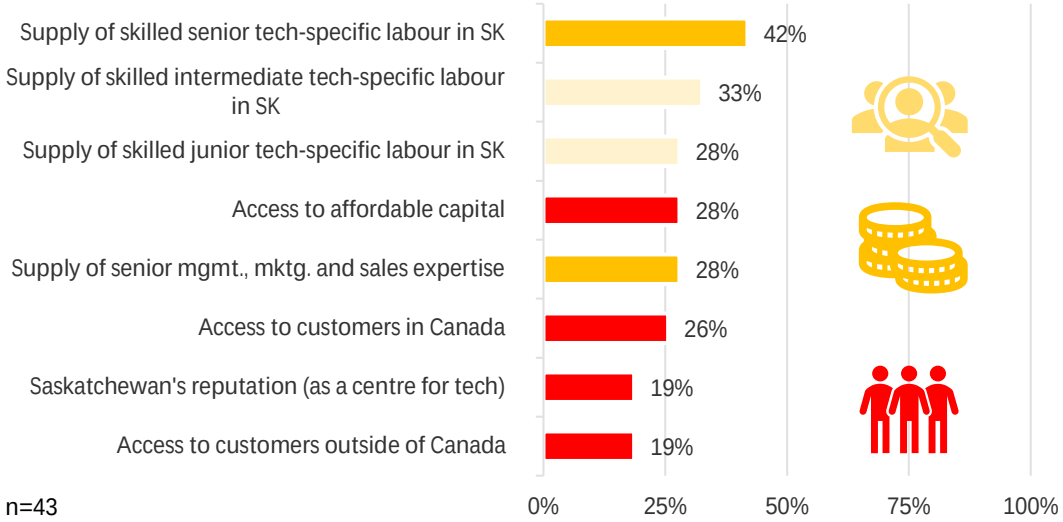
3.5.1 Access to Talent

This section describes companies' perspective regarding access to talent in Saskatchewan which is elaborated further in Section 4.

Nearly every stakeholder indicated that access to talent was the largest challenge for Tech Companies. The industry survey substantiates this observation. The **limitations in skilled personnel (at all levels of experience)** were designated as the major hurdles hampering the sector's growth. Moreover, Tech Companies seem to face difficulties in raising capital which is described further in Section 3.5.2.

[22] Statistics Canada, Non-residential capital and repair expenditures, 2017 (revised), 2018 (preliminary) and 2019 (intentions); Statistics Canada, Table 36-10-0487-01: Gross domestic product (GDP) at basic prices, by sector and industry, provincial and territorial

Figure 34: Main challenges facing Tech Companies



Source: Saskatchewan Tech Sector Industry Survey 2019

In terms of developing expertise, Saskatchewan's small market size means that tech talent can be forced to be 'jack of all trades.' As a result, many have a strong generalist skillset but limited ability to become a 'master' or develop expertise in more niche business markets. Relatedly, it was felt that Saskatchewan entrepreneurs feel they are not truly experts in their field unless they have developed experience in other larger tech markets. As a result, it makes it **difficult for growing Tech Companies to source experts or specific skills** that they may require.

3.5.2 Access to Financing

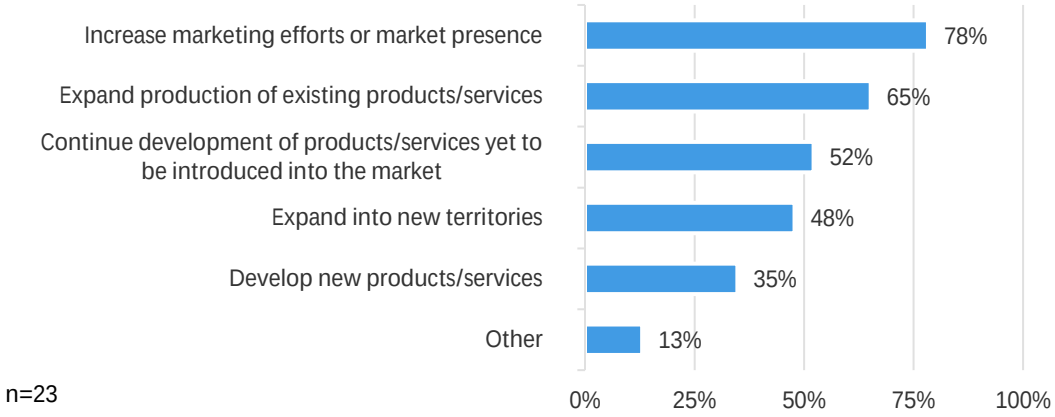
Access to capital is a key pillar to any Tech Sector. This section describes the current state of Tech Sector financing in Saskatchewan and is drawn from survey results, stakeholder engagement and research about financing programs. Note, other sources of support available to Saskatchewan Tech Companies presented in Appendix B.

Investment Use
In discussing with stakeholders what they would use more capital for, it was widely agreed that companies would use it **hire more people.** As reflected in the survey results, the role/focus of new hires varied between things from business development to research and product design.

While **most interviewees were not actively seeking investment**, those that were intended to deploy funds for hiring. Since most of the reasons for seeking investment cited by survey respondents are labour-related (as illustrated in the following figure), these findings suggest that staff capacity is an important barrier for Tech Companies in Saskatchewan. Nearly every stakeholder noted that the largest challenge for running their company is finding senior talent.

The three main reasons cited for which Tech Companies want to raise money are improving their marketing efforts, expanding their existing offerings, and developing products – each of these three objectives is labour intensive and relies on attracting talent.

Figure 35: Reasons for Tech Companies to seek investment



Source: Saskatchewan Tech Sector Industry Survey 2019

When combined with findings in preceding sections, it is likely Tech Companies are **looking to hire to increase market production and expanding production.**

Public Funding

Stakeholder engagement identified numerous means through which Tech Companies were accessing public financial support. The most commonly used support was national funding through the National Research Council of Canada Industrial Research Assistance Program (IRAP) and the Scientific Research and Experimental Development (SR&ED) tax incentive program. IRAP was celebrated for being 'easy to access' with helpful local Industrial Technology Advisors (ITAs) who are very receptive to entrepreneurs. While some believe it is "integral for startups" it was also widely agreed that IRAP is successful in 'weening' entrepreneurs off support and forcing them to become profitable companies independently. SR&ED feedback was more mixed - many believing it was critical to their business while others claiming it was 'more work than it was worth' to track spending per their requirements. WD was also noted less frequently as a national source, indicating a potential opportunity to explore the **awareness of WD's support to Tech Companies in Saskatchewan.**

At the provincial level, it was noted by many Tech Companies that nearly all the funding available in Saskatchewan was introduced recently (i.e., in the last five years). It was indicated by some that new funding opportunities have been driven in part by coordination and lobbying efforts by provincial industry associations. Many were optimistic about recent support measures such as the Saskatchewan Technology Startup Incentive (STSI) and Made in Saskatchewan Technology Program (MIST). As of March 20, 2020, STSI has been responsible for attracting $8.2 of private investment for Saskatchewan companies in the first two years of a three-year pilot (based on results for fiscal years 2018-19 and 2019-20).

Training grants available through the Canada-Saskatchewan Job Grant were noted by stakeholders to be smaller when awarded to Tech Companies, as compared with similar support available to other sectors (e.g., mining has access to grants for $15,000 that are not available to Tech Companies). It was also noted that these **grants available for training are slow to process and don't always fit the needs of growing Tech Companies.**

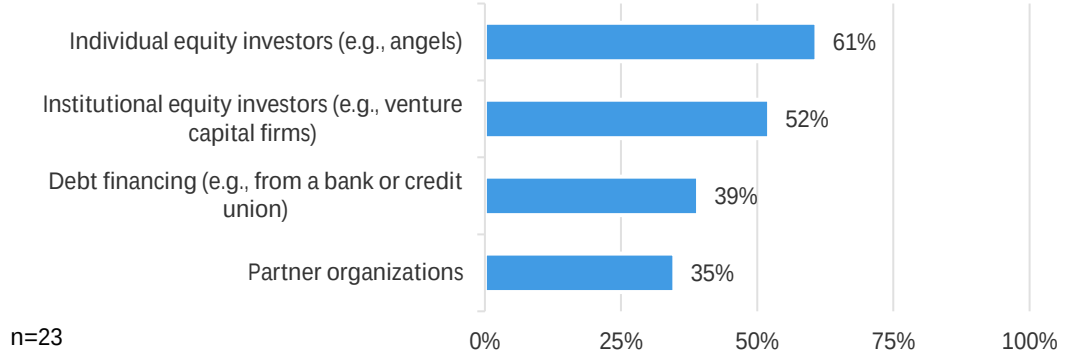
Innovation Place and incubators such as Co.Labs and Cultivator were noted for being useful in connecting companies to public funding opportunities. It was also noted that B2B mentorship regarding public funding (among other things) would be very helpful for smaller, start-up companies.

Private Financing

In addition to the public funding described above, there are opportunities to source private investment through various types of structure. According to survey responses, equity investment is the primary type of investment that Tech Companies are seeking, whether individual (61%) or institutional (52%).

> "Both IRAP and SR&ED have been very helpful for speeding up our growth, especially allowing us to hire (including Sask grads)."
>
> Tech Company Founder

Figure 36: Types of investment that Tech Companies seek



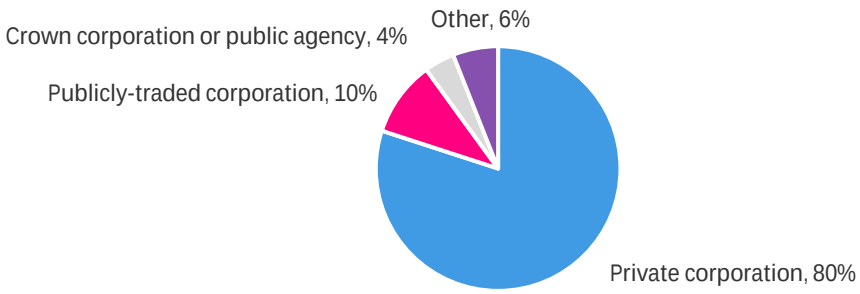
Source: Saskatchewan Tech Sector Industry Survey 2019

Access to private investment was widely agreed to be improving in the province. At the same time, all stakeholders agreed that there remains room for growth before there are opportunities in Saskatchewan that are comparable to larger tech centres. That is, the larger tech centres have a much larger cohort of investors providing Tech Companies with a diverse range of financing options.

On the positive side, many noted the strong entrepreneurial reputation that Saskatchewan Tech Companies have - 'focusing on their business/bottom line first' and 'doing more with less.' That is, many companies are minimizing their reliance on outside capital, raising capital when needed, often **through family and friends**, until their business is established and profitable. Entrepreneurs in Saskatchewan felt that this mentality differs from the Tech Sector in other regions, where many start-ups seek funding for an idea externally before building a successful business around it.

Relatedly, Saskatchewan's Tech Companies are largely privately owned reflecting the sentiment that many entrepreneurs are focusing on building a sustainable business before seeking opportunities to go public. According to the industry survey, 80% of responding Tech Companies are private corporations, as illustrated in the figure below. The *other* category includes not-for-profit organizations and sole proprietorships.

Figure 37: Tech Company ownership



n=50

Source: Saskatchewan Tech Sector Industry Survey 2019

Other opportunities noted by entrepreneurs included the Golden Opportunities Fund and the Conexus VC fund. These funds are described in detail in Appendix B, subsection B.1. In addition, increased activity from non-Saskatchewan investors has helped to de-risk investments for local investors. That is, investors are able to spread the risk of investment across multiple investors in a single venture and diversify their own portfolio. Outside interest in Saskatchewan Tech Companies also brings more 'smart money' to the sector – i.e., investors that bring knowledge and experience in addition to capital.

As far as companies' progression through funding stages is concerned, angel investors typically provide investments of $50k to $250k. The Saskatchewan Technology Startup Incentive mainly appeals to investments within this range (i.e., typically ranging from $20k to $150k, based on the value of investments that applied for the credit). The Golden Opportunities fund picks up at investments in the range of $2M - $5M. Although there are a variety of other private funding sources, these major sources leave a **gap in the $250k to $2M tier of investments.** Creative Saskatchewan also offers funding and other support to companies; its funding for interactive content provides a meaningful source of funding for eligible tech-related projects.

The need for Valuation Skills
It was noted that Tech Companies are often unsure of how to value themselves, in turn, making it difficult for investors to recognize the potential value in investing in these companies. Many entrepreneurs spoke to the need for improved education for both investors and entrepreneurs as it relates to accurately valuing Tech Companies.

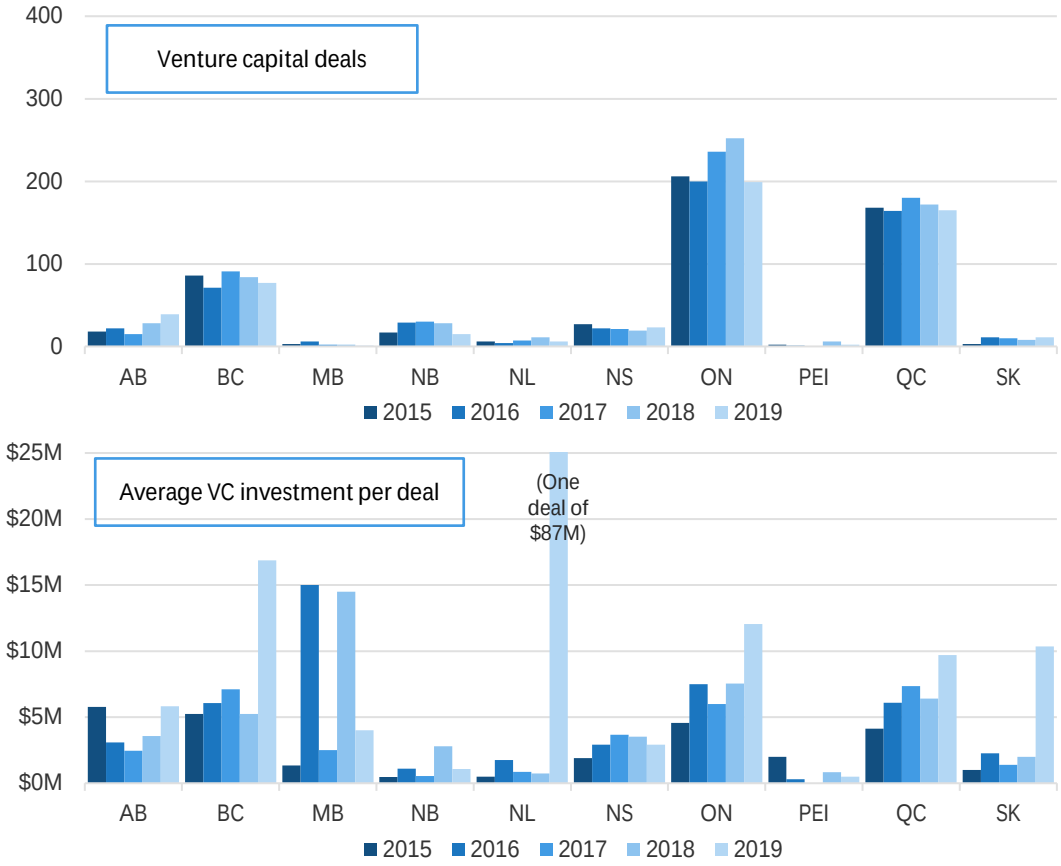
As is the case in most jurisdictions, the majority of Saskatchewan **investors are later stage, usually retail funds.** At the same time, there are still challenges regarding coordinating these investors for strategic investments into the technology sector. While Saskatchewan Capital Network (SCN) is working to act as a coordinating body, most stakeholders agreed there is still much progress to be made regarding the coordination of investors in the province.

The following two charts show data collected by the Canadian Venture Capital and Private Equity Association (CVCA). While the data encompasses all sectors, CVCA indicates that the **top VC sectors are ICT, Life sciences and Cleantech, Oil & Gas and Industrial & manufacturing.** As such the trends observed below constitute a relatively good proxy for the Tech Sector as defined in the present report.[23]

[23] CVCA public reports do not offer provincial breakdowns by sector.

Over the 2015-2019 period, the average venture capital investment per deal in Saskatchewan (all sectors) was $3.4 million – versus $6.8 million for all Canada – which places Saskatchewan as a mid-tier province in terms of investment attraction. On the bright side, the average amount involved per deal doubled between 2015 and 2018 reaching $2 million, with an outstanding $10 average deal size in 2019[24]. However, on average, only nine deals were concluded each year: this low number does not offer many investment opportunities for entrepreneurs seeking capital and corroborates the gap observed in the $250k to $2M range.

Figure 38: Venture capital deals and average investment, by province 2015-2018



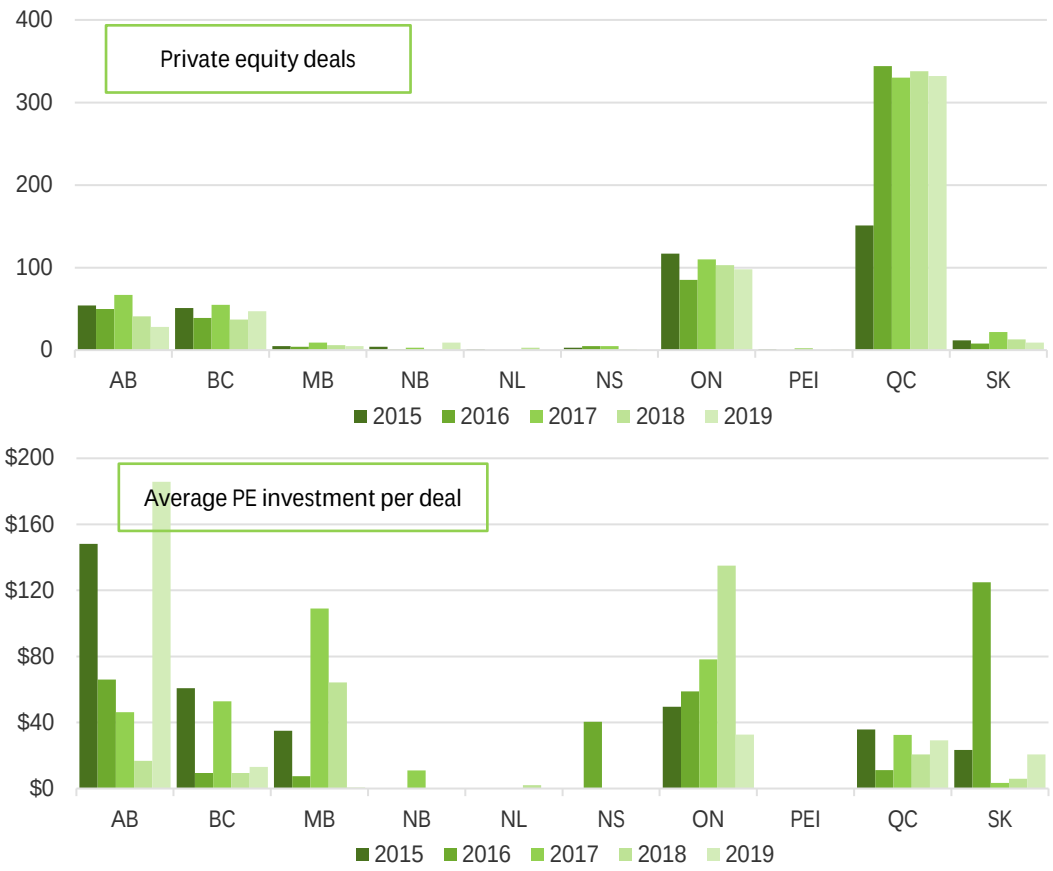
Source: Canadian Venture Capital and Private Equity Association

As shown below, private equity investment data is more clear-cut. Three tiers can be identified: first, Quebec and Ontario capture most private equity deals, and then Alberta and British Columbia follow with a distinctly lower, but still substantial, share. Finally, some twenty more deals happen every year in all other provinces. Saskatchewan leads this lowest tier with an average 13 deals per year.

A trend-focused analysis of the average investment is made difficult by the high variability of these amounts. Large transactions, often happening in the Oil & Gas industry, create a number of outliers, such as the $975M transaction relating to the Saskatchewan assets of Penn West Petroleum in 2016.

[24] Note that this significant increase in average deal value is based on a sample of 11 deals, so one or a few significant deals can have a sizable impact on the provincial average in a particular year. An extreme case of this effect occurred in Newfoundland and Labrador, where the only deal in the province was worth $87M in 2019.

Figure 39: Private equity deals and investment, by province, 2015-2018



Source: Canadian Venture Capital and Private Equity Association

As indicated above, most Tech Companies are focusing on building sustainable business models before actively seeking public funding or investment. At the same time, companies note growth in private equity activity and celebrate support from organizations public bodies like IRAP.

3.5.3 Growth Opportunities

The Tech Sector in Saskatchewan is a very tight knit community, always willing to learn with each other and share experiences. Despite mentorship programs existing at places such as Co.Labs and Ideas Inc, numerous stakeholders still suggested there is an **opportunity to formalize this collaborative mentality for more structured mentorship opportunities**. In addition, it was noted that the tight community suggests there is access to support and a willingness to make things happen quickly.

> "You can get business support very quickly here and move from challenge to solution quicker than in larger jurisdictions."
>
> Tech Company Owner

Another key opportunity is that Tech Companies can be flexible given **lower expenditure costs** both in terms of space and labour. That is, companies are able to stretch a dollar further, enabling them to react to shifting markets without necessarily needing to secure more capital.

Interviewees and survey respondents also noted a variety of means through which all levels of government (supported by industry association advocacy from SaskInteractive or SaskTech organizations) could more effectively support and collaborate with the Tech Sector:

- **Urban planning** – incentivize Tech Companies to contribute to the development of a livable and vibrant city by supporting companies (e.g., through subsidized rent) to locate in City cores, instead of locating in lower cost spaces on city peripheries;
    - Stakeholders suggested that many companies in Saskatoon have been establishing their offices outside of the city core.
- **Tech education** – while there are opportunities in the PSIs, many companies noted that technical skills could be developed earlier (i.e., in grade schools);
    - Stakeholders noted a discernible gap in tech related skills being included in Saskatchewan's grade school curriculum.
- **Immigration support** – simplify and speed up the process for immigration of talented Tech Workers into Saskatchewan;
    - Stakeholders indicated that it often took several months to fill important labour gaps in their companies, slowing operations or growth opportunities.
- **Export development** – help companies reach new markets outside of SK: other provinces, US, Europe, Africa, Southeast Asia; and,
    - Stakeholders expressed a desire for more support to conduct oversees business development through marketing, trades show/conferences and trade missions.
- **Professional development** – support the development of marketing and financial (business valuation) skills.
    - Stakeholders remarked that many technical workers lacked professional business skills and many entrepreneurs and financers indicated limitations in abilities to valuate tech companies in Saskatchewan.

3.6 Summary

Saskatchewan's Tech Sector is operating in a global market seeking to capitalize on the opportunities presented by a technological disruption. This reality means that the meaning of 'Tech Companies' is evolving with increasing technological disruptions across different industries.

There are more than 5,000 Tech Companies in Saskatchewan operating mainly (64%) in Saskatoon and Regina. In terms of size, these companies employ an average of 13 persons, though more than half of the companies are without employees. Roughly three quarters of these companies earn less than $500,000 though there are more than 500 companies that earn more than $2 million. The top three industries which make up 53% of Tech Companies are Architectural, engineering and related services, Health and personal care stores and Computer systems design and related services.

Speaking to employment and compensation, Nordicity estimates that the sector employed more than 31,000 persons. The three industries described above account for over half of the workforce. *NAICS 4461 – Health and personal care stores* and *NAICS 5415 – Computer systems design*, drove job growth near 20%, adding a combined 1600 jobs since 2015. As a sector, there the number of Tech Occupations grew 3% in the same time period. The average salary in the sector was $76,000 – about 43% more than in other sectors. While the average wage for software engineers in Saskatoon is 36% of that in San Francisco, workers have a similar proportion of income left over at the end of the year.

When focusing analysis specifically on the 'core Tech Sector' (*NAICS 5415 - Computer systems design and related services*), Nordicity estimates that this burgeoning cluster of Tech Enterprises contributed more than half a billion dollars to Saskatchewan's GDP in 2018. The sector has grown 38% since 2010 and 19% since 2015. In 2018, it generated nearly $124M in fiscal (tax) impact, including more than $50M for the province of Saskatchewan.

Saskatchewan's smaller sized tech sector (sixth largest provincial ICT sector in Canada)[25] presents challenges for companies in the sector to find, attract and retain tech talent at all levels of experience. Most companies are focusing on building sustainable business models before actively seeking public funding or investment. Companies cite encouraging growth in private equity activity and strong support from organizations like IRAP, as well as growth in provincial support. Those that are actively seeking investment are most likely to use it to hire more staff both for business development and production expansion. Companies expressed optimism for the future with opportunities to galvanize a strong core of Tech Companies through further coordination and government support.

25 https://www.statista.com/statistics/723991/canada-ict-sector-output-by-province/

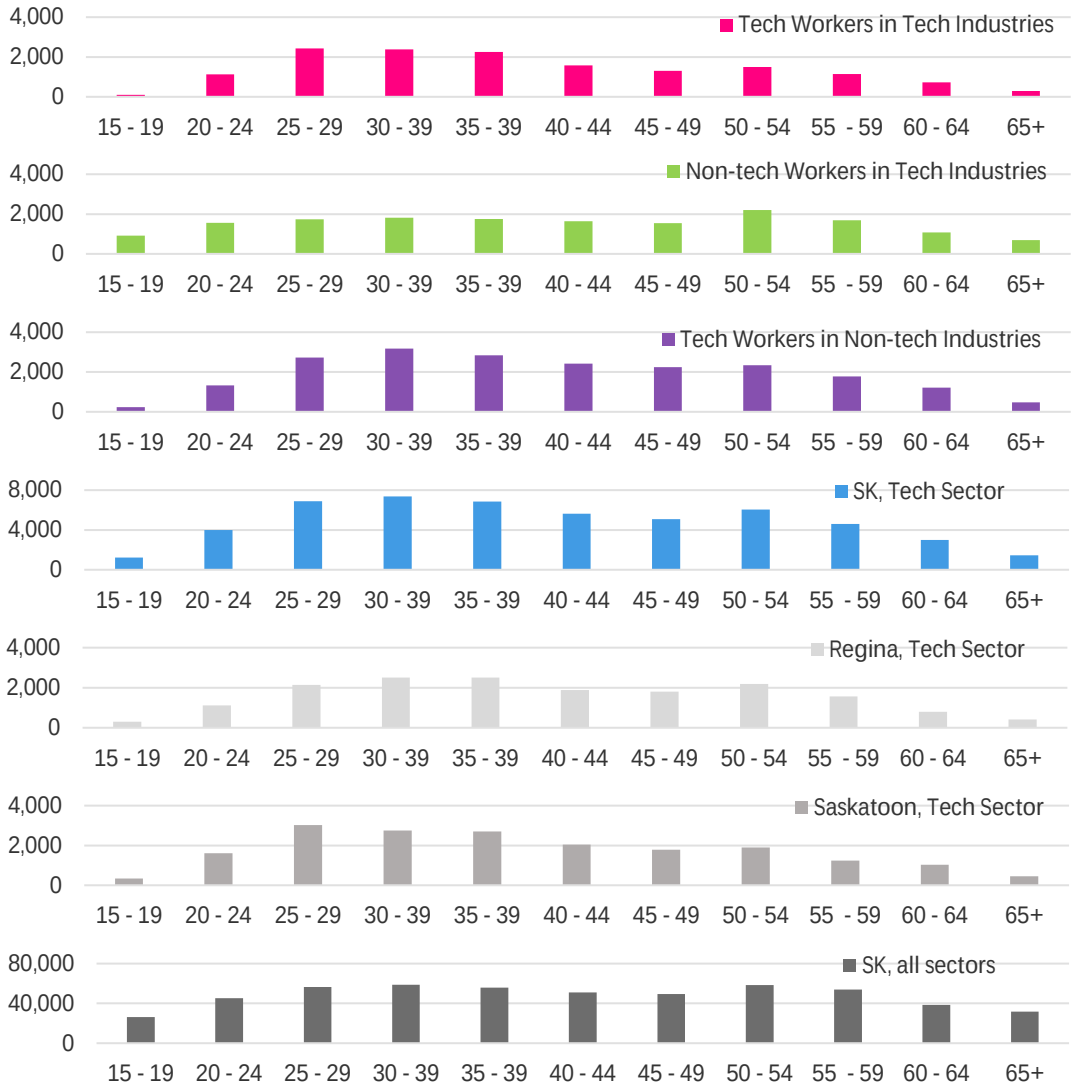
4. Saskatchewan's Tech Workforce

This section provides further details on Saskatchewan Tech Workers, beginning with a demographic profile of this workforce. Second, this section presents the challenges and opportunities of pursuing a career in the Tech Sector in Saskatchewan. Finally, a closer look is taken at the local pool of Tech talents.

4.1 Worker Profile

The following charts illustrate the age distribution of workers in segments of the Saskatchewan Tech Sector and Saskatchewan overall.

Figure 40: Employment by age and category, 2018



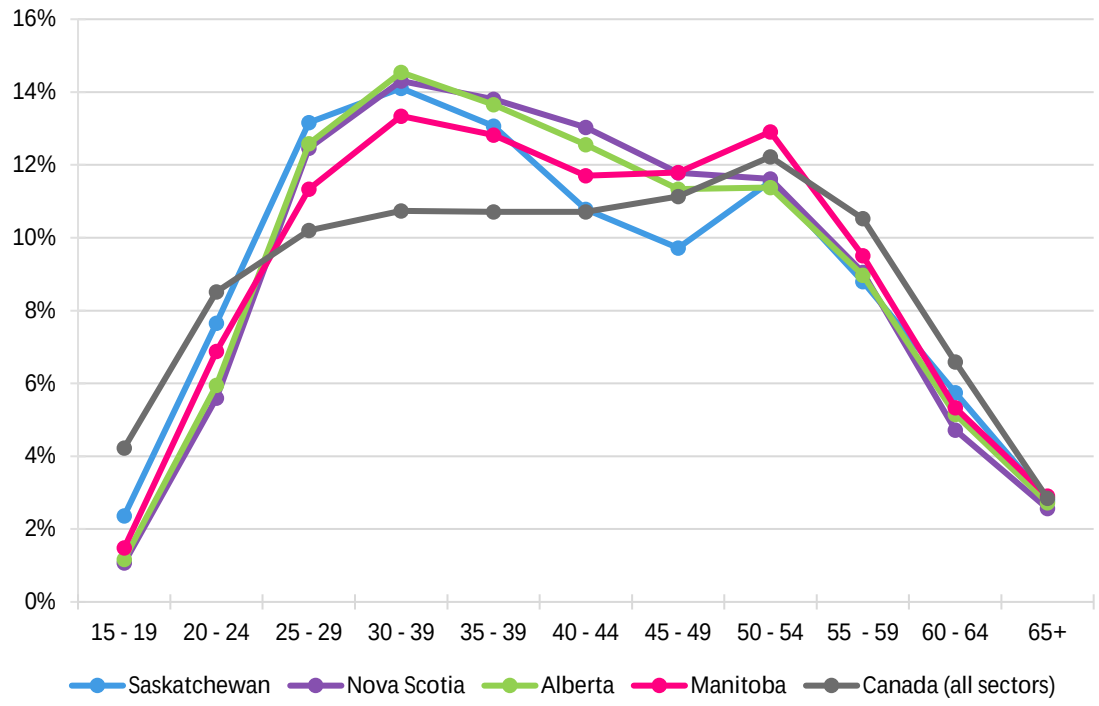
Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

As the figures above show, the age distribution of Tech Workers is notable for having a **peak in the 25-39 age group**. In contrast to workers in all sectors, a high proportion of Tech Workers hold post-secondary credentials (See Figure 44), which contributes to lower workforce participation in the youngest (15-24) age segments. In general, Tech Workers tend to skew younger than the overall workforce; this trend is perhaps most visible among Tech Workers in Tech Industries – there are almost 2,500 Tech Workers in tech industries between the age of 25-29, as compared to less than 1,000 in the 60-64 age range. Similarly, the **Tech Sector workforce in Saskatoon skews younger than that in Regina,** where a substantial portion of the tech workforce is known to be employed in government, crown corporations, and government contractors.

> "The tech-bro culture still persists. The sector has a lot of young men. It remains is a hard place to be a woman."
>
> Tech Sector Employee

The age distribution of Tech Sector workers in the province is very similar to the distribution observed in other provinces. Evidently the sector skews younger than the national average, as visualized below. All provincial Tech Sectors demonstrate the same spike in the 50- 54-year age group as does Canada. One difference between the jurisdictions observed in the figure below is Nova Scotia, which is the only province that shows a declining proportion of workers along the age axis, after the spike in the 25-39-year age group.

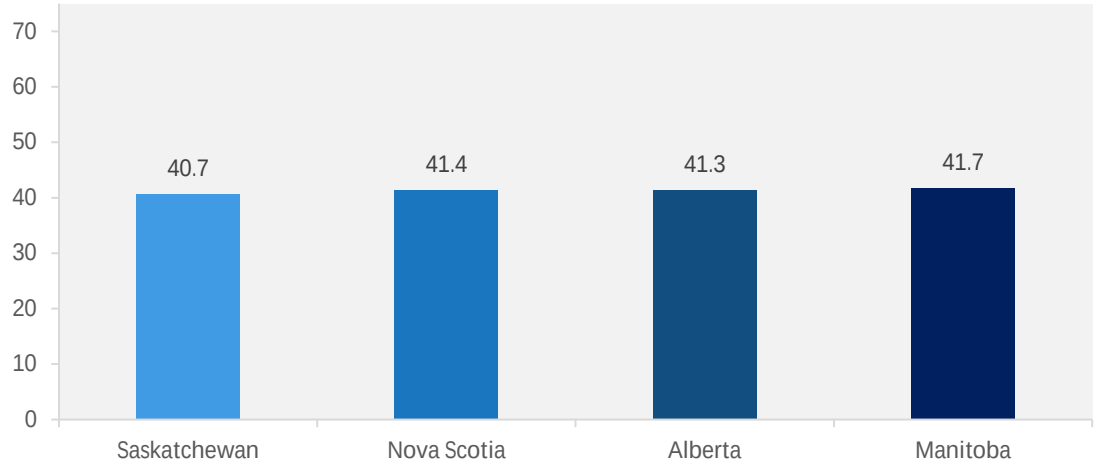
Figure 41: Employment by age (% of Tech Sector workers for provinces, % of workers in all sectors for Canada), 2018



Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

In addition to the similar distribution among age groups observed above, the average age of a Tech Sector worker is also similar across provinces.

Figure 42: Average age of Tech Sector Workers, 2018

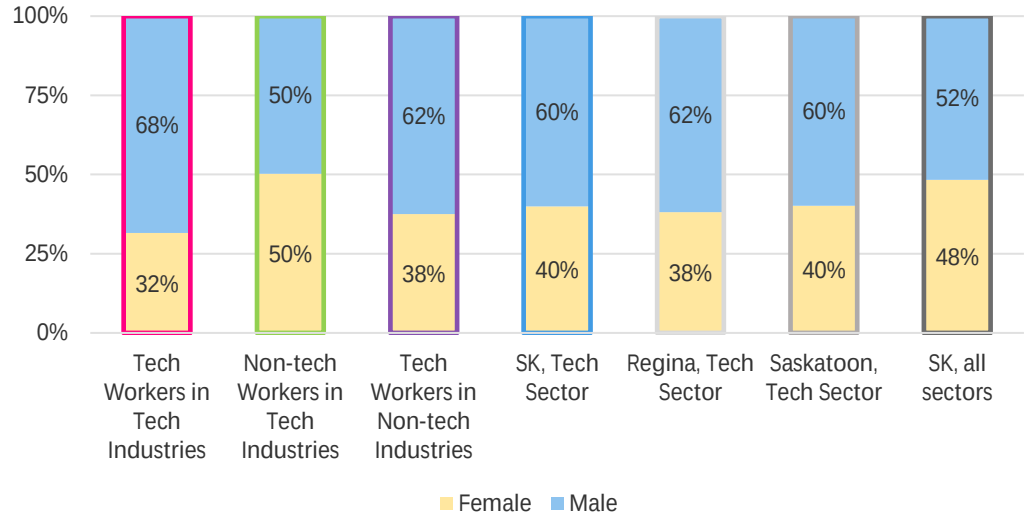


Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

Although the difference is minimal, the average Saskatchewan Tech Sector worker is younger than their counterparts in the other (selected) provinces.

In terms of gender, Tech Workers in Saskatchewan are significantly more likely to be male, with three males for every two females in the overall Tech Sector (including non-Tech Workers). By contrast, the distribution of gender within all sectors in Saskatchewan are almost equal, with 48% female and 52% male. This gender imbalance is even more pronounced in Tech Occupations. Two thirds of Tech Workers in Tech Industries are male, and **62% of Tech Workers in non-tech industries are male**. However, there is equal distribution of male and female non-Tech Workers in Tech Industries.

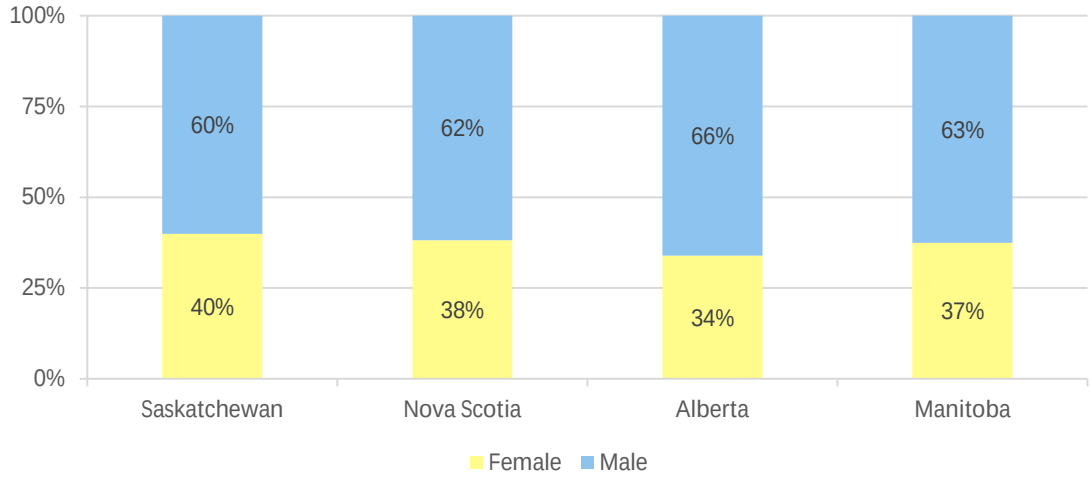
Figure 43: Gender of workers, 2018



Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

The **gender imbalance** in the Tech Sector is **observed in comparative jurisdictions** as well, with Saskatchewan performing slightly better than its peers. The Tech Sector in Alberta has the lowest proportion of women among the compared provinces.

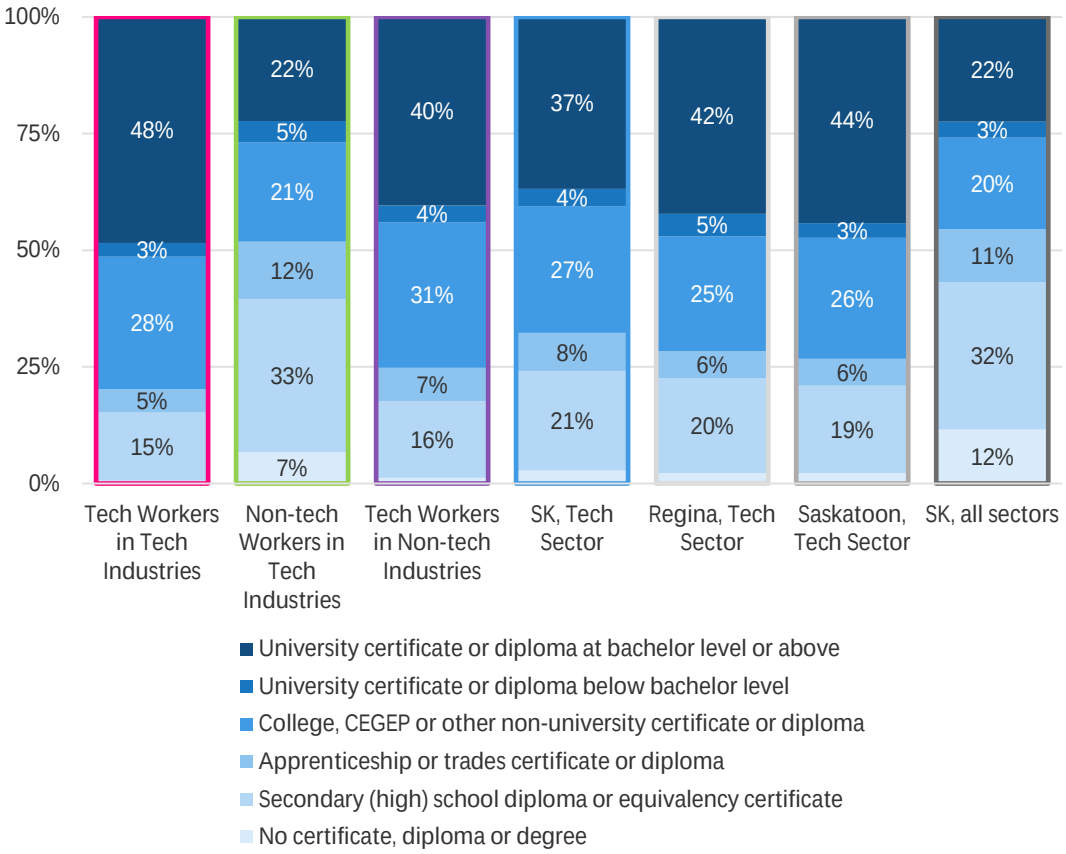
Figure 44: Gender of Tech Sector workers, 2018



Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

The chart below shows that Tech Workers are comprised of a highly educated talent pool, with post-secondary degrees approximately twice as prevalent among Tech Workers as in the Saskatchewan workforce overall.

Figure 45: Highest level of educational attainment of workers, 2018

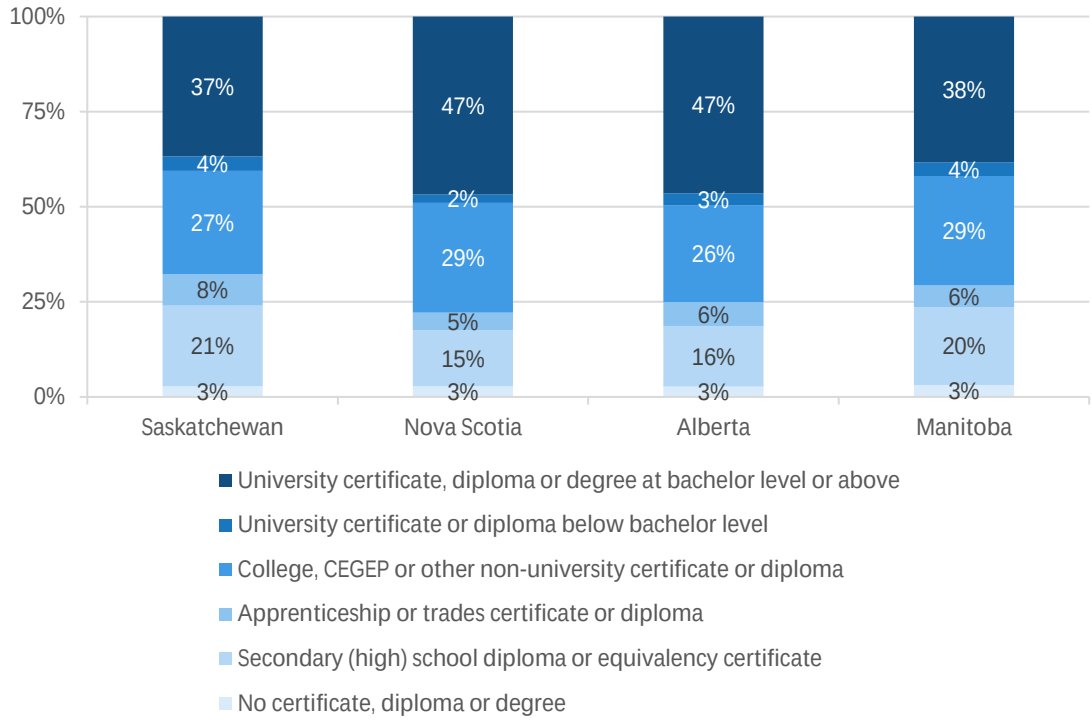


Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

Educational attainment is highest among Tech Workers employed in the Tech Industries, with nearly **half (48%) holding a university degree**. Educational attainment in the Tech Sector is also higher in urban centres (i.e., Saskatoon and Regina). In interpreting this finding, note that Tech Workers (in non-tech and Tech Industries) are more likely than non-tech workers in Tech Industries to be concentrated in office jobs in urban centres; as such, it is expected that educational attainment would skew higher in urban centres. Paralleling prior observations about the distribution of workers by mode of work, the educational attainment of non-tech workers in Tech Industries' mirrors that of the overall workforce in the province.

Educational attainment rates are similar in Manitoba, but the proportion of workers holding a university degree is much higher (47%) in Alberta. This high proportion is consistent with the high average income estimated for the Tech Sector in Alberta, as explored in Section 3.3.

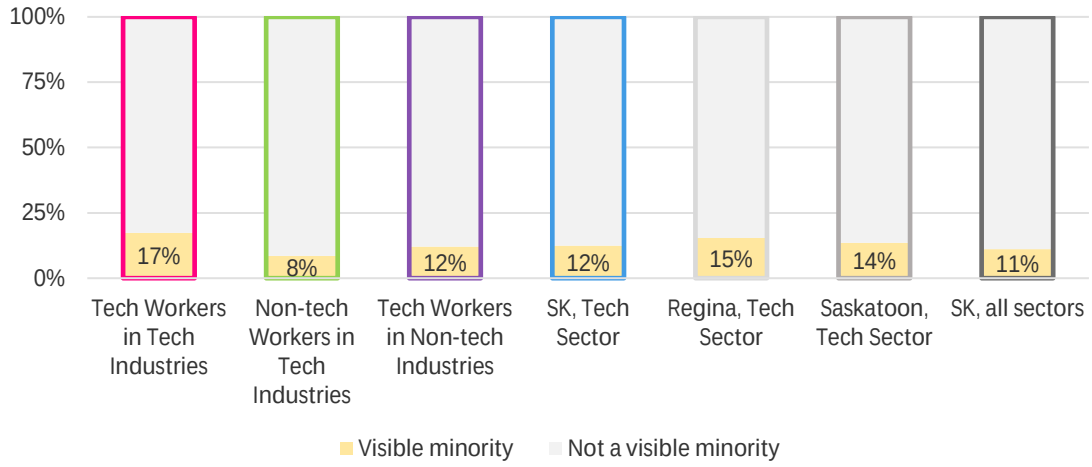
Figure 46: Highest level of educational attainment of Tech Sector Workers, 2018



Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

Visible minorities are relatively well represented amongst Tech Workers, especially for those employed in the Tech Industries (17%), as compared to 11% in the overall Saskatchewan workforce. As with the distribution of educational attainment, Tech Workers (who tend to exhibit a higher prevalence of visible minorities) are more concentrated in urban centres, so Regina and Saskatoon exhibit a higher level of visible minorities than Saskatchewan overall.

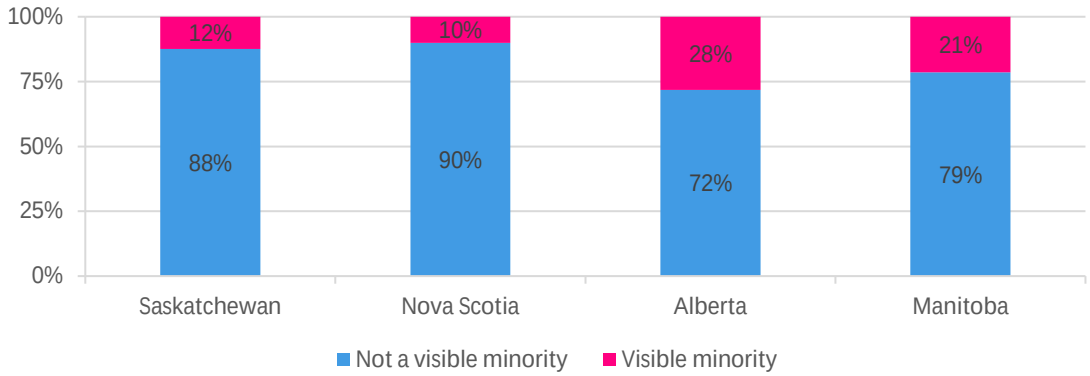
Figure 47: Representation of visible minority communities, by worker category, 2018



Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

The Tech Sector in Alberta shows a slight overrepresentation of visible minorities compared to the population. Alberta's visible minority population is 18.4% of the total while the Tech Sector is 28% visible minority. This overrepresentation is also observed in Manitoba, although to a smaller extent, which has a visible minority population of 17.5%.

Figure 48: Representation of visible minority communities in the Tech Sector, 2018

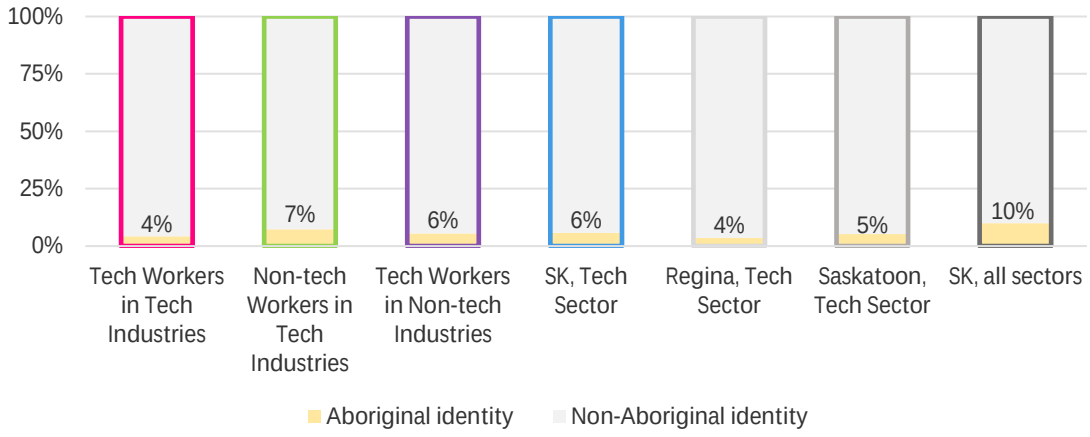


Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

In stakeholder consultations, crown corporations were noted as leaders in diverse workplace practices, which was seen as largely a bottom-up initiative led by employees and all levels of management. However, for the Tech Sector more broadly, gender and age-related barriers still exist.

Although the Saskatchewan Tech Sector scores well for inclusivity in terms of the inclusion of visible minorities, there is **room for improvement with respect to lagging participation by Indigenous workers**. As indicated below, only 6% of workers in the Tech Sector identify as Indigenous, which is considerably lower than Indigenous participation in the provincial workforce (10%).

Figure 49: Representation of Aboriginal identities, by worker category, 2018[26]



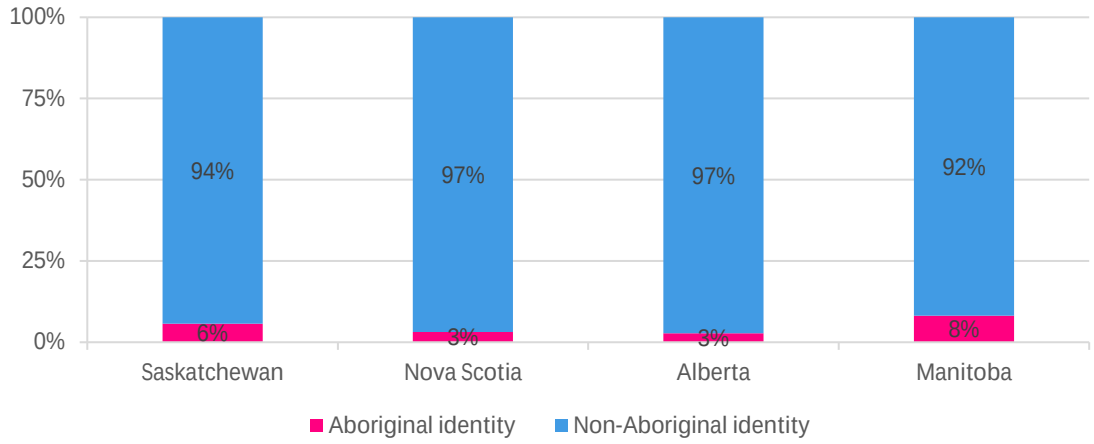
Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

[26] Aboriginal identity encompasses First Nations, Métis and Inuk (Inuit)

Overall, **lower participation by Indigenous workers** in Tech Occupations in Regina and Saskatoon suggests that Indigenous participation in the Tech Sector is most prevalent in non-tech occupations outside of urban centres. While Plato Sask Testing is an initiative that seeks to counteract this trend by offering a holistic program of training, internships and employment to Indigenous communities outside of urban centres, this finding should prompt additional efforts to reduce structural (especially geographic and socioeconomic) barriers to Indigenous participation in the opportunities afforded by employment in the Tech Sector.

Indigenous workers are also underrepresented in the Tech Sector in Alberta, Nova Scotia as well as Manitoba.

Figure 50: Representation of Aboriginal identities in the Tech Sector, 2018[27]

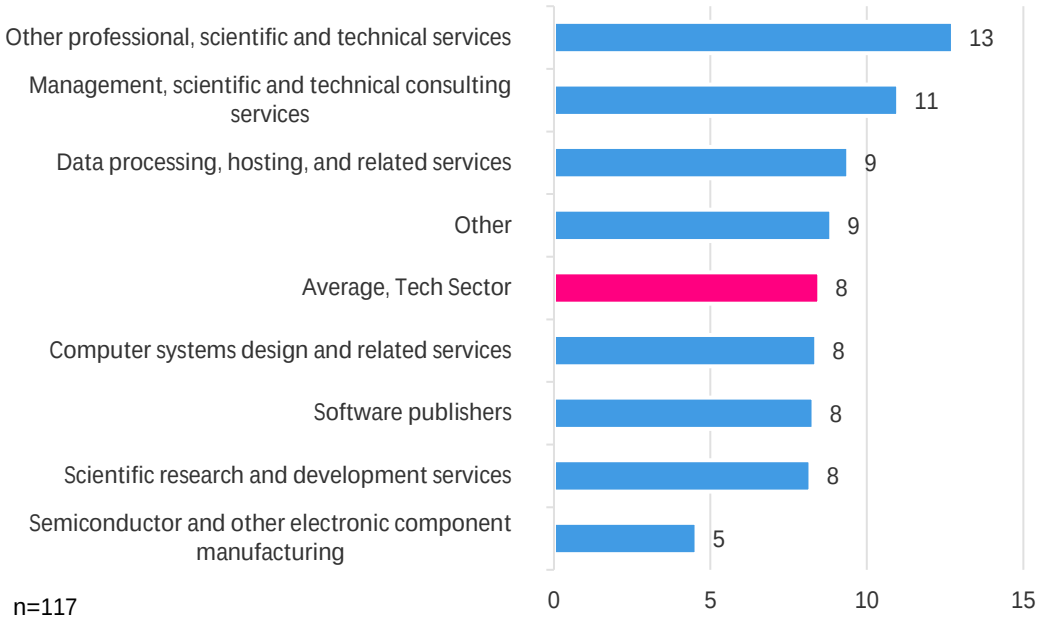


Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

The following chart summarizes the average experience level cited by Tech Workers, by industry. As visualized, the **average experience for the Tech Sector is 8 years**. The industries with the highest average years of experience appear to be consulting industries, namely, *Other professional, scientific and technical services*, and *Management, scientific and technical consulting services*. The *Semiconductor and other electronic component manufacturing* industry appears to have a workforce that skews towards less experienced workers, which likely indicates that workers in that industry are relatively younger.

[27] Aboriginal identity encompasses First Nations, Métis and Inuk (Inuit)

Figure 51: Tech Workers' years of experience, by industry[28]



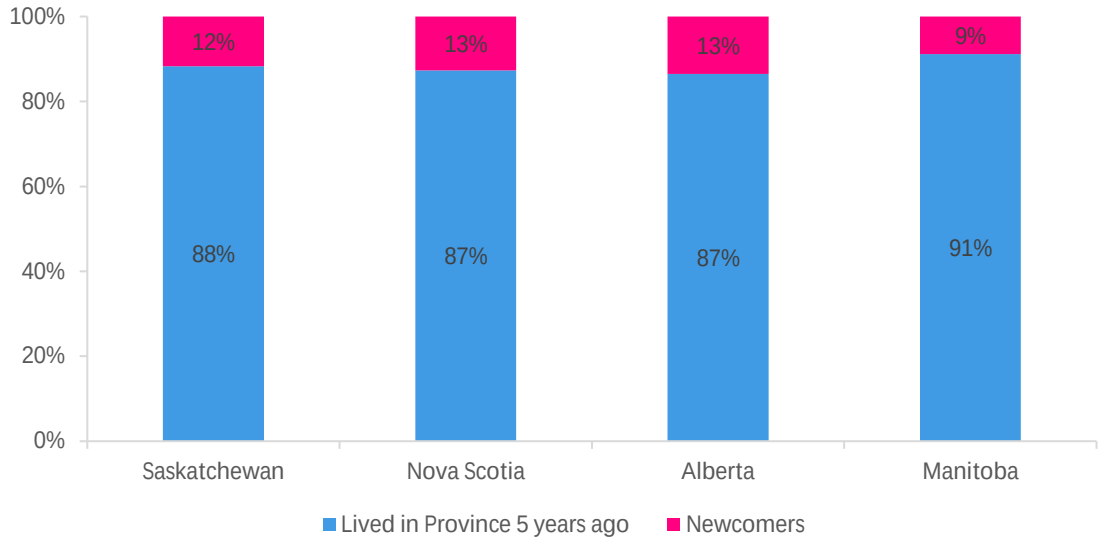
Source: Saskatchewan Tech Sector Industry Survey 2019

8 years
Average experience for Tech Workers

The following chart shows the place of residence reported by Tech Workers in the 2016 Census. In broad terms, 12% of the workers in 2015 moved to Saskatchewan since 2010. Note that this figure includes post-secondary students that were studying outside of Saskatchewan and immigrants from elsewhere in Canada and internationally.

[28] This graphics shows industries for which the survey sample was n≥4. Other industries were consolidated in the "Other" category.

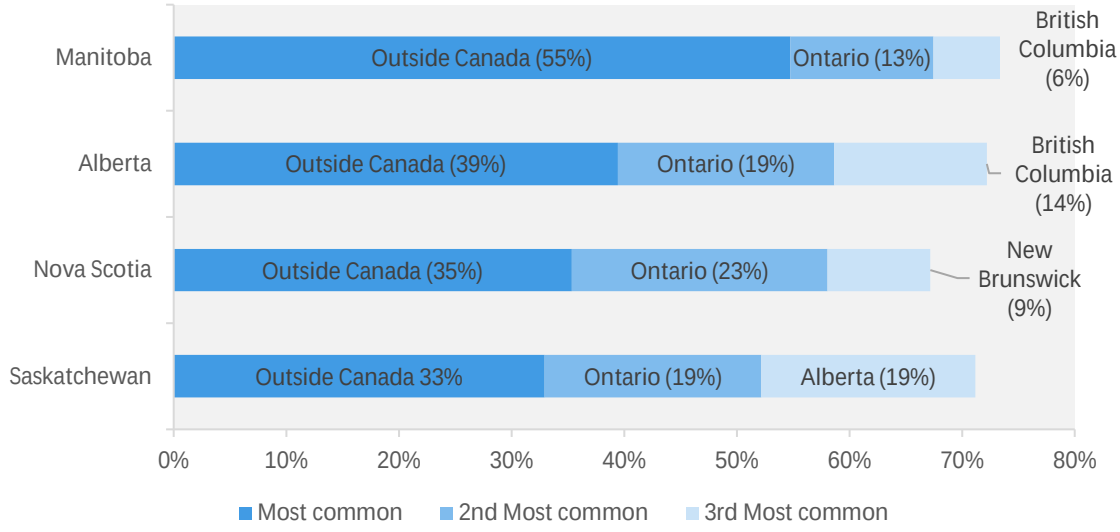
Figure 52: Provenance of workers in the Tech Sector (place of residence 5 years ago), 2015



Sources: Statistics Canada, Census of Population 2016

The **largest cohort of newcomers to the province came from outside Canada**, followed by Ontario. As seen in the figure below, immigration and Ontario appear to be the top sources for newcomers for all comparable provinces.

Figure 53: Provenance of newcomers (% of Newcomers) in the Tech Sector (place of residence 5 years ago), 2015



Sources: Statistics Canada, Census of Population 2016

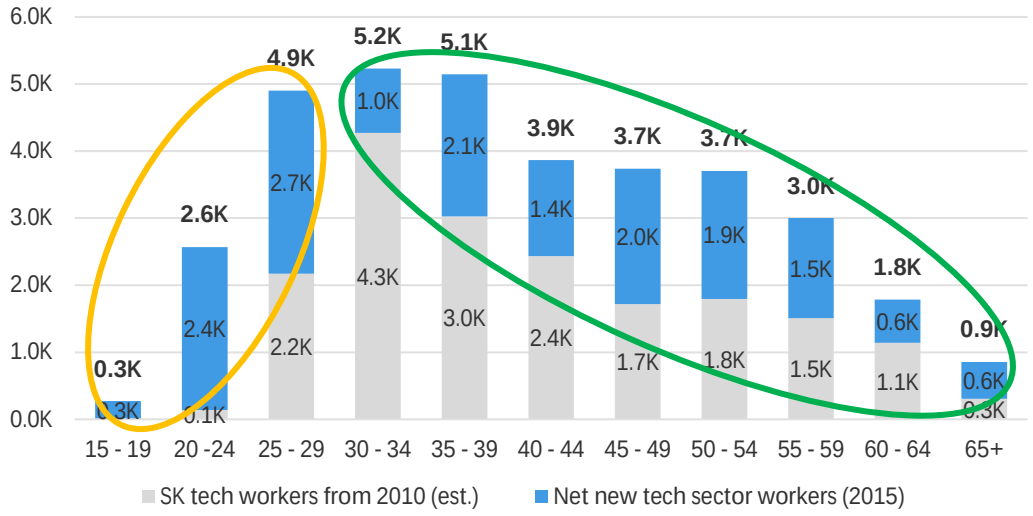
Migration from Ontario could be due to the lower cost of living in Saskatchewan, as demonstrated for Toronto in the cost of living analysis in Section 3.3.

The following chart illustrates the results of Nordicity's **net migration analysis**. This analysis uses several sources of data to assess changes in the composition of Tech Workers between the 2011 National Household Survey and the 2016 Census of Population. The analysis is performed by applying Statistics Canada's Life Tables to the gender and age distribution of Saskatchewan Tech Workers in 2010 to estimate the influence of mortality over the following five years. Survivors are then assumed to have aged five years since 2010 and then compared to the age distribution of Tech Workers in 2015, as reported in the 2016 Census. The difference between these populations (illustrated in blue) accounts for several sources of changes:

- Immigration to Saskatchewan from the rest of Canada and other countries;
- Emigration from Saskatchewan to the rest of Canada and other countries;
- Individuals that changed careers into or out of Tech Occupations within Saskatchewan;
- New Tech Student graduates that are hired into Tech Occupations within Saskatchewan; and
- Retiring Saskatchewan Tech Workers.

As illustrated below, both recent graduate-aged (as indicated by the yellow oval) and older, likely more experienced workers (as indicated by the green oval) have entered Saskatchewan's tech workforce in large numbers between 2010 and 2015. As highlighted in Section 2, this finding suggests that the shortage of senior talent, as reported by Tech Companies, is a reflection of wider (national/global) **talent supply issues in a rapidly growing sector**, rather than an unavailability of talent –the workforce demographics clearly show growth in the age groups for which the most acute shortages were reported.

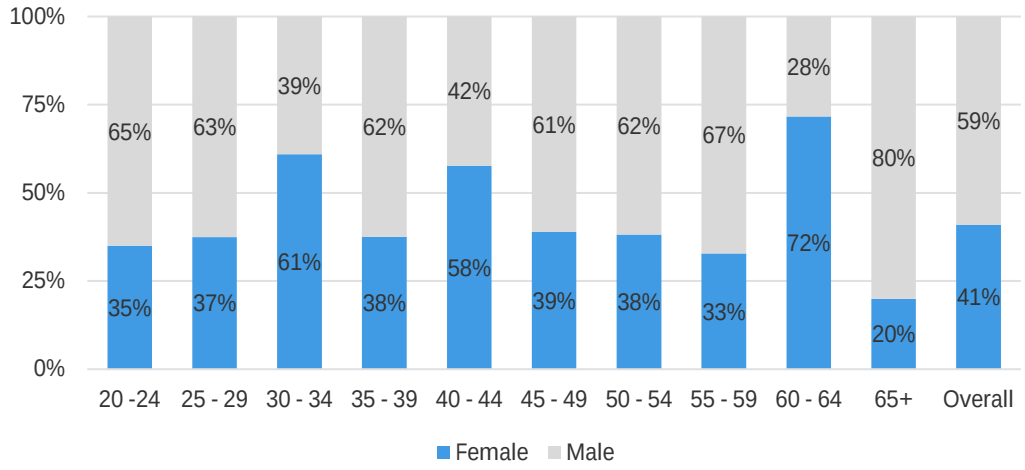
Figure 54: Saskatchewan new Tech Workers, by age (2010-2015)



Sources: Statistics Canada, National Household Survey, 2011; Statistics Canada, Census of Population 2016; Statistics Canada, Life Tables

The following figure shows the gender distribution of new Tech Workers in Saskatchewan within each age bracket. Overall, the **gender distribution of new Tech Workers** entering the sector from 2010 to 2015 was essentially the same as the current demographics of the sector, with roughly three males for every two females entering the workforce. Note also that the only age groups with a significant proportion of females entering the workforce (i.e., 30-34, 40-44, and 60-64) represent small segments of the new workforce in absolute terms, as illustrated in the chart above, and therefore do not contribute significantly to the overall average.

Figure 55: New Tech Workers in Saskatchewan (2010-2015), by gender and age



Sources: Statistics Canada, National Household Survey, 2011; Statistics Canada, Census of Population 2016; Statistics Canada, Life Tables;

In essence, a Tech Worker in Saskatchewan is most likely to be "young" (25 – 39 year age group) and male, with a university degree. The worker is also more likely to be a visible minority than the overall workforce but less likely to identify as Indigenous.

4.2 The Supply of Tech Talent in Saskatchewan

4.2.1 Current State

> "Now that you can find tech jobs in Saskatchewan, you can expect younger workers to stay for about 3 years, though longer for the older workers."
> Tech Sector Company

Regarding the **availability of talent**, stakeholders across the sector generally agreed that junior talent is comparatively more available than workers with other levels of experience. On the other hand, there was wide agreement that there is a significant **lack of senior talent** for the reasons cited by stakeholders below:

- The sector is newer in Saskatchewan, meaning they have had less time to develop the senior talent needed from within;
- Workers that develop skills in Saskatchewan often migrate to larger centres such as Vancouver, Toronto or Silicon Valley to advance their careers;
- Companies are less comfortable hiring remotely for senior management roles, given that responsibilities are likely to focus on managing local teams; and
- Growth in the number of Tech Companies and investment into them is rapidly outpacing growth in labour supply – i.e., graduates.

Many specialized roles (e.g., machine learning) are being outsourced as they are hard to source from within the province. Part of this trend may relate to the fact that many specialized tech jobs have certification barriers (e.g., MS server certification) which are hard to acquire in Saskatchewan.

However, it was also noted that being too 'technical' can mean that you are pigeon-holed and make it difficult to climb the ranks to executive level positions – i.e., there is a perception that "technical people don't make good managers". In order to succeed, soft skills such as managerial and

communication skills as well as time management are increasingly sought after. However, this **combination of skills remains difficult to source.**

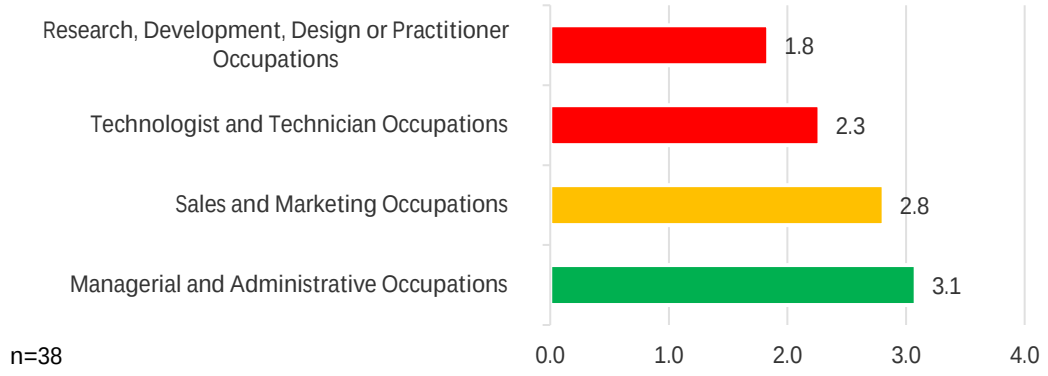
As noted in Section 3.3, the Saskatchewan does not pay the same as Toronto or Vancouver. As such, Tech Companies are using the lifestyle benefits (e.g., affordability, short commutes and tight-knit community) as well as company culture as important parts of the pitch to attract workers. Moreover, as the cost of living analysis in Section 3.3 suggests, the lower cost of living in Saskatchewan means that **workers are able to keep more of their income** as surplus than in other jurisdictions.

In addition to trying to attract workers to Saskatchewan from other larger, more expensive tech centres, many **companies are recruiting internationally**. Nearly all the large Tech Companies engaged are using VanHack to source labour from outside the country. Data supplied by VanHack showed that the platform facilitated 21 new international hires in 2018 and another 14 in 2019 in Saskatoon.

Regarding **retention**, it was noted that there is more movement (e.g., cross pollination) in the sector. There were *some* instances of poaching by other firms reported – bigger Tech Companies were mentioned alongside companies like banks, crown corporations and US companies like Digital Ocean. This type of move is usually accompanied by a drastically increased salary but can also be due to other factors such as flexibility, work-life balance, and benefits. As such, smaller companies are focusing on creative **incentives to stay** such as RRSP's, longer vacations, etc.

In response to the skilled labour shortage and difficulties with retention, **industry survey respondents expressed the relative challenge they experienced in filling specific types of positions**. The following chart shows that the most difficult positions to fill are in research, development, design or practitioner occupations.

Figure 56: Difficulty of hiring specific occupations



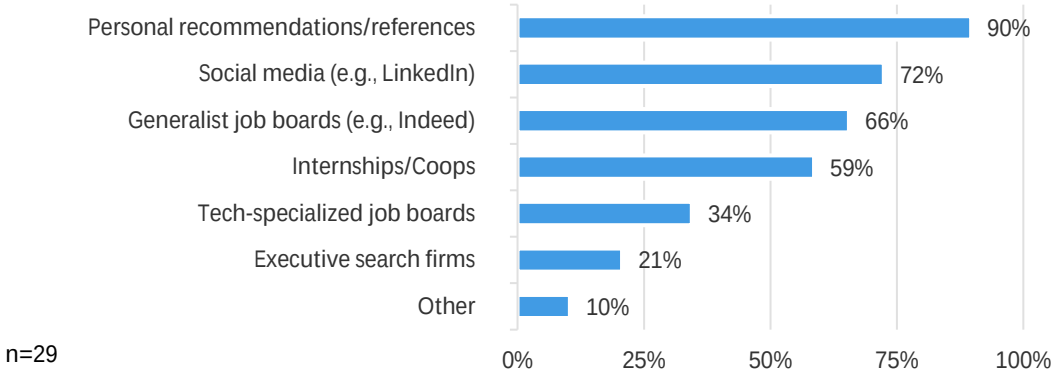
Source: Saskatchewan Tech Sector Industry Survey 2019
Note: Responses to this question were collected using a ranking interface. The results depicted here show the average rank of each occupation – a low number indicates an occupation that was more difficult to hire.

To find the personnel they are looking for, Tech Companies deploy a range of methods, as illustrated in the following figure. Nine in ten respondents **leveraged their personal network to make meaningful hiring recommendations**. Despite the oft-stated need for senior talent, only one third of these companies reported using specialized job boards, and one in five used executive search firms. This finding reflects a commonly cited preference for

> "We spend a lot of time on HR now – you used to be able to fill roles with word of mouth or asking professors at the university. Now there is lots of competition for these people."
> Tech Sector Company

hiring local as a means for supporting and building the local Tech Sector as well as the desire to minimize the administrative burden and cost from hiring elsewhere. While specific websites or platforms were not discussed systematically, LinkedIn and Indeed were referred to most commonly, while the National Job Bank or Saskjobs.ca were not specifically noted by interviewees during stakeholder interviews.

Figure 57: Hiring methods used by Tech Companies



Source: Saskatchewan Tech Sector Industry Survey 2019

Insights from the Industry survey indicate that about 16% of Saskatchewan Tech Companies' existing workforce was hired within the last 12 months. Of these new hires, 75% were sourced from the province's local talent pool.

16%
New hires over the last 12 months

75%
Of new hires locally sourced

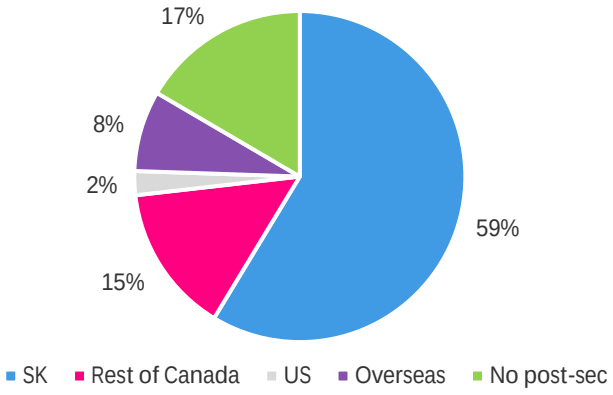
Source: Industry survey (n=30)

As described above, the current state of tech talent supply is a significant challenge for Saskatchewan Tech companies. These companies are seeking both technical and admin/business focused roles primarily using personal recommendations and social media to source talent.

Graduate Analysis

The following chart illustrates where Saskatchewan Tech Workers obtained their highest level of educational attainment at the post-secondary level. About three fifths of Saskatchewan Tech Workers pursued their highest level of educational attainment in the province.

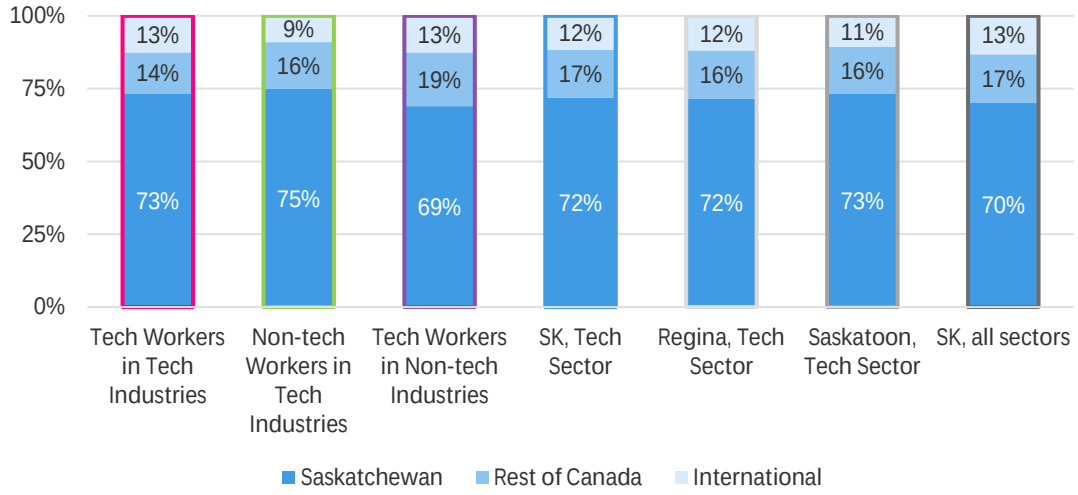
Figure 58: Location where SK Tech Workers' highest level of post-secondary education was attained



Source: Statistics Canada, Census of Population 2016
Note: Broken out figures may not sum to totals exactly due to rounding.

The following chart shows where Saskatchewan workers obtained their highest level of post-secondary education. In that regard, Saskatchewan's Tech Workers/industries are roughly in line with non-tech occupations and industries in the province.

Figure 59: Location of workers' highest post-secondary study, by tech/non-tech occupations and industries

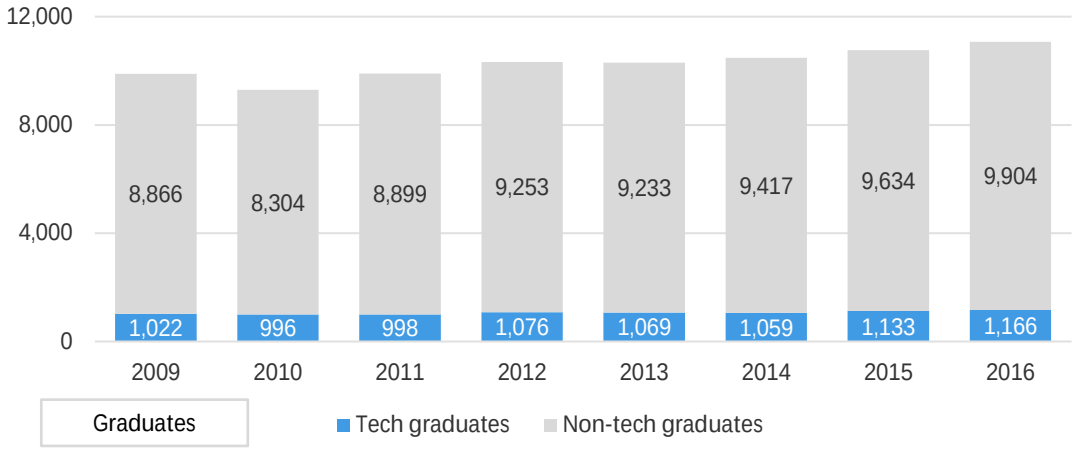


Source: Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours
Note: Broken out figures may not sum to totals exactly due to rounding.

The following chart illustrates the number graduates that Saskatchewan's post-secondary institutions produced from 2009 to 2016, broken out by tech and non-tech fields of study. Tech graduates were designated based on the areas of study reported by Saskatchewan Tech Workers. The **number of**

Tech Graduates increased by 14% between 2009 and 2016, compared to only a 12% increase in all other fields.

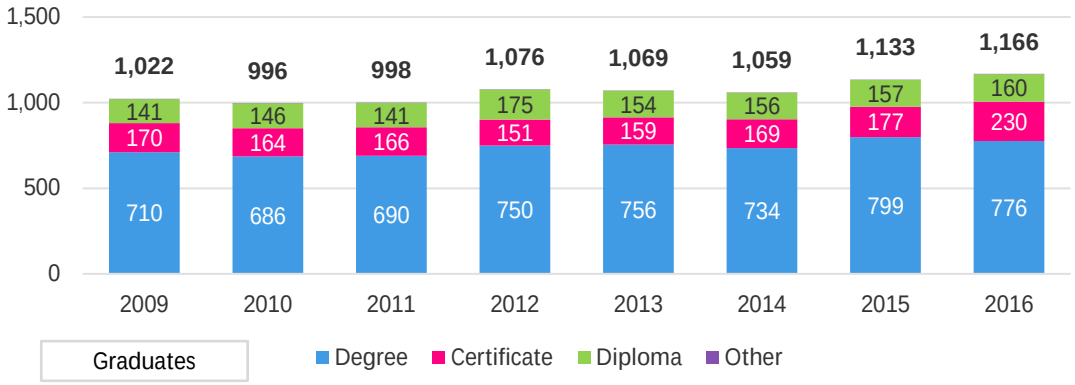
Figure 60: Number of graduates from accredited post-secondary educational institutions in Saskatchewan[29]



Sources: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, PSIS custom tabulation

As illustrated in the figure below, the distribution between different **degree types largely remained the same** during this period, although there was a notable increase in the number of certificates delivered in 2016.

Figure 61: Number of Tech Graduates, by degree type

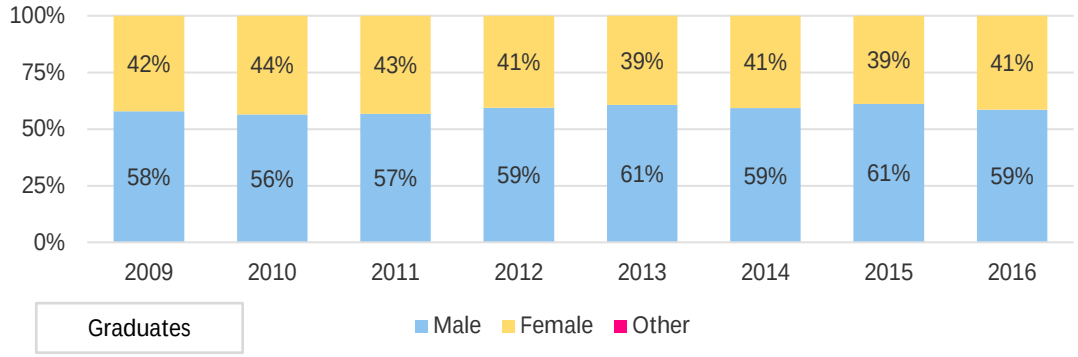


Sources: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, PSIS custom tabulation

[29] The definition of Tech Students is based on a secondary mapping process from census data. To illustrate how tech graduates were identified, please consider the following example: in the Saskatchewan workforce, 52.7% of people who studied computer science (at their highest level of educational attainment) were employed in tech occupations. To produce this chart, we therefore assume that 52.7% of computer science graduates are destined for work in the Tech Sector.

The **gender distribution of Tech Graduates remained fairly consistent** over the eight years under review, and these figures are in line with the gender distribution of Saskatchewan Tech Workers, as well as the gender split of new Tech Workers that entered Tech Occupations in Saskatchewan between 2010 and 2015. In all these analyses, there is a 3:2 ratio between males and females (see Section 4.1).

Figure 62: Gender of Tech Graduates



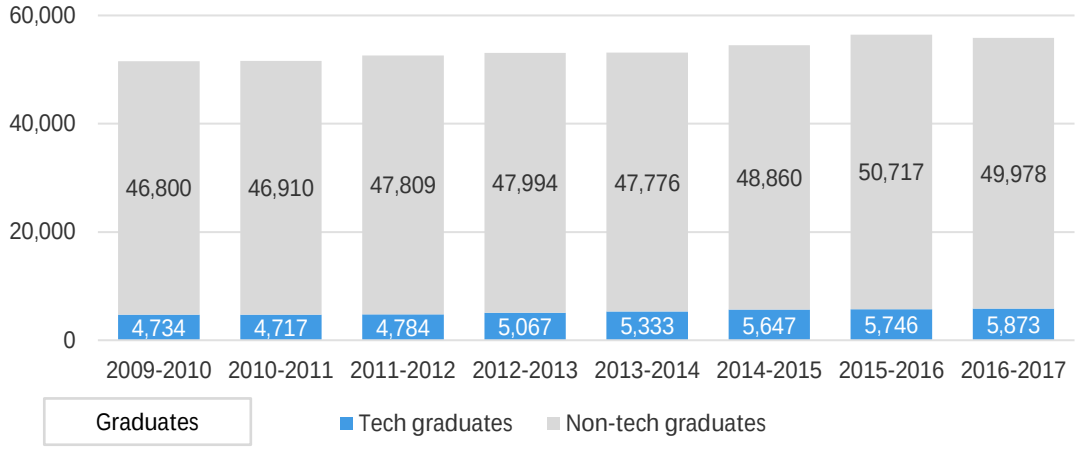
Sources: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, PSIS custom tabulation

In summary, the number of tech related graduates is on the rise, related to other fields helping to supply the 75% of new local hires. More than half of graduates are completing degree programs and about three fifths of these graduates are male.

Enrollment Analysis

While graduates provide a backward-looking view of post-secondary institutions' output, enrollment is a leading indicator of future outputs. In contrast to the relatively steady growth of graduates during this period, the number of **Tech Student enrollments in Saskatchewan saw a 24% increase between 2009 and 2016, in contrast to only 7% growth in all other fields of study.**

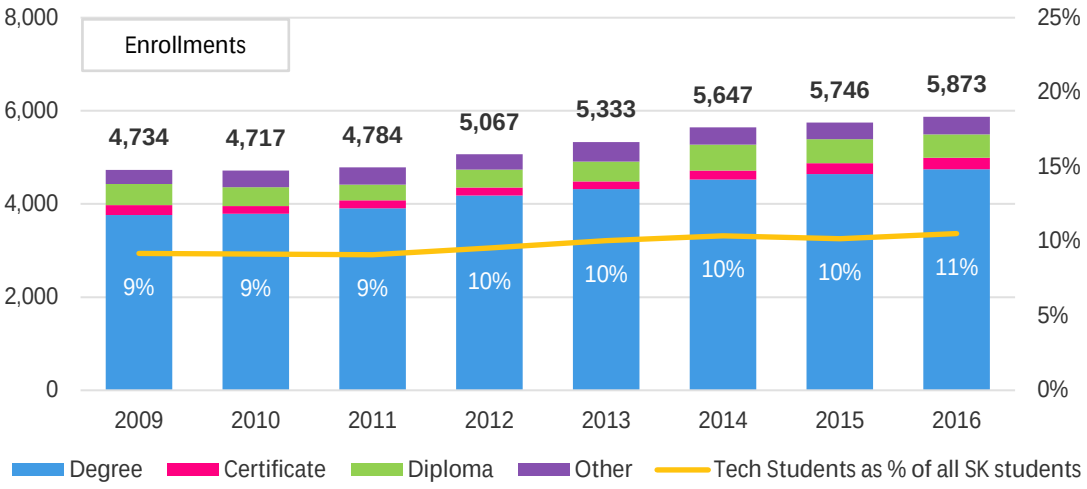
Figure 63: Graduates from accredited post-secondary educational institutions in Saskatchewan



Sources: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, PSIS custom tabulation

As illustrated in the following chart, this growth was primarily driven by an increase in degree programs. Overall, Tech Students' increasing share of total enrollment suggests that there will be a faster **growing pool of skilled junior workers** progressively entering the market in the near future.

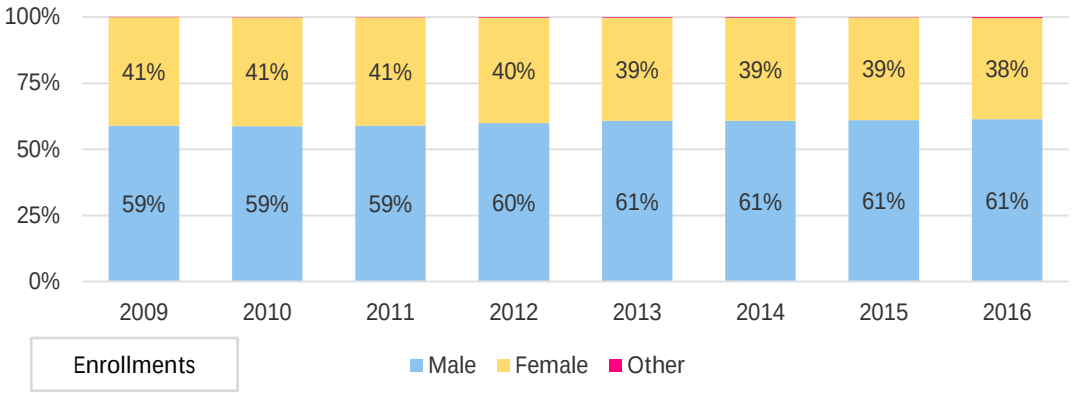
Figure 64: Number of Tech Students, by degree type, enrollments



Sources: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, PSIS custom tabulation

A closer look as Tech Students enrolled in various degree programs over the 2009-2016 period indicates not only that female students account for 40% of the total enrollments, and that their share decreased by two points. As such, the leading indicator suggests that Tech Graduates of the future are likely to perpetuate (and even slightly widen) the gender imbalance among Saskatchewan's Tech Workers.

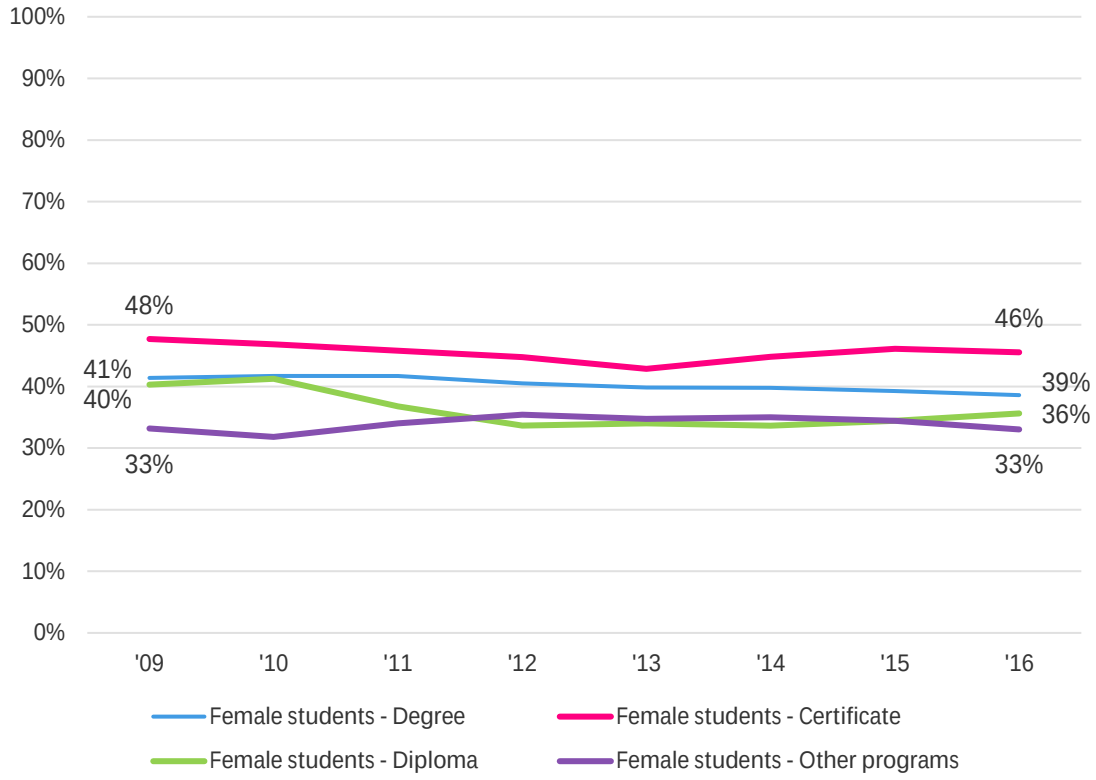
Figure 65: Gender of Tech Students, enrollments



Sources: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, PSIS custom tabulation

The following Figures provide a breakdown by credential type and gender. This data confirms that, in relative shares, female Tech Students have been flat or have become less represented across all credential types during the 2009-2016 period. Female enrollment in certificate programs are the most equal of all credential types, with 46% of students comprised of females; on the other hand, female students represent about only one third of Tech Students enrolled in Diploma programs.

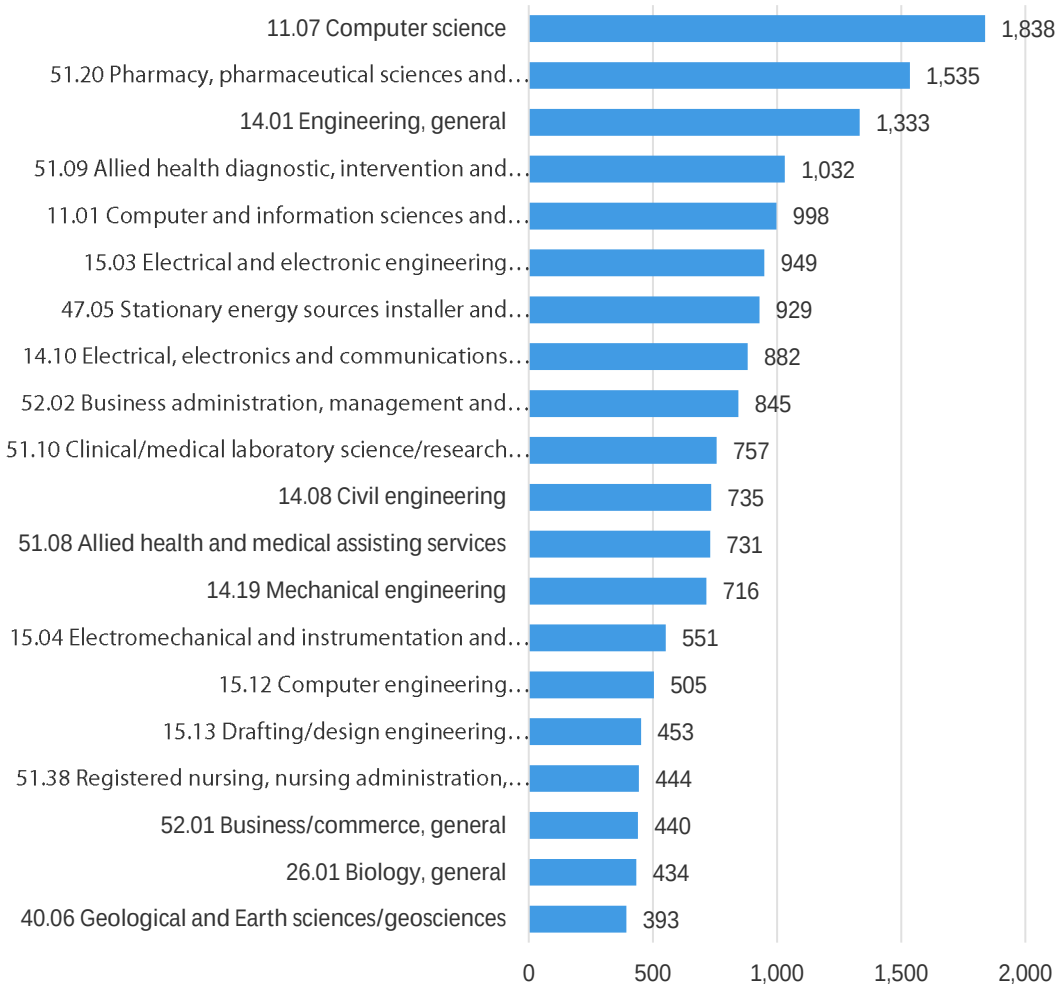
Figure 66: Percentage of female Tech Students enrolled in degree programs



Sources: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Statistics Canada, PSIS custom tabulation

The following figure presents the most prevalent fields of study in which Tech Workers hold degrees in Saskatchewan. **Computer and information sciences, Pharmacy and pharmaceutical sciences, Engineering and Allied health diagnostics are the top five subject matter areas.** These categories align with corresponding jobs that are concentrated in the industries that exhibited the strongest employment growth, including *NAICS 5415 – Computer systems design and related services* and *NAICS 4461 – Health and personal care stores*, as well as two industries that are notable for being major employers in Saskatchewan's Tech Sector, including *NAICS 5413 – Architectural, Engineering, and Related Services* and *NAICS 5171 – Wired telecommunications carriers*. Altogether, these four industries employ the most Tech Workers in Saskatchewan, and this data suggests that they are poised for medium-term growth.

Figure 67: Top 20 fields of study reported by Tech Workers for their highest level of educational attainment (certificates, diplomas and degrees), 2016



Source: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, PSIS custom tabulation

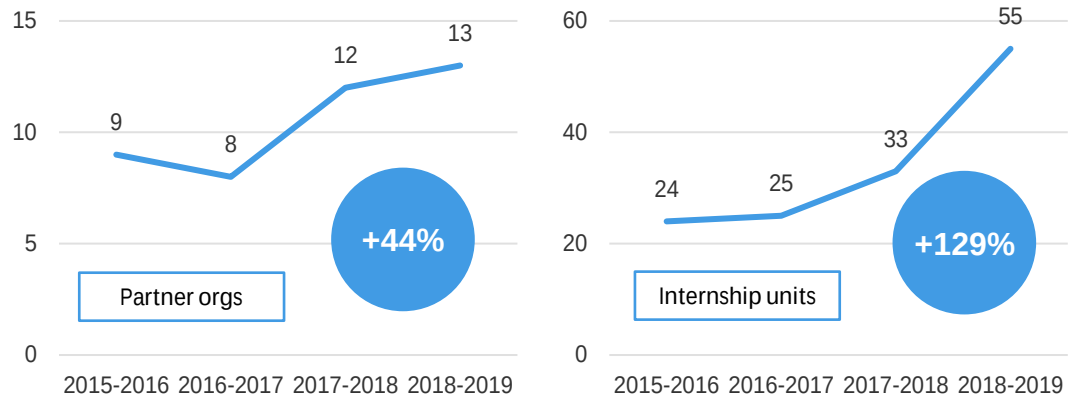
The enrollment analysis above suggests that interest in tech sector fields of study is on the rise. While the **tech sector talent shortage is a global concern**, there are signs that **Saskatchewan post-secondary institutions are increasing output** of students qualified to enter the tech sector. However, there remains an opportunity to improve on gender and ensuring that graduates' skills are employment ready.

Mitacs Analysis

Although accredited training programs typically bestow graduates with the occupational skills that they require to enter the workforce, Mitacs was developed to foster cutting edge innovation by developing and funding "partnerships between academia, industry, and the world – to create a more innovative Canada." More precisely, the idea behind Mitacs is that post-secondary students, especially those performing specialized research in graduate and post-graduate programs, are ideally positioned to participate in collaborative research with local companies. While large companies have the resources to connect directly with educational institutions and pull top talent, Mitacs was established to help perform this function for Canadian small and medium enterprises.

The following chart shows recent growth in the number of Saskatchewan companies that partner with the program alongside the number of internship units in the past four fiscal years. While the data start from a small base, **the number of internship units have more than doubled in the last four years** (with a notable uptick in 2018-2019) and the number of participating partner organizations have increased from 9 to 13. As such, the growing interest for Mitacs in the Saskatchewan Tech Sector, as heard through industry consultations, is consistent with the growth observed in other aspects of the Saskatchewan Tech Sector.

Figure 68: Number of Mitacs partner organizations and internship units[30] in Saskatchewan

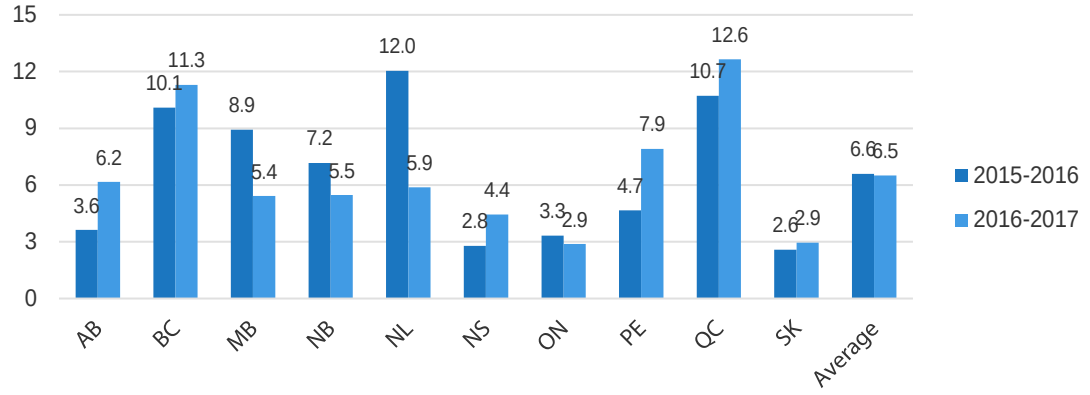


Source: Mitacs

The preceding charts illustrate the success of Mitacs' Saskatchewan office to prioritize support for the Tech Sector. However, the following figure shows that Saskatchewan has **comparatively low participation in terms of Tech Sector interns** per Tech Students relative to other provinces in 2016 and 2017. Although enrollment data (used as the base in this calculation) is not available after 2017, growth in the number of tech interns in Saskatchewan in the following two years (+50%, on a small base) was in line with the national increase (+49%) during that period.

[30] An internship unit represents a 4-month paid Full Time Equivalent (FTE) internship position.

Figure 69: Number of interns per 1,000 Tech Students enrolled, 2015-2017[31]



Source: Mitacs, PSIS custom tabulation

To explain Saskatchewan's lagging uptake of the program, it is important to note that Mitacs' program funding model is based on matching Mitacs funds equally with private sector contributions to its programs. In that context, the Mitacs portion of the cost is 40% funded by the provincial government and 60% funded by the federal government. In other words, every dollar invested by the provincial government in Mitacs programs can trigger an additional four dollars of funding from federal ($1.50) and private ($2.50) sources.

While the federal contribution in this funding model that is available to each province is based on its share of the national population, provincial funding is a discretionary budget item. At present, Saskatchewan leaves money on the table by contributing less than the amount that would be required to fully leverage federal funding available to the province, and in turn, attract matching funds from the private sector.

Looking ahead, based on this analysis and exchanges with stakeholders, the Tech Sector in Saskatchewan has the opportunity to better leverage Mitacs' support if certain barriers can be overcome:

- Sufficient provincial funding for Mitacs to leverage federal and private sector funding for Tech Sector internships in Saskatchewan; and
- Companies' willingness to take advantage of Mitacs' programs at a level that more closely matches other provinces, which may require IP policy modernization at post-sec institutions through which Mitacs funds are paid to interns.

4.2.2 Looking Ahead

Respondents of the industry survey indicated that they **expect to add an average seven people** to their headcount in the next 24 months (n=44). The survey indicates that Tech Companies will be looking to add research, development, design or practitioner occupations (on average 3 positions in the next 24 months), as well as sales and marketing occupations (three new positions as well). Tech

[31] This chart excludes 2017-2018 and 2018-2019 because of a 2-year delay in the publication of PSIS data, and therefore it does not convey the recent drastic increase in the number of interns in Saskatchewan (+50% in the last two years) and nationally (+49%). While this chart is somewhat incomplete, Saskatchewan certainly still lags other provinces as Saskatchewan has lagged the national increase in those two extra years.

Companies are also likely to open two technologist and technician occupations and one managerial and administrative position in the next two years (Industry survey, n=36).

> "We have a waitlist already. We need more space before we can think about trying to attract more students. Staff and space are limiting for us."
>
> Ron New, SaskPoly

It is evidently increasingly hard to find the right students as many universities are slow to adapt to changing need. Many stakeholders looked favourably upon possible means for working more closely with post-secondary institutions to help '**right-skill for the future.**' At the same time, it was agreed that SaskTech as been an important partner for post-secondary institutions in establishing industry **relevant program curriculum**. In addition to trying to keep up with the rapid pace of technical change, post-secondary institutions are also focusing on trying to develop **more 'well-rounded' tech graduates**, including business and communication skills as part of programs.

While it can take time for the larger post-secondary institutions to adapt to changing industry needs, many noted that Sask Polytechnic is nimble and is currently graduating more industry ready students. Co-ops and Mitacs were also noted for being very helpful to source and develop students for the industry. Interviews with representatives of post-secondary institutions noted the misaligned timelines (even when curriculum can be changed quickly) as a significant challenge. That is, even the most up to date curriculum takes 3-5 years to graduate students into the industry, by which time many of the learnings are 'out of date.' As quoted in the breakout box, keeping up with demand for tech related programs can also pose challenges.

There is a significant opportunity for post-secondary institutions to track their students' career trajectories post-graduation. However, it was noted by one interviewee that this can be challenging as this usually falls under an alumni relations portfolio, meaning it is often outside the control of program heads. Despite the lack of data, anecdotally it was noted that **a significant majority of graduates stay in the province.**

International students are increasingly drawn to tech-related programs at the University of Saskatchewan (and the Regina campus of Sask Poly). More specifically, there are increasing numbers coming from countries impacted by changes to USA visa regulations. Importantly, many of these students stay in the province after graduating, due largely to contributing to a faster process for obtaining permanent resident status.

4.3 Demand for Tech Workers in Saskatchewan

This section takes what is known about the current Tech Workforce in Saskatchewan (i.e., who are Saskatchewan Tech Workers and where did they come from) and presents Nordicity's analysis of what the sector will look like in the future.

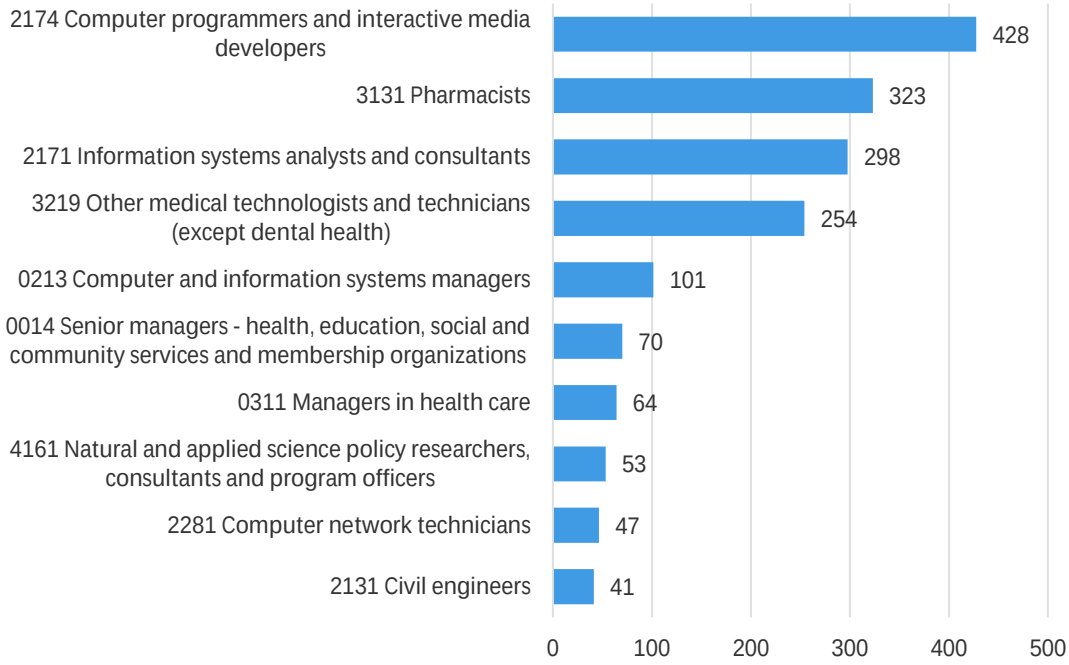
> "Between 2017 and 2018, there was a 500% growth in capital investment into the Tech Sector – compare that to only 16% growth in USask tech graduates and you can see why there is a misalignment of supply and demand for talent."
>
> Tech Sector Company

In order to conduct this analysis, Nordicity developed a workforce forecasting model, which was supplemented by more detailed assumptions derived from interviews with

Tech Companies.[32] As such, the occupational forecast presented in this section is based on a blend of historical trends which were then validated based on input from companies in industries that are the most prolific employers of Tech Workers.

The following chart illustrates the top ten Tech Occupations, ranked based on the cumulative number of employees that are expected to be added to Saskatchewan's workforce between 2018 and 2022. Looking to the list of occupations, **IT and health specializations represent the most significant contributor to employment growth**.

Figure 70: Top ten occupations by number of employees added from 2018 to 2022



Source: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

The three IT occupations that made it onto the top ten list[33] are collectively **forecast to increase by 827 employees** (15.1% growth from 2018 to 2022). Given that these are highly specialized and mobile occupations that are recruited from a national (and even international) talent base, even just keeping up with the Saskatchewan Tech Sector's historical rate of growth is anticipated to be a challenge. Health occupations, though those on the top ten list are projected to add 712 new workers, have more standardized career paths, educational curricula, and draw from a more localized labour market, so this portion of the workforce is expected to also experience less resistance to hiring.

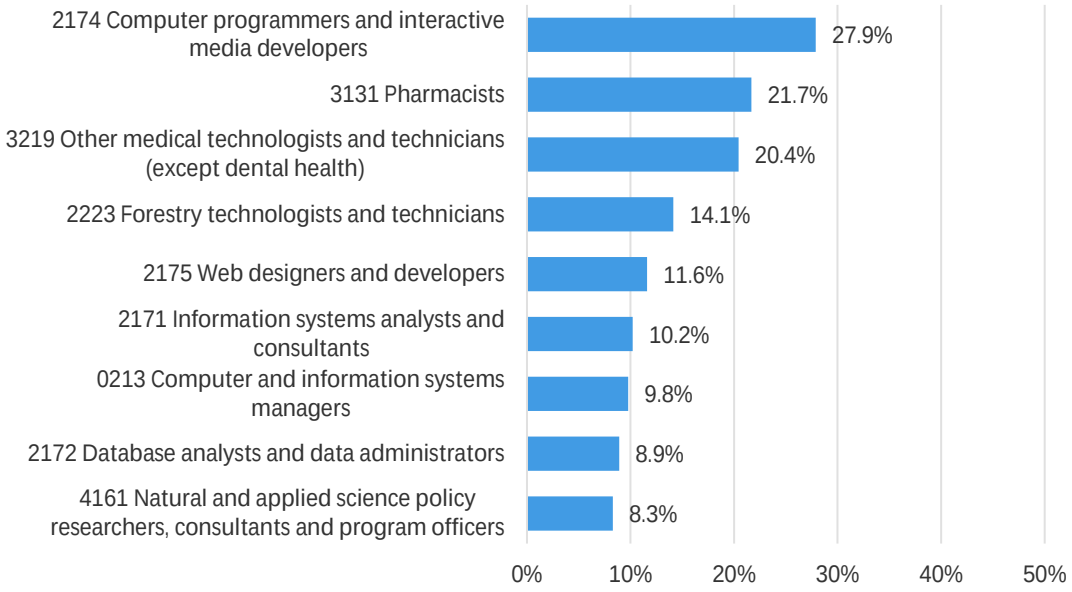
[32] Detailed methodology can be found in Appendix A.4.

[33] "IT occupations" in this context refers to *NOC 2174 – Computer programmers and interactive media developers*, *NOC - 2171 Information systems analysts and consultants*, and *NOC- 0213 Computer and information systems managers*

827 employees
expected to be added in top 3 Saskatchewan IT Tech Occupations from 2018 to 2022

Viewed from another perspective, the following chart presents the top ten list of occupations ranked by the highest growth rate from present levels of employment. Note that percentage increases are independent of the actual number of employees in each occupation (i.e., from 1000 to 1100 and from 10 to 11 are both 10% increases), so the occupations for which this top ten list overlaps with those appearing on the previous chart that are of the most interest – i.e., large percentage changes *and* large numbers of employees. This ranking should be interpreted as an indicator of the volume of new hires *relative to existing employees* in a given occupation. A high percentage rate of growth likely correlates to difficulty in mentoring young, less experienced entrants as they advance through their careers. Occupations with a high growth rate are also more likely to recognize this gap and seek out more senior employees to help manage large numbers of new, less experienced workers.

Figure 71: Top ten occupations by cumulative growth from 2018 to 2022



Source: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

Paralleling the ranking of occupations by the number of employees forecast to be added, *NOC 2174 – Computer programmers and interactive media developers* once again tops the list. This finding suggests that the shortage of experienced programmers that was widely reported by software-focused companies is likely to continue unless the underlying supply of such workers increases. Building from the focus on *NAICS 5415* companies in Section 3.4, it is worth noting that this industry employs 35% of all *NOC 2174 – Computer programmers and interactive media developers* in the province, so these companies must compete for workers with other industries that represent the majority of employment for these types of workers. Likewise, rapid growth in certain health occupations, particularly those with a patient-facing role (Opticians, Pharmacists, and Chiropractors), is projected to result in a similar shortage going forward in those occupations as well (though to a lesser extent).

Taken together, this market dynamic (i.e., a **high level of demand alongside evidence of low supply**) underscores the ongoing need for Saskatchewan Tech Companies to compete with

companies in other jurisdictions (nationally and internationally) to **attract workers with the necessary skillsets to the province.** The natural market response to such conditions is typically to find equilibrium through increasing compensation, although it is worth noting that prospective employees evaluate benefits holistically, including the overall attractiveness and amenities of the urban centres in which they will reside while working in Saskatchewan.

4.4 Working in Saskatchewan's Tech Sector

This section provides an overview of the challenges and opportunities for workers in the Tech Sector, particularly as they relate to finding jobs, career progress and job satisfaction. The data for the analysis in this section was primarily derived from the survey.

4.4.1 Availability of Jobs

The findings from the statistical analysis presented above is widely reflected by the sentiments of those working in the sector. It was generally agreed that there *are* available jobs in the sector, but they were narrow in options. For example, many are more entry-level and are in Regina (anecdotally, one stakeholder claimed that their analysis of Indeed.com listings revealed that 80% of tech jobs were located in Regina). Moreover, many still noted difficulties in workers' awareness of available jobs, citing poor advertising. This perception underscores the **need for a coordinating role** between talent and those seeking it (e.g., Hack Regina). These jobs present several barriers to entry such as rigid degree requirements, specific certifications, and often a minimum number of years of experience, even for relatively junior positions.

Some stakeholders suggested the Tech Sector has provided a 'fallback' opportunity for some who have lost resource jobs while others suggested there was room for improvement for redeployment of resource workers. However, it is widely recognized that the Tech Sector pays significantly less, making it less appealing for many who still hold onto hopes that they will eventually be able to return to their natural resource job.

For creative technologists and digital media talent, the removal of the film and TV credit and subsequent demise of the industry has **depleted digital media related tech jobs**. Furthermore, as noted in Section 3, the creation of this tax credit in 1998 helped spur the development of some of Saskatchewan's older Tech Companies. As a result of the drop in digital media related activity, one stakeholder indicated that he is now forced to settle for "remote post-production gigs on projects being developed in Vancouver and Toronto."

4.4.2 Job Satisfaction

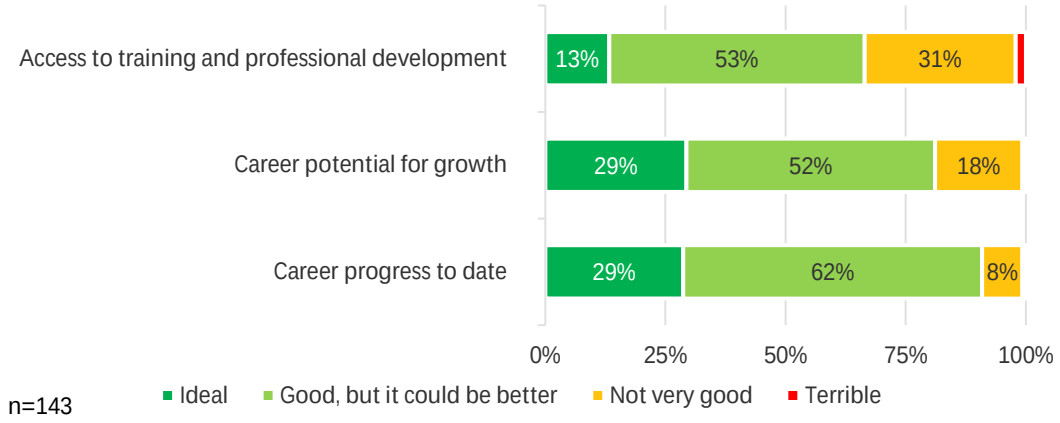
As illustrated in Figure 72, 91% of survey respondents reported being satisfied with their career progress and 81% see potential for growth in the years to come.

On the other hand, about a third of respondents reported that access to training and professional development leave a lot of room for improvement in Saskatchewan. Many believed training opportunities to be critical as they observe Saskatchewan Tech Sector is moving toward a freelance model, similar to one that is becoming more prevalent in Europe.[34] This trend also relates to the commoditization of some skills (e.g., consumer computer support) that is pushing wages down. To help overcome this trend, '**lifelong learning**' is critical for Tech Workers, that is, keeping up to date on latest skills/languages as many will become out of date every few years. Despite its importance,

[34] https://ec.europa.eu/epsc/publications/strategic-notes/future-work_en

most interviewees and roundtable participants agreed that Saskatchewan employers are not giving workers adequate time or support for professional development.

Figure 72: Tech Workers' satisfaction with their career progress



Source: Saskatchewan Tech Sector Industry Survey 2019

> "My internship in a mining company up north paid significantly better than my current full-time role in a technology company."
>
> Tech Sector Employee

While lower compensation is a key advantage for Tech Companies and a selling point for Saskatchewan, this is a pain point from the workers' perspective. In other words, salaries in the Tech Sector in the province do not see the same premium observed in Tech Hubs around the world, and in Canada, particularly in Toronto and Vancouver. At the same time, as also shown in Section 3.3, when adjusted for cost of living (e.g., income surplus), it is more cost effective to work in Saskatchewan's Tech Sector than in Toronto or Vancouver. That said, Figure 73 below reveals that local Tech Companies are perceived not to offer competitive salaries remains a challenge for Tech Sector workers.

Figure 73: Main challenges facing Tech Workers

Source: Saskatchewan Tech Sector Industry Survey 2019

Further research and stakeholder engagement revealed a more nuanced **binary in terms of wages**. That is, larger companies (primarily crown corporations) pay well, while smaller companies pay much less, especially when compared to Tech Companies in other jurisdictions.

Some positive workplace satisfaction factors were discussed. In particular, the province was noted for having **affordable housing** (although it was noted by many that the cost of living in Saskatchewan has been rising in recent years). Additionally, Tech Companies offer **good benefits,** prompting workers with families to be more inclined to work there. A strong **social safety net** in the province was also noted, meaning workers can afford to take greater risks, making it easier to survive should one go without a job for a period of time.[35] Interviewees speculated that this safety net has been made larger as a result of a close communities – i.e., because smaller cities allow for more **interconnectedness.**

4.5 Summary

Saskatchewan's tech labour force has its peak in the 25-39 age group and has a high proportion (48%) of workers with post-secondary credentials. While the provincial distribution is similar, Saskatchewan's average age (40.7) in the Tech Sector is slightly lower than that observed in other provinces. Within the province, Saskatoon skews younger than in Regina, which reflects sentiments that Regina's Tech Sector is known to be employed in government, crown corporations, and government contractors. 63% of the sector is male and a similar imbalance is found in other jurisdictions.

Visible minorities are relatively well represented amongst Tech Workers, especially for those employed in the Tech Industries (17%), as compared to 11% in the overall Saskatchewan workforce. Lower participation by Indigenous workers in Tech Occupations in Regina and Saskatoon suggests that Indigenous participation in the Tech Sector is most prevalent in non-tech occupations outside of urban centres. On average, Tech Workers had eight years of experience. In 2015, 12% of the workforce had recently moved to Saskatchewan (within the past five years). The largest cohort of newcomers came from outside of Canada (33%) followed by a fifth coming from Alberta and Ontario respectively.

Saskatchewan's Tech Sector is showing growth in new Tech Workers - both in terms of recent graduate-aged as well as older workers. This reflects that the talent supply issues are largely related to the global tech talent crunch, as opposed to a lack of available labour. Gender distribution of new Tech Workers entering the sector from 2010 to 2015 was essentially the same as the current demographics of the sector. About three fifths of Saskatchewan Tech Workers pursued their highest level of educational attainment in the province.

Speaking to the supply of labour many suggested that junior resources are available while senior sources remain difficult to source for a variety of reasons. As a result, many of the more specialized roles are being outsourced. At the same time, it is hard to source those with the right mix of soft and technical skills. To attract labour from Canada and internationally, many are using Saskatchewan's lifestyle and affordability case. While opportunities exist to source labour from elsewhere, many in the sector expressed a preference for using personal recommendations and networks.

16% of Saskatchewan Tech Companies' existing workforce was hired within the last 12 months. Of these new hires, 75% were sourced from the province's local talent pool. The number of Tech Graduates increased by 14% between 2009 and 2016, compared to only a 12% increase in all other

[35] While this finding was largely anecdotal, research such as this Maytree Report illustrates that Saskatchewan's welfare income was higher than most provinces in 2018.

fields. Tech Student enrollments in Saskatchewan saw a 24% increase between 2009 and 2016, in contrast to only 7% growth in all other fields of study. Speaking specifically to Mitacs registration, the number of internship units have more than doubled in the last four years. However, Saskatchewan has comparatively low participation in terms of Tech Sector interns per Tech Students relative to other provinces in 2016 and 2017.

Looking forward, respondents of the industry survey indicated that they expect to add an average 7 people to their headcount in the next 24 months. More specifically, Tech Companies are likely to open two technologist and technician occupations and 1 managerial and administrative position in the two years to come. As the sector grows stakeholders are looking to universities and experiences like co-ops or Mitacs internships to develop the local talent supply that is needed to sustain the growth. Looking to specific future occupation growth, IT and health specializations represent significant growth opportunities. The three IT occupations that made it onto the top ten list are collectively forecast to increase by 827 employees (15.1% growth from 2018 to 2022).

While jobs do exist in the sector, many working in the sector expressed that there were limitations in the type of jobs and means for being aware of existing opportunities indicating a need for more coordination. In terms of job satisfaction, 91% of respondents reported being satisfied with their career and 81% see potential for growth in years to come. Half of survey respondents indicated that the inability of local Tech Companies to offer (nationally/internationally) competitive wages was a key challenge for them. On the positive side, affordable housing was a key benefit, as was intangible benefits such as a tight-knit communities and strong social safety net.

5. Economic Impact of Saskatchewan's Tech Sector

This section presents the results of Nordicity's economic impact assessment of Saskatchewan's Tech Sector. It begins with an explanation of the scope of the analysis, followed by the impact figures.

5.1 Scope of Economic Impact Analysis

The scope of the Tech Sector addressed in this analysis includes the economic activity associated with Tech Companies (including non-tech as well as Tech Workers) and Tech Workers employed in non-tech industries.

Some economic impact assessments (such as the one conducted *for NAICS 5415 – Computer systems design and related services* earlier in this report) use Input-Output modelling to estimate the spin-off effects associated with a) companies' purchases from supplier industries and b) the re-spending of labour income generated in the target industry as well as its suppliers. By contrast, the analysis presented in this section is limited only to the ***direct economic impacts* of the Tech Sector**.

The reason for this limitation in scope is that Input-Output tables use data collected about inter-company purchases through supplier relationships to model how commercial and household expenditures circulate through the economy of specific geographical areas (e.g., Canada, provinces, tourism regions, etc.). Because the Tech Sector is a collection of industries, **a portion of the total Tech Sector revenue found in this report consists of purchases between companies within the Saskatchewan Tech Sector.** This means that an Input-Output model would double-count expenditures within the sector: intra-Tech Sector expenditures would first be counted as direct impacts, and then as spin-off impacts by modelling labour income and operating surplus at supplier industries. While Input-Output models can be adapted to specialized industrial groupings, this work was out of scope in the context of the present engagement.

As such, this section assesses only the direct economic impacts of the Tech Sector. In this analysis, direct GDP is comprised of the sum of two components: Tech Sector labour income and Tech Companies' operating surplus. In this context, it is helpful to think of GDP as representing the total value added by industries in question – specifically, GDP is the amount of value (over and above the cost of materials and supplies) that Saskatchewan Tech Sector companies and employees created in the form of products and services that they sold. The following section addresses each of these components in turn.

5.2 Economic Impact

The following table summarizes Nordicity's assessment of Tech Sector labour income. The total for the Tech Sector includes all labour income in the Tech Industries and that of Tech Occupations in non-tech industries.

Table 10: Saskatchewan direct labour income, by non-tech and Tech Industries and Occupations

Category	Direct Labour Income
Tech Industries	$2.2B
NAICS 5415	$0.3B
All other Tech Industries	$1.9B
Non-tech industries	$26.6B
Tech Occupations	$1.8B
Non-tech occupations	$24.8B
Total Tech Sector	**$3.9B**
Total Saskatchewan	**$30.5B**

Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours

In order to determine the operating surplus of Saskatchewan Tech Companies, Nordicity referred to Industry Canada's Financial Performance Reports to obtain the profitability and typical expenditures of Tech Companies in Saskatchewan. Where Saskatchewan-specific data was unavailable, Nordicity drew from statistics at the national level.[36]

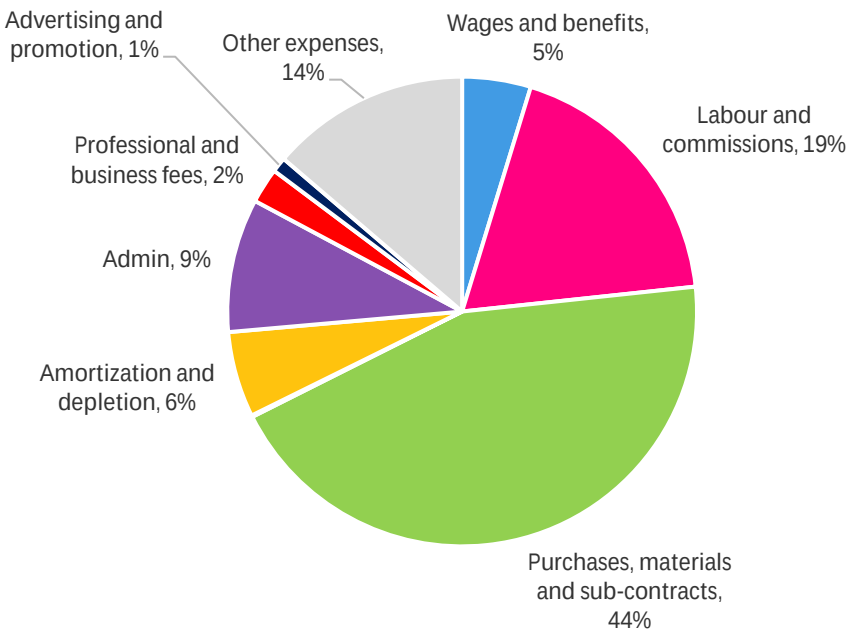
Based on this analysis, the average (aggregate) profitability of Tech Companies in Saskatchewan is 7.05%.[37] On $10.2 billion in revenue, this yields an aggregate operating surplus of $0.7B.

The following chart illustrates the average expenditure profile of Tech Companies in Saskatchewan.

[36] Industry Canada publishes Financial Performance Reports for NAICS at the provincial level for companies with between $30,000 and $5,000,000 in revenue. In some cases, certain industries were not available at the provincial level (i.e., data was suppressed due to confidentiality). Additionally, data for companies with revenue between $5 and $20 million in revenue are available only at the national level. Nordicity preferentially used Saskatchewan-specific data within these constraints.

[37] The methodology is explained in preceding paragraph. Sources include: Nordicity Analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports

Figure 74: Aggregate Tech Industries expenditure profile



Sources: Nordicity Analysis; Statistics Canada, Census of Popuation 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports

The following table shows the two components of direct GDP generated by the Tech Sector in Saskatchewan in 2018.

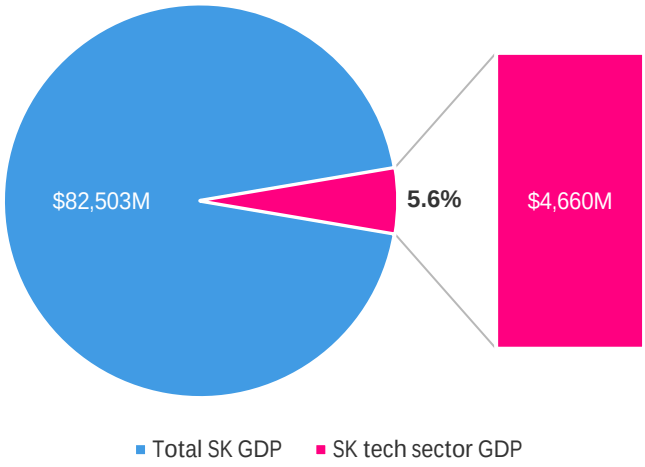
Table 11: Breakdown of direct GDP generated by the Saskatchewan Tech Sector in 2018

Component of GDP	Dollar Value
Labour income	$3,942 M
Operating surplus	$717 M
Total Tech Sector GDP	**$4,660 M**

Source: Nordicity analysis; Statistics Canada, Census of Population 2016 and Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports

As illustrated in the following chart, Nordicity estimates that Saskatchewan's Tech Sector generated direct GDP of $4.7 billion in 2018, which represents 5.6% of Saskatchewan's total GDP.

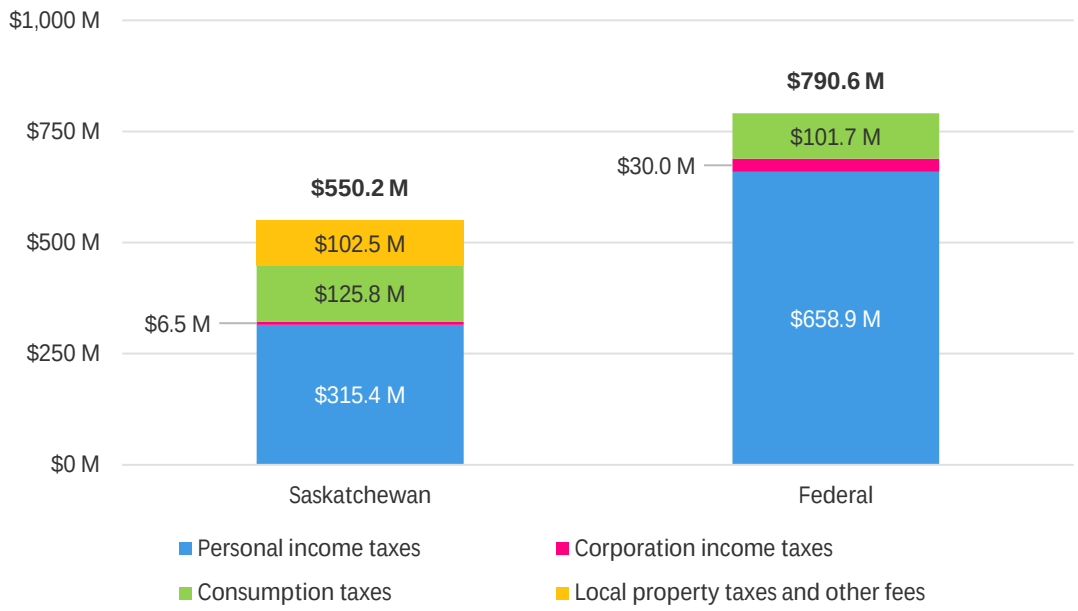
Figure 75: Saskatchewan's Tech Sector direct GDP, 2018



Sources: Nordicity analysis; Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports; Government of Saskatchewan, Key Economic Indicators Dashboard

Based on the economic activity quantified above, Nordicity estimates that the **Saskatchewan Tech Sector contributed $550M to provincial and municipal tax coffers, and $791 in federal taxes in 2018**.

Figure 76: Direct fiscal impact of Saskatchewan's Tech Sector, 2018



Source: Nordicity analysis (MyEIA™); Statistics Canada, Census of Population 2016; Statistics Canada, Labour Force Survey; Statistics Canada, Survey of Employment, Payrolls and Hours; Industry Canada, Financial Performance Reports

5.3 Summary

An economic impact assessment was conducted based on the activity associated with Tech Companies (including non-tech as well as Tech Workers) and Tech Workers employed in non-tech industries. While some estimates (such as the one conducted for *NAICS 5415 – Computer systems design and related services* earlier in this report) use Input-Output modelling to estimate the spin-off effects, this assessment is limited only to the direct economic impacts of the Tech Sector. This methodological decision was to avoid the possibility of double counting as a result of purchases between companies within the sector.

Based on Nordicity analysis, the average (aggregate) profitability of Tech Companies in Saskatchewan is 7.05%. On $10.2 billion in revenue, this yields an aggregate operating surplus of $0.7B. Nordicity estimates that Saskatchewan's Tech Sector generated direct GDP of $4.7 billion in 2018, which represents 5.6% of Saskatchewan's total GDP. Based on this economic activity, Nordicity estimates that the Saskatchewan Tech Sector contributed $550M to provincial and municipal tax coffers, and $791 in federal taxes in 2018.

6. Key Observations

The results of statistical analysis and sector engagement described in detail in the sections above portray a Tech Sector in Saskatchewan that is growing and actively seeking the talent needed to sustain such growth. As the increasing use of technology continues to disrupt sectors and create new opportunities in Saskatchewan, further research can enable decision-makers to make informed decisions regarding key considerations such as policies and support programs for: business, labour and education; post-secondary curricula; and industry advocacy. As such, Nordicity has proposed some opportunities further research that will allow Saskatchewan to be on the forefront of data-driven decision making for foster Tech Sector growth:

- **Long form survey** - A more fulsome survey of Tech Companies in future iterations of the study could provide immense value. While Nordicity developed a short form survey to increase the likelihood of updated information, some stakeholders perceived the questionnaire to be short – and, at times, too limited in scope. It is understood that Tech Sector is difficult to reach through surveys – however, a coordinated and comprehensive outreach and/or mandating responses through industry organizations would make a more rigorous process possible in the future. This objective can be accomplished as a mandatory information collected in a funding program that is broadly used by Tech Companies in the province.
- **Longitudinal analysis of business formation and failure** - While the study uses the Business Register to report on the number of companies, it was not possible to assess growth or births/deaths based on the available data. The most reliable source of this type of information is a Statistics Canada data product called the *National Accounts Longitudinal Microdata File*. At the time of writing, this data source was unavailable due to Statistics Canada's ongoing implementation of methodological changes to the product. Due to limitations in the Business Register (which are specifically addressed in the microdata file) Statistics Canada explicitly cautioned against using Business Register counts for longitudinal analysis. We recommend the use of this source after Statistics Canada completes its methodological changes and the product becomes available once again.
- **Economic spinoff benefits -** One uncertainty that arose in the Tech Sector economic impact analysis is the extent to which spin-off impacts are captured in transactions between industries within the Tech Sector. Assessing the value of these inter-company transactions within the sector would require an immensely complicated data collection exercise, which is beyond the scope of this study. Nevertheless, intra-sectoral transactions within the Tech Sector (i.e., the extent to which Tech Companies contribute to one another's revenue through operating and capital expenditures) would be an interesting topic to explore in future research.
- **Migration and interjurisdictional competition in the labour market** - The net migration analysis would benefit from the ability to cross-tabulate worker age, gender, *and* place of residence five years ago. The current analysis is based only on a cross-tabulation of the first two variables. Moreover, the net migration analysis could be extended to all Canadian jurisdictions outside of Saskatchewan to better understand the circumstances Tech Workers that have moved to another province. Where did they go? Are they truly getting paid more? What are their demographic characteristics? An entire study could be developed to explore this topic at the level of individual occupations.

Appendix A. Detailed Methodology

This appendix provides in-depth documentation of the quantitative methodology employed in this study. Specifically, the following sections provide a step-by-step discussion of the analytical process, accompanied by the results of intermediate calculations in the analysis.

A.1 Occupational Definitions

Occupational definitions are the only subjective inputs into this study's methodology. At the simplest level, a dynamic mapping analysis requires that researchers define a group of relevant workers in terms of occupational characteristics. The definition of relevant occupations may be based on (1) a pre-existing list or (2) a set of criteria which is then tested against all occupations, depending on a study's research objectives.

For the purpose of this engagement, Nordicity worked with stakeholders to establish two tests used to designate occupations as Tech Occupations. In order to qualify, each occupation would need to pass at least one criterion associated with each of two tests. The following table summarizes the tests and criteria discussed in this section.

Table 12: Summary of tests and criteria used to define Tech Occupations

Test	Criterion Title	Criterion
Test 1 STEM occupations or technological skills	**Criterion 1.1** STEM occupations	Does the job map to occupations included in the SOC Policy Committee's list of STEM occupations?
	Criterion 1.2 Technology skills	Are technical skills, knowledge, and technical work activities important and exhibited at a high level of proficiency in the occupation?
Test 2 Technological outputs, innovation, or implementation	**Criterion 2.1** Technological outputs	Is the role highly engaged in the production of technological outputs (i.e., products or services)?
	Criterion 2.2 Innovation and implementation	Does the role most commonly solve a problem or achieve a goal through novel uses of technology?

Test 1 – STEM occupations or technological skills

This test is intended to round up a shortlist of potentially relevant occupations for a more detailed assessment in Test #2. To pass this test, an occupation must pass at least one of the following two criteria.

Criterion 1.1 – STEM occupations

Nordicity used a list of STEM occupations produced by the SOC Policy Committee in the US. This definition has been used by the Bureau of Labor Statistics (BLS) in its research on high-tech industries.

Criterion

Does the job map to occupations included in the SOC Policy Committee's list of STEM occupations?

Rationale

Overall, the skillset of STEM occupations is highly related to the development and implementation of technology. Using this criterion allows the research to efficiently narrow the entire list of occupations in the National Occupational Classification to those that have job skills that are relevant to work in technology. The broad scope of STEM occupations leaves few occupations to be considered for the criteria set out in Test #2.

Implementation

In order to perform this operation, Nordicity relied on documentation associated with the SOC Policy Committee's recommendation to the US Office of Management and Budget (OMB) to define STEM occupations. To that end, Nordicity used crosswalk tables to map occupations outlined in that document to International Standard Occupational Classifications[38] (ISOC) and then to Canada's National Occupational Classifications[39] (NOC).

In general, the crosswalk process was straightforward. The only significant discord was that the SOC Policy Committee's list of STEM occupations includes subject matter-specific post-secondary teaching occupations (e.g., "Math and Computer Teachers, Post-secondary," "Engineering Teachers, Post-secondary," etc.) whereas NOC does not break down post-secondary teaching occupations by subject matter. Although this difference represents a technical limitation, Nordicity notes that teaching occupations would be excluded from subsequent steps of the definitional process, as they would not pass either of Test #2's criteria (requiring that the occupation (a) have technological outputs or (b) contribute to innovation or implementation of technology), as outlined for each criterion in Section 1.2.

Criterion 1.2 – Technology skills

Nordicity drew from the methodology used in the Brookfield Institute's *Who are Canada's Tech Workers?* to identify non-STEM occupations that require a high degree of facility with technology. This process relied on O*NET, a database which scores the importance and level of occupational skills, knowledge, and work activity (among other occupational characteristics).

Criterion

Are technical skills, knowledge, and technical work activities important and exhibited at a high level of proficiency in the occupation?

Rationale

Brookfield Institute's *Who are Canada's Tech Workers?* defines Tech Workers as "individuals that either produce or make extensive use of technology, regardless of industry," based on "a bottom-up, skills-based approach to identify tech occupations, which allows these definitions to evolve as technology, skills, occupations and industries evolve."[40]

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[38] Bureau of Labor Statistics (2012), ***2008 International Standard Classification of Occupations to the 2010 SOC***.

[39] Statistics Canada (2015), ***Concordance: National Occupational Classification (NOC) 2011 to International Standard Classification of Occupations (ISCO) 2008***.

[40] Brookfield Institute, *Who are Canada's Tech Workers* (1)

This criterion has significant overlap with Criterion 1.1, however it allows the methodology to capture certain occupations that make extensive use of technology, but do not fit into a STEM-based lens on jobs. For example, some types of media production jobs do not produce technology, but heavily rely on technology to produce innovative outputs.

Implementation

Paralleling the methodology in *Who are Canada's Tech Workers?*, Nordicity used Brookfield Institute's SOC to NOC crosswalk table to query the O*NET database for the importance and level of selected occupational skills, knowledge, and work activities.

The job attributes evaluated to satisfy this criterion are summarized in the following table. The O*NET database refers to the attributes in the database as 'elements.'

Table 13: Occupational attributes used to test for Tech Workers in O*NET database

Element Type	Element Name
Knowledge	Computers and Electronics
Knowledge	Engineering and Technology
Knowledge	Telecommunications
Skills	Programming
Skills	Technology Design
Work Activity	Interacting with Computers

Source: Brookfield Institute, Who are Canada's Tech Workers?

As described in Brookfield Institute's (BI) methodology, Nordicity queried the "level" and "importance" scales in the database for each occupation. Nordicity used the average value where multiple occupations in the O*NET database were mapped to a single four-digit NOC code.

To associate a single (rankable) score with each occupation, Nordicity calculated the product of the "level" and "importance" scales and took the harmonic mean of the six resulting values (i.e., a single score for each element listed in the preceding table). It is worth (briefly) noting that each of the steps used to aggregate these scores into a single value for each occupation introduces subjective preferences into the result:

- Taking the product of "level" and "importance" means that the resulting value prioritizes cases in which *both* scales are rated highly. For example, an occupation that has a high "level" of interaction with computers will only score highly if it is also important to the job.
- Use of the harmonic mean is discussed at length in *Who are Canada's Tech Workers?*.[41] In that discussion, it is noted that that "harmonic means reward a high rank while not punishing a low rank," which is a desirable characteristic in the context of this analysis. Accordingly, occupations that score well on just one skill are more likely to be included by way of this approach.

In BI's work, the aggregated scores were used to rank occupations, and the top 5% were selected for inclusion in the BI study's definition of the Tech Sector. For consistency with other parts of Nordicity's methodology, this study applies the Tukey outlier test on the set of aggregated scores – scores exceeding the upper threshold were included in Nordicity's definition of the Tech Sector.

[41] Brookfield Institute, *Who are Canada's Tech Workers* (40)

Once applied, Criterion 1.2 largely overlaps the results produced by Criterion 1.1, however this approach was the reason that the following NOCs were included in the definition used in this study:

- 5224 – Broadcast technicians;
- 2242 Electronic service technicians (household and business equipment);
- 5225 Audio and video recording technicians;
- 7247 Cable television service and maintenance technicians;
- 7246 Telecommunications installation and repair workers; and
- 2252 Industrial designers.

Test 2 – Technological outputs, innovation, or implementation

These criteria are intended to filter the list produced in Test #1 down to those occupations that contribute to the development, production and/or deployment of new technologies. To pass the second test, an occupation must satisfy one of the following two criteria.

Criterion 2.1 – Technological outputs

This criterion identifies occupations that directly contribute to the output of technological goods or services.

Criterion

Is the role highly engaged in the production of technological outputs (i.e., products or services)?

Rationale

This criterion provides an opportunity to assess the type of products produced by certain workers, as well as opening the definition of technical workers to include those involved in throughout the value chain (e.g., this criterion would be satisfied by both goods- and service-producing workers).

Implementation

Nordicity attempted to make a distinction between occupations that simply use common technology (e.g. GPS, computer assisted design [CAD]) and those that are actively engaged in the production of technological outputs. With only a few exceptions, computer occupations, life science occupations, physical science occupations, mathematical science occupation, and engineering occupations were mostly determined to produce technological outputs.

Key terms present in Statistics Canada's National Occupational Classification[42] descriptions that are indicative of an occupation which produces technological outputs include:

- "Maintains" or "designs" databases, technology, equipment or machinery
- "Transfer and integrate new technologies"
- "Provide technical support"
- "Technical aspects of diagnosis and treatment"

[42] Statistics Canada (2018), *National Occupational Classification (NOC) 2016 Version 1.1*.

Nordicity determined that most occupations in social sciences, architecture and healthcare, apart from certain technologists and technicians, did not produce technological outputs.

It should be noted that although some Statistics Canada's National Occupational Classification descriptions of managers and supervisors do not explicitly mention the use of technology, they have been included because Nordicity has made the judgement that these occupations are part of the larger value chain due to their managerial relationship to occupations that are clearly involved in the production of technological outputs.

Criterion 2.2 – Innovation and implementation

To take a broader view of the tech value chain, this criterion identifies occupations that achieve a goal or solve a problem through the development or implementation of new technology. This criterion allows the definition of tech occupations to include basic research and support/maintenance technicians.

Criterion

Does the role most commonly solve a problem or achieve a goal through novel uses of technology?

Rationale

This criterion captures both R&D-focused workers as well as tech practitioners/support. As it is currently worded, the criterion generalizes tech R&D in a way that is inclusive of roles that support the development, deployment, and use of technology. This approach is more consistent with distinctions made in the Frascati Manual, wherein it is emphasized that staff with supporting job titles may be intimately involved with R&D activities. Moreover, this criterion is inclusive toward hotly anticipated classifications for data scientists in forthcoming occupational standards.

Additionally, note that this definition excludes basic research at post-secondary institutions on the basis that that academic research is not directly tied to product development and commercialization. For the purposes of this study, academic research activities do not necessarily contribute to a *localized* competitive advantage at a provincial or national level, at least to the extent that such research is conducted in researchers' capacity as employees of academic institutions. This consideration would not apply to the same individuals' work for private enterprises and does not discount the importance of post-secondary instructors' work training Tech Workers.

Implementation

Key terms used in Statistics Canada's National Occupational Classification descriptions that assisted Nordicity in determining innovation and "novel uses of technology" include:

- "Research"
- "Assisting in research"
- "Participate in research"
- "Conducts tests, investigations and examinations"
- "Develops and implements"
- "Establishes techniques"
- "Establishes procedures"
- "Provide solutions"

- "Develop new practices and products"
- "Provide solutions to problems in the scientific field"

The application of this criterion yielded a subset of occupations that met the first criterion of test #2 ("technological outputs"). As such, this criterion may be used to identify segments in the technology sector that rely most heavily on occupations engaged in the development and implementation of new technologies.

List of Tech Occupations

The following table provides a list of occupations that satisfied the tests described in this appendix, including the result of applying each criterion. Specifically, each occupation satisfied at least one of the criteria in Test 1 *and* at least one of the criteria in Test 2. The occupations in the table are ranked in descending order based on the aggregated value calculated for each occupation for Criterion 1.2.

Table 14: Tech occupations, as defined by the tests described in this appendix

NOC	Criterion 1.1	Criterion 1.2	Criterion 2.1	Criterion 2.2	
2147 Computer engineers (except software engineers and designers)	✓	✓		✓	✓
2281 Computer network technicians	✓	✓		✓	✓
2173 Software engineers and designers	✓	✓		✓	✓
2132 Mechanical engineers	✓	✓		✓	✓
0131 Telecommunication carriers managers	✓	✓		✓	✓
2174 Computer programmers and interactive media developers	✓	✓		✓	✓
2172 Database analysts and data administrators	✓	✓		✓	
2171 Information systems analysts and consultants	✓	✓		✓	✓
2175 Web designers and developers	✓	✓		✓	✓
2133 Electrical and electronics engineers	✓	✓		✓	✓
5224 Broadcast technicians		✓		✓	
2241 Electrical and electronics engineering technologists and technicians	✓	✓		✓	✓
0213 Computer and information systems managers	✓	✓			
2111 Physicists and astronomers	✓	✓		✓	✓
2148 Other professional engineers, n.e.c.	✓	✓		✓	✓
2283 Information systems testing technicians	✓	✓		✓	✓
2142 Metallurgical and materials engineers	✓	✓		✓	✓
2143 Mining engineers	✓	✓		✓	✓
2144 Geological engineers	✓	✓		✓	✓
2146 Aerospace engineers	✓	✓		✓	✓
2131 Civil engineers	✓	✓		✓	✓
2233 Industrial engineering and manufacturing technologists and technicians	✓	✓		✓	✓
2242 Electronic service technicians (household and business equipment)		✓		✓	
5225 Audio and video recording technicians		✓		✓	
2282 User support technicians	✓	✓		✓	✓
0212 Architecture and science managers	✓	✓			
2141 Industrial and manufacturing engineers	✓	✓		✓	✓
7247 Cable television service and maintenance technicians		✓		✓	

2255 Technical occupations in geomatics and meteorology	✓	✓	✓	✓
2134 Chemical engineers	✓	✓	✓	✓
7246 Telecommunications installation and repair workers		✓	✓	
0211 Engineering managers	✓	✓		
2252 Industrial designers		✓	✓	✓
2145 Petroleum engineers	✓		✓	✓
4161 Natural and applied science policy researchers, consultants and program officers	✓		✓	
2232 Mechanical engineering technologists and technicians	✓		✓	✓
2243 Industrial instrument technicians and mechanics	✓		✓	
2114 Meteorologists and climatologists	✓		✓	✓
2253 Drafting technologists and technicians	✓		✓	
2121 Biologists and related scientists	✓		✓	✓
2223 Forestry technologists and technicians	✓		✓	✓
2113 Geoscientists and oceanographers	✓		✓	✓
2112 Chemists	✓		✓	✓
6221 Technical sales specialists - wholesale trade	✓		✓	
0311 Managers in health care	✓			
2212 Geological and mineral technologists and technicians	✓		✓	✓
2161 Mathematicians, statisticians and actuaries	✓		✓	✓
2231 Civil engineering technologists and technicians	✓		✓	✓
3141 Audiologists and speech-language pathologists	✓		✓	✓
3219 Other medical technologists and technicians (except dental health)	✓		✓	
3215 Medical radiation technologists	✓		✓	✓
3212 Medical laboratory technicians and pathologists' assistants	✓		✓	
0014 Senior managers - health, education, social and community services and membership organizations	✓		✓	
2254 Land survey technologists and technicians	✓		✓	
3217 Cardiology technologists and electrophysiological diagnostic technologists, n.e.c.	✓		✓	
2221 Biological technologists and technicians	✓		✓	✓
3214 Respiratory therapists, clinical perfusionists and cardiopulmonary technologists	✓		✓	✓
9241 Power engineers and power systems operators	✓		✓	
2261 Non-destructive testers and inspection technicians	✓		✓	✓
3131 Pharmacists	✓		✓	✓
3213 Animal health technologists and veterinary technicians	✓		✓	✓
3211 Medical laboratory technologists	✓		✓	✓
2211 Chemical technologists and technicians	✓		✓	✓
2115 Other professional occupations in physical sciences	✓		✓	✓

A.2 Industrial Definitions (Dynamic Mapping)

Having defined Tech Occupations, Nordicity then used the list of occupations as the basis to define Tech Industries. This process is based on an approach called dynamic mapping.

In developing the methodology for this engagement, Nordicity performed a document review of research precedents that used dynamic mapping to define the cultural, creative and tech industries. Dynamic mapping can be reduced to a two-step process.

1. **Calculate the concentration of relevant workers in each industry** (often referred to as the creative/tech intensity of an industry, depending on the study). By identifying industries in which relevant workers are employed, it is possible to identify industries that most rely on the group of relevant workers across different industries.
2. **Set thresholds to identify industries with high concentrations of relevant workers.** To this end, most researchers set two thresholds – one to exclude small industries that do not have a sufficiently large sample size, and an intensity threshold based on the concentration of relevant workers in each industry.

The use of dynamic mapping is a valuable way to analyze sectors that principally rely on a workforce with common and identifiable characteristics. Because sectors identified with this process are defined in terms of the industries in which a relevant group of workers is most concentrated, it should be noted that the analysis can be based on the local concentration of workers (at a provincial level, for the purposes of this study). Accordingly, industries considered to be "tech," as defined in this study will vary from jurisdiction to jurisdiction and can change dynamically over time (as suggested by the term *dynamic* mapping).

This section organizes a discussion of the dynamic mapping process that Nordicity employed in this study into three steps:

1. Calculate the **Tech Intensity** of each industry;
2. Set the **Tech Intensity Threshold** for tech industries; and
3. Calculate the **Industry Inclusion Factor** for each industry by calculating probabilities associated with sampling error.

Calculating Tech Intensity

Tech Intensity measures tech employment as a percentage of each industry's total workforce. In this study, Tech Intensity is calculated for each industry at the level of four-digit NAICS codes, as reported in a custom order of Statistics Canada's Census of Population 2016 data. At its most granular, the census can break out industries in the North American Industry Classification System (NAICS) at the four-digit level, and occupations in the National Occupational Classification (NOC) at the four-digit level.

Setting the Tech Intensity Threshold

Tech Industries are typically defined as those industries whose Tech Intensity exceeds a **Tech Intensity Threshold**. Nordicity set the tech intensity threshold by performing the Tukey test, a simple statistical test for outliers. To perform this calculation, Nordicity calculated the 25th and 75th percentile of Tech Intensities across all industries. The Tukey test upper bound is calculated as 1.5 times the interquartile range plus the 75th percentile.

In Saskatchewan, the calculation described above yielded a Tech Intensity Threshold of 24.39%. This compares to 28.29% when the same analysis is performed at a national level. The following table summarizes the descriptive statistics on Tech Intensities observed in Saskatchewan and Canada.

Table 15: Tech Intensity, Canada and Saskatchewan

Descriptive Statistic	Canada	Saskatchewan
Mean average (overall Tech Intensity)	10.26%	8.46%
25th percentile	2.32%	0.00%
50th percentile (median)	6.12%	2.32%
75th percentile	12.71%	9.76%
Interquartile range	10.39%	9.76%
Tukey outlier test upper bound	28.29%	24.39%

As this table shows, Saskatchewan's overall Tech Intensity (8.46%) is considerably lower than the national average (10.26%). At a high level, this means that Saskatchewan has fewer Tech Workers per capita. Moreover, Saskatchewan underperforms the national figures at each quartile, meaning that on average, Saskatchewan employers simply employ fewer Tech Workers than the average employer in Canada across the board. As such, the result of a lower tech intensity threshold for Saskatchewan makes sense in the context of the sector's level of development.

As such, the Tech Industries identified in this study should be understood to represent Tech Industries *in Saskatchewan*. It is possible that national-level tech industries' tech employment is concentrated outside of Saskatchewan – and though they would qualify as Tech Industries at the national level, they do not have a sufficiently technologically-oriented workforce in Saskatchewan to exceed the threshold (and would therefore not qualify at a provincial level).

Calculating the Industry Inclusion Factor

The industrial definition accounts for sampling error by calculating the **Industry Inclusion Factor**, which represents the probability that a given industry should, in fact, be classified as a Tech Industry.

In many applications of dynamic mapping, there appears to be a preference among researchers to set a hard-cutoff point to exclude small industries that have employment below a specified threshold. Conceptually, this approach recognizes that the statistical reliability of data declines if it is based on a smaller sample; however, a hard cutoff point necessarily omits small (potentially tech-focused) industries and does not work as well in smaller jurisdictions (i.e., provinces and cities) in which all industries under review will be smaller (and therefore closer to the cutoff point).

Moreover, while a hard cutoff point will allow researchers to conservatively identify Tech Workers at a particular moment in time, applying this approach over a period of time in the same jurisdiction with a small overall workforce has the potential to create an erratic time series. For example, the number of companies and non-technical workers in entire industries may need to be either wholly included or excluded in consecutive years if those industries' sizes are fluctuating close to the industry size threshold due to sampling error. To ensure that the approach developed for this engagement is able to provide a more stable indicator of the size of the Tech Sector (in terms of workers, companies, economic output, etc.) over time, Nordicity developed an approach that takes sampling error into account in the way that the intensity threshold is applied.

The 2016 Census program issued a mandatory questionnaire to approximately one in four households. To ensure that worker and company counts output by this analytical process reflect the statistical reliability of the sample involved, Nordicity calculated the standard error of each industry based on its (a) estimated sample size (i.e., one fourth of the total employment reported in the census data) and (b) Tech Intensity. Based on the number of standard deviations between each industry's Tech Intensity and the Tech Intensity Threshold, Nordicity calculated the probability that each Tech Industry is a Tech Industry. Instead of using a hard cutoff, Nordicity then used these probabilities to weight the extent to which industries were included in the Tech Sector.

In practice, this approach means that:

1. Industries with a Tech Intensity that is close to the Tech Intensity Threshold will be weighted at approximately 50% (because they are close to the point where sampling error may have pushed them over or under the threshold).
2. Smaller industries are more likely to be subject to sampling error, so these industries tend to have a higher probability of misclassification than larger industries. As such, these industries will have lower weightings if their Tech Intensity exceeds the threshold, even if they are farther from the threshold; conversely, small industries with a Tech Intensity below the threshold will have a higher probability, as there is a larger chance that they were misclassified and are, in fact, Tech Industries.

Note that all subsequent analysis based on this approach uses partial inclusions of certain industries, depending on (a) the industry's total employment (which was used to infer the sample size based on the sampling methodology for the long-form census), and (b) the difference between the industry's Tech Intensity and the Tech Intensity Threshold. All subsequent analysis of Tech Industries, including employment and company counts, is factored down using this probability.

List of Tech Industries in Saskatchewan

The following table provides a list of all industries in Saskatchewan for which employment was reported in the 2016 Census of Population, including:

- **Total employment** in Saskatchewan;
- Total employment in **Tech Occupations** in Saskatchewan;
- **Tech Intensity** (calculated as Tech Occupations/total employment for each industry)
- **Hard cutoff method**: Some dynamic mapping methodologies use intensity thresholds as a hard-cutoff point for the definition of relevant industries. For the purpose of comparison, this column shows the amount of Tech Sector employment would be contributed by each industry if this study had used this approach.
- **Industry Inclusion Factor**: This factor represents the probability that each industry is a Tech Industry in the province, based on the analysis outlined in the previous subsection.
- **Tech Sector workforce:** This column shows each industry's contribution to Tech Sector employment using the Industry Inclusion Factor, as opposed to the hard-cutoff method.
- **Variance**: This column shows the difference between the hard-cutoff method and the results obtained using the Industry Inclusion Factor used in this study. Overall, the largest variances occur for industries that are close to the intensity threshold. Industries above the intensity threshold produce negative variances because the Industry Inclusion Factor recognizes the probability that these industries are, in fact, not Tech Industries. Conversely, industries with an intensity below the threshold produce positive variances because the factor recognizes that there is some probability that these industries are, indeed, Tech Industries.

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Table 16: Tech Industries in Saskatchewan, 2015

Industry Name (abbreviated)	Total employment	Tech occupations	Tech intensity	Hard cutoff method	Industry Inclusion Factor	Tech Sector workforce	Variance
9191 International & other extra-territorial public admin.	3,100	2,440	79%	3100	100%	3,100	0
5174 Satellite telecommunications	860	525	61%	860	100%	860	0
5415 Computer systems design & related services	5,225	2,890	55%	5225	100%	5,225	0
5112 Software publishers	1,470	790	54%	1470	100%	1,470	0
6215 Medical & diagnostic laboratories	4,225	2,230	53%	4225	100%	4,225	0
4173 Computer & comms equip. & supplies wholesalers	5,315	1,900	36%	5315	100%	5,315	0
5413 Architectural, engineering & related services	95	75	79%	95	100%	95	0
5417 Scientific research & development services	415	230	55%	415	100%	415	0
5171 Wired telecommunications carriers	210	130	62%	210	100%	210	0
5172 Wireless telecom. carriers (except satellite)	235	115	49%	235	100%	235	0
3342 Communications equip. mfg.	320	140	44%	320	100%	320	0
5179 Other telecommunications	3,640	1,080	30%	3640	100%	3,639	-1
8112 Electronic & precision equip. repair & maintenance	365	145	40%	365	100%	365	0
4862 Pipeline transportation of natural gas	185	80	43%	185	100%	184	-1
5122 Sound recording industries	370	125	34%	370	97%	363	-7
3344 Semiconductor & electronic component mfg.	155	60	39%	155	97%	152	-3
4461 Health & personal care stores	350	115	33%	350	95%	339	-11
5182 Data processing, hosting, & related services	170	60	35%	170	93%	162	-8
4184 Chemical & allied product merchant wholesalers	80	30	38%	80	89%	74	-6
3341 Computer & peripheral equip. mfg.	65	25	38%	65	88%	60	-5
3364 Aerospace product & parts mfg.	280	85	30%	280	86%	253	-27
5261 Pension funds	95	30	32%	95	77%	80	-15
6114 Business schools & computer/mgmt. training	60	20	33%	60	77%	51	-9
5612 Facilities support services	45	15	33%	45	74%	37	-8
3353 Electrical equip. mfg.	30	10	33%	30	70%	24	-6
3254 Pharmaceutical & medicine mfg.	30	10	33%	30	70%	24	-6
3251 Basic chemical mfg.	30	10	33%	30	70%	24	-6
2211 Electric power generation, transmission & dist.	140	35	25%	140	53%	91	-49
3345 Navigational, measuring, medical & control instruments mfg.	895	220	25%	895	53%	575	-320
4831 Deep-sea, coastal & great lakes water transp.	40	10	25%	40	52%	26	-14
4179 Other machinery, equip. & supplies wholesalers	10	10	100%	10	50%	10	0
5416 Mgmt., scientific & technical consulting services	3,005	725	24%	725	43%	1,710	985
3241 Petroleum & coal product mfg.	1,635	390	24%	390	40%	886	496
5419 Other professional, scientific & technical services	180	40	22%	40	36%	91	51
3332 Industrial machinery mfg.	50	10	20%	10	35%	24	14
3221 Pulp, paper & paperboard mills	270	60	22%	60	33%	130	70
3253 Pesticide, fertilizer & other agricultural chem. mfg.	170	35	21%	35	27%	71	36
2122 Metal ore mining	170	35	21%	35	27%	71	36
3259 Other chemical product mfg.	170	35	21%	35	27%	71	36
3391 Medical equip. & supplies mfg.	200	40	20%	40	22%	75	35
3336 Engine, turbine & power transmission equip. mfg.	60	10	17%	10	21%	21	11
4145 Pharmaceuticals, toiletries, cosmetics & sundries merchant wholesalers	560	120	21%	120	20%	206	86
5269 Other funds & financial vehicles	1,855	420	23%	420	18%	683	263
7131 Amusement parks & arcades	320	65	20%	65	18%	111	46
4161 Electrical, plumbing, heating & air-conditioning equip. & supplies merchant wholesalers	165	30	18%	30	15%	50	20
3335 Metalworking machinery mfg.	145	25	17%	25	13%	40	15
5322 Consumer goods rental	180	30	17%	30	8%	42	12
8133 Social advocacy organizations	80	10	13%	10	5%	14	4

4861 Pipeline transportation of crude oil	195	30	15%	30	4%	37	7
3314 Non-ferrous metal (except aluminum) production	90	10	11%	10	2%	12	2
4431 Electronics & appliance stores	415	70	17%	70	2%	77	7
5611 Office administrative services	3,000	630	21%	630	1%	657	27
4172 Construction, forestry, mining, & industrial machinery, equip. & supplies merchant wholesalers	380	60	16%	60	1%	63	3
3333 Commercial & service industry machinery mfg.	975	180	18%	180	1%	187	7
2111 Oil & gas extraction	225	30	13%	30	1%	31	1
5511 Management of companies & enterprises	140	15	11%	15	0%	16	1
2123 Non-metallic mineral mining & quarrying	130	10	8%	10	0%	10	0
3361 Motor vehicle mfg.	275	30	11%	30	0%	30	0
3312 Steel product mfg. from purchased steel	220	20	9%	20	0%	20	0
4121 Petroleum & petroleum products wholesalers	460	55	12%	55	0%	55	0
4141 Textile, clothing & footwear merchant wholesalers	145	10	7%	10	0%	10	0
2212 Natural gas distribution	655	85	13%	85	0%	85	0
8132 Grant-making & giving services	150	10	7%	10	0%	10	0
6220 Hospitals (6221 to 6223)	710	90	13%	90	0%	90	0
8139 Business, professional, labour, other member orgs.	1,285	190	15%	190	0%	190	0
3114 Fruit & vegetable preserving & specialty food mfg.	165	10	6%	10	0%	10	0
6219 Other ambulatory health care services	2,070	330	16%	330	0%	330	0
8134 Civic & social organizations	270	20	7%	20	0%	20	0
3115 Dairy product mfg.	360	30	8%	30	0%	30	0
3359 Other electrical equip. & component mfg.	625	65	10%	65	0%	65	0
2213 Water, sewage & other systems	370	30	8%	30	0%	30	0
9120 Provincial & territorial public admin. (9121 to 9129)	1,005	125	12%	125	0%	125	0
3311 Iron & steel mills & ferro-alloy mfg.	665	70	11%	70	0%	70	0
5222 Non-depository credit intermediation	540	50	9%	50	0%	50	0
6113 Universities	475	40	8%	40	0%	40	0
3331 Agricultural, construction & mining mach. mfg.	200	10	5%	10	0%	10	0
3399 Other miscellaneous mfg.	595	55	9%	55	0%	55	0
6115 Technical & trade schools	2,855	445	16%	445	0%	445	0
5241 Insurance carriers	540	45	8%	45	0%	45	0
4162 Metal service centres	1,100	120	11%	120	0%	120	0
1153 Support activities for forestry	390	25	6%	25	0%	25	0
3323 Architectural & structural metals mfg.	835	80	10%	80	0%	80	0
5629 Remediation & other waste management services	1,180	130	11%	130	0%	130	0
3339 Other general-purpose machinery mfg.	235	10	4%	10	0%	10	0
5621 Waste collection	355	20	6%	20	0%	20	0
3121 Beverage mfg.	360	20	6%	20	0%	20	0
4111 Farm product merchant wholesaler	3,510	520	15%	520	0%	520	0
5614 Business support services	760	60	8%	60	0%	60	0
3112 Grain & oilseed milling	260	10	4%	10	0%	10	0
4144 Personal goods merchant wholesalers	1,060	90	8%	90	0%	90	0
4182 Paper product & plastic product wholesalers	2,035	230	11%	230	0%	230	0
6112 Community colleges & C.E.G.E.P.s	420	20	5%	20	0%	20	0
5151 Radio & television broadcasting	645	40	6%	40	0%	40	0
6117 Educational support services	545	30	6%	30	0%	30	0
4171 Farm, lawn machinery & equip. wholesalers	970	75	8%	75	0%	75	0
3334 Ventilation, heating, air-conditioning & commercial refrigeration equip. mfg.	1,655	165	10%	165	0%	165	0
6214 Out-patient care centres	435	20	5%	20	0%	20	0
5191 Other information services	575	30	5%	30	0%	30	0
5418 Advertising, public relations, & related services	305	10	3%	10	0%	10	0
2131 Support activities for mining & oil & gas extraction	310	10	3%	10	0%	10	0
4183 Agricultural supplies merchant wholesalers	465	20	4%	20	0%	20	0
3212 Veneer, plywood & engineered wood product mfg.	710	40	6%	40	0%	40	0
6243 Vocational rehabilitation services	715	40	6%	40	0%	40	0
4181 Recyclable material merchant wholesalers	1,365	110	8%	110	0%	110	0
5324 Commercial & industrial machinery & equip. rental	325	10	3%	10	0%	10	0
5616 Investigation & security services	1,075	75	7%	75	0%	75	0
2379 Other heavy & civil engineering construction	6,635	960	14%	960	0%	960	0

2371 Utility system construction	960	60	6%	60	0%	60	0
5622 Waste treatment & disposal	340	10	3%	10	0%	10	0
6242 Community food & housing, & emergency services	340	10	3%	10	0%	10	0
5613 Employment services	720	35	5%	35	0%	35	0
7132 Gambling industries	905	50	6%	50	0%	50	0
4132 Beverage merchant wholesalers	670	30	4%	30	0%	30	0
3371 Furniture & kitchen cabinet mfg.	1,215	80	7%	80	0%	80	0
2121 Coal mining	2,575	250	10%	250	0%	250	0
1150 Support activities for farms (1151 & 1152)	745	35	5%	35	0%	35	0
2373 Highway, street & bridge construction	705	30	4%	30	0%	30	0
6211 Offices of physicians	1,375	90	7%	90	0%	90	0
3261 Plastic product mfg.	1,100	60	5%	60	0%	60	0
9130 Local, muni. & regional pub. admin. (9131 to 9139)	1,425	90	6%	90	0%	90	0
6213 Offices of other health practitioners	1,650	110	7%	110	0%	110	0
4931 Warehousing & storage	450	10	2%	10	0%	10	0
4541 Electronic shopping & mail-order houses	2,520	185	7%	185	0%	185	0
5121 Motion picture & video industries	685	20	3%	20	0%	20	0
2382 Building equip. contractors	4,105	380	9%	380	0%	380	0
7111 Performing arts companies	1,370	65	5%	65	0%	65	0
6216 Home health care services	2,325	155	7%	155	0%	155	0
5414 Specialized design services	1,560	80	5%	80	0%	80	0
5619 Other support services	490	10	2%	10	0%	10	0
5242 Agencies, brokerages & insurance related activities	725	20	3%	20	0%	20	0
3362 Motor vehicle body & trailer mfg.	730	20	3%	20	0%	20	0
5313 Activities related to real estate	2,600	175	7%	175	0%	175	0
7113 Promoters of performing arts, sports & sim. events	520	10	2%	10	0%	10	0
3329 Other fabricated metal product mfg.	2,370	140	6%	140	0%	140	0
8114 Personal & household goods repair & maintenance	995	30	3%	30	0%	30	0
3119 Other food mfg.	2,325	130	6%	130	0%	130	0
4821 Rail transportation	555	10	2%	10	0%	10	0
2372 Land subdivision	1,700	75	4%	75	0%	75	0
6230 Nursing & residential care facilities (6231 to 6239)	2,880	175	6%	175	0%	175	0
3328 Coating, engraving, cold & heat treating	600	10	2%	10	0%	10	0
4163 Lumber, millwork, bdlg. supplies wholesalers	8,380	830	10%	830	0%	830	0
1133 Logging	890	20	2%	20	0%	20	0
7121 Heritage institutions	630	10	2%	10	0%	10	0
4812 Non-scheduled air transportation	1,430	45	3%	45	0%	45	0
3219 Other wood product mfg.	1,730	60	3%	60	0%	60	0
4884 Support activities for road transportation	680	10	1%	10	0%	10	0
5239 Other financial investment activities	685	10	1%	10	0%	10	0
4152 New motor vehicle parts & accessories wholesalers	3,490	185	5%	185	0%	185	0
4532 Office supplies, stationery & gift stores	1,555	45	3%	45	0%	45	0
3116 Meat product mfg.	12,470	1,305	10%	1305	0%	1,305	0
4131 Food merchant wholesalers	3,600	190	5%	190	0%	190	0
5221 Depository credit intermediation	710	10	1%	10	0%	10	0
4422 Home furnishings stores	3,655	190	5%	190	0%	190	0
3324 Boiler, tank & shipping container mfg.	725	10	1%	10	0%	10	0
2362 Non-residential building construction	1,085	20	2%	20	0%	20	0
4191 B2B electronic markets, & agents & brokers	770	10	1%	10	0%	10	0
5411 Legal services	780	10	1%	10	0%	10	0
8131 Religious organizations	3,790	170	4%	170	0%	170	0
4811 Scheduled air transportation	1,705	40	2%	40	0%	40	0
6116 Other schools & instruction	7,070	465	7%	465	0%	465	0
8113 Commercial & industrial machinery & equip. (except automotive & electronic) repair & maintenance	1,185	20	2%	20	0%	20	0
9111 Defence services	830	10	1%	10	0%	10	0
6111 Elementary & secondary schools	1,210	20	2%	20	0%	20	0
6241 Individual & family services	875	10	1%	10	0%	10	0
3118 Bakeries & tortilla mfg.	27,075	3,165	12%	3165	0%	3,165	0
5311 Lessors of real estate	920	10	1%	10	0%	10	0
4543 Direct selling establishments	935	10	1%	10	0%	10	0

8123 Dry cleaning & laundry services	2,340	55	2%	55	0%	55	0
4539 Other miscellaneous store retailers	11,885	620	5%	620	0%	620	0
6212 Offices of dentists	10,725	520	5%	520	0%	520	0
4151 Motor vehicle merchant wholesalers	14,250	460	3%	460	0%	460	0
2361 Residential building construction	7,220	165	2%	165	0%	165	0
3211 Sawmills & wood preservation	3,550	75	2%	75	0%	75	0
7115 Independent artists, writers & performers	3,025	60	2%	60	0%	60	0
2381 Foundation, structure, & building contractors	2,800	55	2%	55	0%	55	0
4533 Used merchandise stores	2,400	45	2%	45	0%	45	0
3327 Machine shops, turned product, & fastener mfg.	2,410	45	2%	45	0%	45	0
8129 Other personal services	29,915	545	2%	545	0%	545	0
4412 Other motor vehicle dealers	4,420	80	2%	80	0%	80	0
2389 Other specialty trade contractors	2,315	40	2%	40	0%	40	0
3273 Cement & concrete product mfg.	2,775	45	2%	45	0%	45	0
4453 Beer, wine & liquor stores	8,490	130	2%	130	0%	130	0
4529 Other general merchandise stores	4,545	65	1%	65	0%	65	0
1114 Greenhouse, Nursery & Floriculture Production	3,205	40	1%	40	0%	40	0
4421 Furniture stores	3,525	40	1%	40	0%	40	0
5312 Offices of real estate agents & brokers	2,045	20	1%	20	0%	20	0
4842 Specialized freight trucking	4,145	40	1%	40	0%	40	0
4411 Automobile dealers	6,270	60	1%	60	0%	60	0
2383 Building finishing contractors	6,860	65	1%	65	0%	65	0
5412 Accounting, tax preparation, bookkeeping & payroll services	4,385	40	1%	40	0%	40	0
5111 Newspaper, periodical, book & directory pub.	1,115	10	1%	10	0%	10	0
1110 Farms (1111 to 1124 & 1129)	47,125	415	1%	415	0%	415	0
4452 Specialty food stores	1,150	10	1%	10	0%	10	0
4471 Gasoline stations	4,680	40	1%	40	0%	40	0
4441 Building material & supplies dealers	4,695	40	1%	40	0%	40	0
8111 Automotive repair & maintenance	5,740	45	1%	45	0%	45	0
4921 Couriers	1,525	10	1%	10	0%	10	0
6244 Child day-care services	7,155	45	1%	45	0%	45	0
7223 Special food services	1,885	10	1%	10	0%	10	0
5617 Services to buildings & dwellings	7,610	40	1%	40	0%	40	0
9141 Aboriginal public administration	1,920	10	1%	10	0%	10	0
4413 Automotive parts, accessories & tire stores	1,930	10	1%	10	0%	10	0
4911 Postal service	2,345	10	0%	10	0%	10	0
8121 Personal care services	5,145	10	0%	10	0%	10	0
4841 General freight trucking	5,220	10	0%	10	0%	10	0
4451 Grocery stores	11,405	20	0%	20	0%	20	0
7211 Traveler accommodation	5,900	10	0%	10	0%	10	0
7225 Full-service restaurants & ltd. service eating places	25,810	40	0%	40	0%	40	0

Employment, demographics and income estimates were developed using custom tabulations from Statistics Canada's Census of Population 2016. Estimates for 2018 are subject to adjustments to account for changes in employment and income growth observed in the period from 2015 to 2018 through Statistics Canada's Labour Force Survey (LFS), and the Survey of Employment, Payrolls and Hours (SEPH). To the extent possible, these adjustments were performed at the level of four-digit NAICS codes, however, however, two- and three-digit codes were mapped to the four-digit level for cases in which data was suppressed at the provincial level.

Company data was obtained through custom tabulations from Statistics Canada's Business Register. This source provides establishment counts by employment ranges at the six-digit level of NAICS, and by revenue ranges at the three-digit level of NAICS.

Tech Students were defined using a vocational perspective. The analysis employed a mapping process based on the field of study that tech and non-Tech Workers pursued at their highest level of educational attainment. For each field of study, Nordicity calculated the likelihood that students were

destined for employment in tech occupations. For example, 57% of Saskatchewan Tech Workers reported studying Computer Science at their highest level of educational attainment. Therefore, Nordicity included 57% of enrolment and graduates in Computer Science in the analysis of Tech Students.

A.3 Summary of Data Sources Used

This subsection provides a summary of statistical and administrative data sources used in this study.

- **Employment/income data:**
  - **Census of Population** (several custom tabulations from Census 2011 and 2016 with *NAICS-4* and *NOC-4* broken out) – including variables covering demographics, income, immigration, provenance of workers, educational attainment, highest educational attainment (and area of study at CIP-4), etc.
  - **Labour Force Survey (LFS)** – to capture changes in overall employment
  - **Survey of Employment, Payrolls and Hours (SEPH)** – to capture changes in non-farm employment and incomes at *NAICS-4* where available – there is some suppression at this level of granularity
  - **2019 Saskatchewan Detailed Occupational Outlook** – to validate our work against the government's published numbers as we progress through analysis.
- **Company data:**
  - **Business Register** (several custom tabulations with revenue bands at *NAICS-3* and employment bands at *NAICS-6*)
  - **Industry Canada's Financial Performance Reports** (at *NAICS-4*)
  - **Statistics Canada, Centre for Special Business Projects – Employer enterprise births (2013-15) and Employer enterprise deaths (2014-16)** – to illustrate relative growth sectors in Saskatchewan's economy compared to national data
- **Education data:**
  - **Post-secondary Information System (PSIS)** – custom tabulations of enrolment and graduates by gender, type of degree and CIP-4.
  - **Mitacs placements** – full account of internship placements in the Tech Sector.
- **Recruitment data:**
  - **VanHack** (administrative data) - numerous interviewees identified using Vanhack to fill roles they are unable to source locally (e.g., senior developers). As a result, we view this source as the most promising way to learn about job postings in Saskatchewan's Tech Sector.
- **Cost of Living data:**
  - Numbeo.com – used to source average rents, monthly expenses and cost of living index data for Tech Hubs around the world, and Canadian cities.
  - U.S. Bureau of Labor Statistics, Central Statistics Office (Ireland), Office for National Statistics (United Kingdom) and Ministry of Manpower (Singapore) for wage data

A.4 Workforce Forecasting Model

In broad terms, the forecast methodology paralleled that used to generate estimates of 2018 employment based on an analysis of the Census of Population, the Labour Force Survey, and the Survey of Employment, Payrolls and Hours. At its foundation, the forecast is segmented, first by industry, and then five categories of workers. The categories of workers include four categories of Tech Occupations (including: Research, development and design workers; Programmers, technical support and technicians; Managerial staff; Sales and marketing staff) and a fifth category to include all non-tech occupations. For each industry, the model assigns a growth rate for all employment and designates the share of workers in each of the five categories. By default (i.e., in absence of additional information from interviews), Nordicity calculated the employment growth rate assumption for each industry based on that observed between 2015 (the census year) and 2018 (based on the labour surveys mentioned above). Likewise, the share of employment in each of the five categories was assumed to remain unchanged.

To supplement the model with more detailed assumptions, Nordicity conducted a series of interviews with companies from the Tech Industries with the largest employment of Tech Workers. Based on their responses to questions about expected hiring over the next three years, Nordicity reviewed the historical trends and compared these figures to companies' responses.

A.5 Survey, Roundtable and Interview Participation

Survey

On October 3rd, the survey was sent directly to nearly 200 stakeholders that were compiled using existing databases from steering committee members. In addition, the key stakeholders below we sent emails, with sample outreach copy attached, requesting their assistance sharing the survey widely with their networks:

- CIPS
- Hack Regina
- Co.Labs
- Cultivator
- SaskInteractive
- SaskTech
- Innovation Saskatchewan
- Western Economic Diversification
- NRC-IRAP
- Ideas Inc
- EDR
- SREDA
- Sask Capital Network
- PIC Group
- Innovation Place (both locations)
- Path Coworking

The survey garnered **185 complete responses.** ~30% of these responses are from those representing a tech company. Of those not representing a company, the significant majority (80%) are full time employees of a tech company. Industry standards for this type of survey would suggest that one can expect to capture data from 10% of the population.

Roundtable Sessions

In addition to the online survey stakeholder engagement also included four roundtable sessions and key informant interviews.

The table below describes each roundtable including its location, type and attendance.[43]

Location	Type	Attendance	Description
Regina	Company	49 companies invited 11 in attendance	Diverse senior level attendees from Tech Companies (including software and gaming) as well as investors and support organizations.
	Employee	5[44]	3 from crown corporations, 1 from a startup that connects talent with those in need of tech labour and 1 newcomer to Saskatchewan.
Saskatoon	Company	61 companies invited 19 in attendance	Senior representation from companies (both startups and mature companies) in sectors as diverse as ag tech and employee scheduling software as well as angel/venture capital investors and support organizations.
	Employee	5	1 CIPS, 1 3D designer, 1 electrical engineer and 2 newcomers to Saskatchewan.

Key Informant Interviews

More than 30 interviews were completed. The process commenced on Monday, September 30th and lasted more than 1 month. Those participating in interviews include:

- Technology Companies
- Education and Training Organizations
- Public Sector Funders and Support Organizations

In addition to the formal interview process deployed in this study, Nordicity agreed to perform additional data collection from:

- A group of Tech Companies that have realized high revenue and employment growth in recent years (5 out of 12 responded)
- A broader group of Tech Companies to provide information about professional development and training expenditures, capital expenditures, exports, and validate the workforce forecast (9 out of 43 responded); and
- Several organizations with access to administrative data that would help to bolster the analysis presented in this report (5 out of 6 responded).

[43] Note, key findings from the roundtables have been included throughout the progress report

[44] Note, the number of workers invited is unknown as worker roundtable invitations were issued as an 'open call' from regional stakeholders.

Appendix B. Funding Programs and Other Sources of Support Available to Saskatchewan Tech Companies

B.1 Financial Support Programs Available to Saskatchewan Tech Companies

Funder	Fund	Description	Eligibility	Amount
Innovation Saskatchewan	Saskatchewan Technology Startup Incentive (STSI)	The Saskatchewan Technology Start-Up Incentive offers a 45% non-refundable tax credit for individual and corporate equity investments in eligible technology start-up businesses, capped at a maximum annual benefit of $140,000 per investor. Offered as a two-and-a-half-year pilot program, the incentive will be funded through Innovation Saskatchewan and will be capped at $1.5 million in its first year, with unused credits rolling into the following fiscal year.	**Eligible Startup Businesses (ESBs)** In order to be eligible to register under the STSI as an ESB, a business must: ▪ Have fewer than 50 employees, including full time, part time, and contract workers; ▪ At least 50% of employees must be based in Saskatchewan; ▪ Have a permanent establishment in Saskatchewan; ▪ Have not previously raised more than $5 million in equity capital; and, ▪ Must be a technology-based startup, with a novel technology for sale or under development for sale as a new product or service. The technology can be from any industry as long as a company is actively developing a novel technology as a new product or service. **Venture Capital Corporations (VCCs)** In order to be eligible to register under the STSI as a VCC, a business must: ▪ Track eligible investor contributions to invested ESBs; ▪ Must have equity capital of at least $25,000 at the time of registration; ▪ Have a share structure consisting of common shares having no special rights	An investor can earn a maximum of $225,000 in tax credits per investment in an ESB (annually) and claim a maximum of $140,000 per tax year. Tax credits can be carried forward for up to four years.

Funder	Fund	Description	Eligibility	Amount
			or restrictions and/or common shares having special rights relating only to the redemption of the shares by the corporation; ▪ An existing venture capital corporation may have to establish a separate fund for the purposes of raising funds to invest in an ESB; and, ▪ The funds intended for ESB investment may not receive tax credits from other incentives. **Investors** Both individuals and corporations may invest under the STSI. This includes: ▪ Accredited investors (i.e., Angel investors); ▪ Corporate investors; ▪ Venture capital corporations; and, ▪ Close family, friends, and business associates of the promoters of the ESB, provided they satisfy the exemption requirements laid out in The Securities Act, 1988 as specified by the Financial and Consumer Affairs Authority of Saskatchewan. ▪ Please note that founders are not eligible to invest in their own company.	
Innovation Saskatchewan	Made in Saskatchewan Technology Program (MIST)	The Made in Saskatchewan Technology Program (MIST) connects the Provincial Government to Saskatchewan technology-based companies	This program is open to technology companies that meet the following criteria: ▪ Saskatchewan based; ▪ Annual revenue under $500,000;	Companies who are successful in the program are awarded a contract of up to $10,000 to have their

Funder	Fund	Description	Eligibility	Amount
		whose products may improve Government service delivery.	▪ 30 employees or less; ▪ Technology is ready to be implemented; and ▪ Company has the capacity to work with Government.	technology piloted by Government.
Creative Saskatchewan	Digital Game & Gamified e-learning Equity Fund	The Digital Game and Gamified e-Learning Equity Fund invests in Saskatchewan's digital developers, helping them create digital games with commercial potential. All projects developed and designed with support from this equity fund must be made available for sale.	Digital games and gamified e-learning projects are eligible for this equity investment. Eligible projects include apps for smart phones and tablets, console or PC games, and augmented or virtual reality experiences. Projects focused on education or training are welcome, as long as the experience has been "gamified," meaning users will feel like they are playing a game. **Eligible Applications:** ▪ Applicants must meet the eligibility criteria defined in the Creative Saskatchewan Investment Fund General Program Guidelines. ▪ Applicants may be an individual or a corporation – see the Creative Saskatchewan Investment Fund General Program Guidelines for definitions. ▪ Applicants must be the owner or co-owner of the project, control copyright, and receive a share of revenue from sales of the project. ▪ Applications must demonstrate a minimum 51% Saskatchewan ownership. **Eligible Projects & Expenses:** ▪ This program supports expenses related to creating digital games and eLearning	Applicants may apply for a maximum of $100,000 or 50% of the total production cash budget, whichever is the lesser, in the form of an equity investment. Equity investments are recoupable from revenues generated through exploitation of the project. Annual financial reporting is required for all successful applicants.

Funder	Fund	Description	Eligibility	Amount
			properties that are market-ready and aimed for commercial exploitation. ▪ eLearning projects must include gamification (game mechanics that add interactivity, engagement, and motivate the user in learning). ▪ The core product must be intended to entertain or educate the user. ▪ Applicants may apply at any stage of development (the final deliverable must be as described above).	
Creative Saskatchewan	Market Travel Grant	This grant provides support to individuals and businesses to attend markets and events.	**Eligible Projects and Expenses** ▪ The primary purpose of the project must be commercial intent; it must demonstrate market potential, viability, and demand. ▪ Expenses must be directly related to the project and incurred during the project term for travel, accommodations, registration, and per diems. ▪ Airfare and event registration may be booked prior to submitting an application to Creative Saskatchewan. ▪ Travel, per diems and accommodation expenses are limited to Saskatchewan residents. ▪ Mileage and per diem amounts must be consistent with Government of Saskatchewan rates.	Funding is in the form of a grant, and approved projects will be funded up to a maximum of 50% of the approved project budget or $5,000 (whichever is lesser).

Funder	Fund	Description	Eligibility	Amount
			▪ Fees for hired performers and support personnel engaged solely for the purposes of the specific project. ▪ Phone expenses are capped at a maximum of $50 when traveling outside of Canada. ▪ Accommodations are limited to $300 per night per room (Canadian funds), inclusive of all taxes. If the rate exceeds the amount, only the excessive amount is disallowed. ▪ Marketing expenses directly related to the activity being applied for, no more than 10% of the total project budget.	
Creative Saskatchewan	The Market and Export Development Grant	The Market and Export Development Grant provides support to individuals and businesses for market access and market development opportunities intended to improve visibility and generate sales.	**Eligible Applicants:** Applicants must meet the eligibility criteria defined in the Creative Saskatchewan Investment Fund General Program Guidelines **Eligible Projects and Expenses:** ▪ The primary purpose of the project must be commercial intent; it must demonstrate market potential, viability, and demand. ▪ Eligible expenses are those for marketing, promotion, distribution, travel, accommodation, shipping and/or services required to develop and deliver the project successfully. ▪ Travel, per diems and accommodation expenses are limited to Saskatchewan residents.	Funding is in the form of a grant and approved projects will be funded up to a maximum of 50% of the approved project budget.

Funder	Fund	Description	Eligibility	Amount
			▪ For film, television and interactive digital media projects, applicants must own a minimum of 51% of the project copyright and include recoupment structures and revenue share position. ▪ For budgeted expenses related to promotional video production, applicants must include a strong rationale for expenses being incurred out-of-province. It is the preference of Creative Saskatchewan for expenses to be incurred within the province.	
Creative Saskatchewan	Business Capacity Grant	The Business Capacity Grant supports projects that focus on developing business knowledge and improved efficiencies, as well as expanded workforce capacity and business skills, which result in growth, market expansion and improved profitability.	**Eligible Applicants** ▪ Applicants must meet the eligibility criteria defined in the Creative Saskatchewan Investment Fund General Program Guidelines. **Eligible Projects and Expenses** Examples of relevant projects: 1. Workshops, seminars or training that improve business skills of yourself, your management team and/or your sta. 2. Learning opportunities including mentorships, work teams or internships that support industry capacity and job growth in Saskatchewan. 3. Workforce readiness through skill and business expertise development specific to an industry	Funding is in the form of a grant; approved projects are funded up to a maximum of 50% of the approved project budget.
Creative Saskatchewan	Research Grant	The Research Grant provides support to projects that focus on market research and market intelligence activities identifying	**Eligible Applicants** ▪ Applicants must meet the eligibility criteria defined in the Creative	Funding is in the form of a grant, and approved projects will be funded up to a

Funder	Fund	Description	Eligibility	Amount
		commercial opportunities and/or emerging technologies.	Saskatchewan Investment Fund General Program Guidelines. ▪ Applicants may be an individual or a corporation – see the Creative Saskatchewan Investment Fund General Program Guidelines for definitions. **Eligible Projects and Expenses** ▪ The result of the research should be to uncover new market opportunities (whether a new geographical focus or a new demographic opportunity), to upgrade business practices to "best practices". ▪ The objective should be to use the results of the research to expand the business.	maximum of 50% of the approved project budget.
Women Entrepreneurs Saskatchewan (WESK)	WESK Financing Fund	The WESK Financing Fund offers loans to assist businesses that are majority woman-owned and controlled (51%) in Saskatchewan.	**In order to be eligible, the applicant must:** ▪ Have a business that is majority woman-owned and controlled (51%) ▪ Have a completed business plan ▪ Have completed Cashflow Projections ▪ Complete the Personal New Worth Statement	The WESK Financing Fund offers loans of up to $150,000 (or more through our partnerships).
Westcap Mtg. Ltd.	Golden Opportunity Fund	Golden Opportunities Fund is Saskatchewan's first Provincial Retail Venture Capital Fund that invests into Saskatchewan companies Golden Opportunities Fund invests in small and medium-sized businesses in Saskatchewan and Manitoba with the goal of	Private equity.	N/A

Funder	Fund	Description	Eligibility	Amount
		achieving long-term capital appreciation		
PIC Investment Group Inc.	PIC Investment Group Inc.	PIC is a private equity (angel investor) that participates in minority investments to facilitate entrepreneurship and help existing businesses grow. The group actively seek out companies to invest in through extensive networks and contacts. The intentions are to maximize return by bringing some expertise to the business.	Private equity (angel investor)	N/A
Saskatoon Regional Economic Development Authority (SREDA)	The Tech Trip	The Tech Trip is an entrepreneurship and business expansion program for local tech companies. Through this program SREDA provides financial support to local tech companies to join representatives from SREDA and Co.Labs in San Francisco. During the stay winners will meet with high-impact investors and mentors who can help take their startups to the next level and scale. In addition, the The Tech Trip winners will be able to build their networks in the heart for tech development – San Francisco.	**Criteria:** ▪ Applicants must be a Saskatchewan based tech company ▪ Applicants must provide a company profile as well as an overview of their technology. ▪ Preference will be given to companies in post-revenue stage. Companies in pre-revenue stage may be accepted if there is sufficient investment. ▪ Program is not available to past winners of The Tech Trip.	Financial compensation provided to one founder of the company.
Community Futures Saskatchewan	Community Future Loans	Community Futures loans are specifically designed for new start-ups, expansions, or to buy a business in a rural community. Solutions are tailored to meet the	If you are starting a new business and already know what your financing requirements will be, you can complete your business plan and loan application and submit to your closest Community Futures office. A representative from that office will be able	$150,000 maximum to any one entity.

Funder	Fund	Description	Eligibility	Amount
		needs of the individual business and decisions are made locally.	to answer any questions and can help with the process. If you have an existing business and are seeking financing, we may not require a business plan. If you complete the Loan Application only, contact your local Community Futures office and arrange a meeting to discuss your requirements.	
Government of Saskatchewan	Saskatchewan Commercial Innovation Incentive (SCII)	The Saskatchewan Commercial Innovation Incentive (SCII or 'Patent Box') is a new-growth tax incentive that offers eligible corporations a reduction of the provincial Corporate Income Tax Rate (CIT) to six per cent for 10 consecutive years for eligible corporations that commercialize their qualifying intellectual property in Saskatchewan.	**To qualify for the program, an applicant must meet the following requirements:** a) Own or license qualifying intellectual property that is linked to the commercialization of new goods, services, or processes in Saskatchewan. The qualifying IP/good(s), service(s), and process(es) must meet one of the following definitions: ▪ The proposed innovation has as no equivalent in the Canadian marketplace or is an exceptional advance on the current state of the art in Canada; AND/OR, ▪ The proposed innovation has unique features and benefits that offer exceptional differentiation from current competitive offerings in the Canadian marketplace and is sufficiently unique that the potential exists to create a competitive advantage or create a new market niche. b) Establish/identify an eligible corporation where the only sources of revenue are related to the commercialization of the qualifying intellectual property.	A reduction of the provincial Corporate Income Tax Rate (CIT) to six per cent for 10 consecutive years for eligible corporations that commercialize their qualifying intellectual property in Saskatchewan. Companies can extend the benefit period to 15 years if at least 50 per cent of the related research and development (R&D) in advance of commercialization occurred and was conducted in Saskatchewan.

Funder	Fund	Description	Eligibility	Amount
			c) Demonstrate new economic benefits to Saskatchewan by meeting two of the five economic benchmarks (these can be accumulative over any period of time): ▪ $3 million in R&D expenditures in Saskatchewan (including labour costs) – consisting of new R&D, existing R&D pertaining to the qualifying intellectual property, or a combination of new and existing R&D; ▪ 10 net new full-time employees; ▪ $10 million in net new capital expenditures; ▪ $3.5 million in new provincial CIT taxes paid; or ▪ Propose a new economic benefit benchmark as pre-approved by the Ministry of Trade and Export Development. d) Once the applicant/eligible corporation demonstrates the required new economic benefits to Saskatchewan, it will be issued an SCII Certificate. The corporation can then submit the SCII Certificate to the Ministry of Finance at a time of its choosing to begin claiming its 10 or 15-year corporate income tax rebate benefit period.	
Government of Canada - National Research Council of Canada (NRC)	Industrial Research Assistance Program (IRAP)	IRAP provides funding to eligible firms under our technology innovation projects and youth employment strategy programs.	In order to be eligible, a business must be: ▪ an incorporated, profit-oriented small or medium-sized business in Canada ▪ have 500 or fewer full-time equivalent employees	Up to $10 million for larger research and development projects.

Funder	Fund	Description	Eligibility	Amount
			▪ plan to pursue growth and profit by developing and commercializing innovative, technology-driven new or improved products, services or processes in Canada.	
Government of Canada	Scientific Research and Experimental Development Tax Incentive Program	The Scientific Research and Experimental Development (SR&ED) program uses tax incentives to encourage Canadian businesses of all sizes and in all sectors to conduct research and development in Canada. There are two main benefits of the SR&ED tax incentives: ▪ You can pool your SR&ED expenditures and deduct them against your current-year income or keep them and deduct them in a future year. ▪ You can earn the SR&ED investment tax credit (ITC) and use it to reduce your income. tax payable. In some cases, the Canada Revenue Agency (CRA) can refund the remaining ITC.	To qualify as SR&ED, the work, for the most part, must be conducted in Canada and must be either basic research, applied research or experimental development. • Basic research: This is work carried out to advance scientific knowledge without a practical application in view. It is usually done in universities or research institutes. • Applied research: This is also work carried out to advance scientific knowledge but, unlike basic research, it is done with a specific practical application in view. • Experimental development: This work is carried out to achieve technological advancement. It is also by far the most common type of SR&ED work: ○ It means that you are generating information or knowledge to advance your scientific or technological knowledge base. This will help you to develop new products or processes or improve existing ones. ○ Developing something new or improving something does not always mean that a technological advancement is being sought. Ask yourself: What	**Canadian-controlled private corporations:** Generally, a Canadian-controlled private corporation (CCPC) can **earn a refundable ITC at the enhanced rate of 35% on qualified SR&ED expenditures of $3 million.** You can also earn a non-refundable ITC at the basic rate of 15% on an amount over $3 million. However, if you are a CCPC that also meets the definition of a qualifying corporation, you also earn a refundable ITC at the basic rate of 15% on an amount over $3 million and 40% of the ITC can be refunded. **Other corporations:** You can earn a **non-refundable ITC at the basic rate of 15% on qualified SR&ED**

Funder	Fund	Description	Eligibility	Amount
			technological uncertainties did I encounter when I tried to develop or improve the material, device, product or process?	**expenditures.** You can use the ITC to reduce tax payable. **Individuals and trusts:** Individuals (proprietorships) and trusts can earn a **refundable ITC at the basic rate of 15% on qualified SR&ED expenditures.** You first must apply the ITC against tax payable before the CRA can refund 40% of the unclaimed balance of ITCs earned in the year.
Government of Canada - Western Economic Diversification Canada	Business Scale-up and Productivity	Business Scale-up and Productivity (BSP): The BSP program stream supports businesses at various stages of development, including high-growth firms, wanting to accelerate their growth, scale-up, and be more productive and competitive in both domestic and global markets. It offers interest-free funding to western Canadian companies.	**Businesses must meet the following mandatory criteria:** • incorporated to do business in Canada • have been in business for at least 2 years in Canada • have operating facilities and staffed offices in Western Canada (defined as British Columbia, Alberta, Saskatchewan or Manitoba) • have confirmed, at the time of application, funding from all other sources (non-government funding must represent at least 50% of the proposed project costs)	Maximum funding limit of $5 million per project and $10 million per recipient over the life of the initiative.

Funder	Fund	Description	Eligibility	Amount
			• have provided all project and business information outlined in Section 10 of the Applicant Guide **What projects are funded through BSP?** Activities that accelerate and support business growth will be eligible. These activities may include: ▪ **Productivity Improvement:** includes acquiring, adapting, and adopting new technologies and processes; process re-engineering; improving manufacturing capacity. ▪ **Business Scale-up:** includes market development/expansion, diagnostics, and adopting best management practices, processes and systems; business opportunity development. ▪ **Technology Commercialization**: includes late stage product development to grow and diversify markets, as well as technology showcasing and technology demonstration. **BSP applications must support one of these priorities:** 1. Clean Technology 2. Clean Resources 3. Life Sciences 4. Value-added Agriculture 5. Advanced Manufacturing 6. Digital Technology	

Funder	Fund	Description	Eligibility	Amount
			Information about these priorities can be found in the Economic Strategy Tables.	
Government of Canada - Western Economic Diversification Canada	Regional Innovation Ecosystems (RIE) program	The Regional Innovation Ecosystems (RIE): The REI program stream aims to create, grow and nurture inclusive regional ecosystems that support business needs throughout the innovation continuum, and foster an entrepreneurial environment conducive to innovation, growth and competitiveness.	**Applicants must meet the following mandatory criteria:** ▪ post-secondary educational institutions; ▪ Business Accelerator and Incubators; ▪ angel networks; ▪ Indigenous (First Nations, Inuit, Métis) organizations, including Indigenous-led not-for profit organizations and Indigenous-owned businesses; ▪ social enterprises; ▪ a group of eligible recipients such as an industry association or consortium; and ▪ a municipality and all other municipal-type organizations. All eligible applicants must be legal entities capable of entering into legally binding agreements **What projects are funded through RIE?** Activities that support a regional innovation ecosystem to respond to a specific challenge, opportunity, or market need or demand related to business scale-up and productivity, with emphasis on: • **Technology Commercialization** - includes enhancing businesses innovation efforts; and establishing, expanding or modernizing a facility for providing specialized services for businesses, including platforms,	

Funder	Fund	Description	Eligibility	Amount
			innovation assets, tools and testbeds. The focus should be on late stage product development; for example, technology showcasing and demonstration. • **Business Scale-Up -** includes entrepreneurship development and business support in market development, export, and investment attraction; and opportunity analyses such as identifying changes in global demand or prime contractors' requirements for a given sector. • **Productivity Improvement** – includes technology transfer including validation of needs, training and implementation of a new technology; and technological adoption for new industrial applications and/or entry into new markets. • **Ecosystem Capacity Building** – includes development of strategic business alliances within a specific sector or cluster; research and analysis to identify barriers to scale-up and productivity enhancement within the sector/cluster; and development of a strategy to address these barriers. • **Business Acceleration and Incubation** – includes supports for entrepreneurs to create and grow their start-up company, such as advice on how to create a business plan, determine a marketing strategy, hire employees, and other aspects of setting up a business. This support may also include services such as	

Funder	Fund	Description	Eligibility	Amount
			office space, expert mentors, or specialized equipment. **RIE applications must support one of the following two priority areas:** 1. Cluster* Growth, within one of the following priority sectors: o Clean Technology o Clean Resources o Life Sciences o Value-added Agriculture o Advanced Manufacturing o Digital Technology 2. Inclusiveness, with respect to one of the following under-represented groups: o Indigenous Peoples o Women o Youth	
Government of Canada - Western Economic Diversification Canada	Economic Development Initiative	The Economic Development Initiative (EDI) provides financial support to economic development projects that encourage economic diversification, business development, innovation, partnerships and increased support for small- and medium-sized enterprises in Official Language Minority Communities (OLMCs).	Applicant(s) must represent and/or support francophone community economic development in Western Canada. The proposed project must: ▪ respond to the economic development needs of western OLMCs, and ▪ support one or more identified needs or priorities confirmed through consultations with OLMC stakeholders. o Tourism,	WD will invest **$3.2 million through the EDI over five years** for projects that contribute to the development of capacities, new expertise, and partnerships leading to the economic development of businesses and

Funder	Fund	Description	Eligibility	Amount
			○ Trade and investment, ○ Immigration, and ○ Community capacity building (with a focus on economic development). The proposed project should support: ▪ the economic well-being of western Official Language Minority Communities and enterprises; ▪ innovation, diversification, partnerships that support community economic development; and ▪ concrete, direct, and measurable impacts for OLMCs.	communities, and the sustainable growth of Western Canada's francophone communities.
Government of Canada - Indigenous and Northern Affairs Canada	Strategic Partnership Initiative	The SPI is an innovative program designed to increase Aboriginal participation in complex economic development opportunities, particularly in the natural resource sectors where projects are emerging at an unprecedented rate across the country. The SPI provides a mechanism for federal partners to collectively prioritize and sequence investments, assess and make project approvals, leverage non-federal sources of funding, monitor progress and report on outcomes. With significant investments in major projects	Investments are prioritized based on the extent to which they meet a number of criteria and objectives, including: ▪ Alignment with Government of Canada priorities; ▪ Alignment with the objectives of the Federal Framework for Aboriginal Economic Development; ▪ Demonstration of significant partnership potential requiring a coordinated federal approach; ▪ Proposed investments are based on the evidence of need; ▪ The initiative does not overlap or duplicate existing federal programs and	

Funder	Fund	Description	Eligibility	Amount
		anticipated in the next 10 years, SPI will focus increasingly on supporting community economic readiness activities so that communities are better prepared to engage with partners and participate fully in these developments.	SPI funding will fill a demonstrated gap; and ▪ The federal role for the proposed initiative is clearly demonstrated.	
Government of Canada - Innovation, Science and Economic Development Canada	Innovation Solutions Canada	Innovative Solutions Canada helps Canadian innovators by funding R&D and testing prototypes in real-life settings. Participating federal departments and agencies will issue public challenges designed around a desired outcome rather than a known product or process specification and will be based on each department's mission and mandate. The challenge will be novel where there is currently no solution(s) in the marketplace	Solution proposals can only be submitted by a small business that meets all of the following criteria: ▪ for profit ▪ incorporated in Canada (federally or provincially) ▪ 499 or fewer full-time equivalent (FTE) employees ▪ research and development activities that take place in Canada ▪ 50% or more of its annual wages, salaries and fees are currently paid to employees and contractors who spend the majority of their time working in Canada ▪ 50% or more of its FTE employees have Canada as their ordinary place of work ▪ 50% or more of its senior executives (Vice President and above) have Canada as their principal residence.	two streams with a combined funding of over $140 million dedicated to Canadian innovators who want to start, grow, and get to market.
Government of Canada - Agriculture and Agri-Food Canada	AgriInnovate Program	The AgriInnovate program aims to accelerate the commercialization, adoption and/or demonstration of innovative products, technologies,	**Who is eligible:** For-profit organizations that are incorporated in Canada. They can include:	Applicants may apply for program funding up to 50 percent of total eligible costs, to a

Funder	Fund	Description	Eligibility	Amount
		processes or services that increase sector competitiveness and sustainability. In order to be eligible for funding, applicants must clearly illustrate how proposed projects will commercialize/adopt/demonstrate an innovation new to the sector or country. Once the innovation requirement has been established the program will then prioritize project applications that advance the government's agenda through one or more of the following priority areas: ▪ adoption of new or world leading clean technology (including precision agriculture) ▪ increase productivity through advanced manufacturing, automation or robotics ▪ strengthen Canada's value-added agri-sectors ▪ secure or expand new export markets Projects that incorporate more than one program priority area will be given greater consideration.	▪ Businesses and/or corporations ▪ Co-operatives ▪ Corporations and co-operatives in Indigenous communities Note: Eligible applicants must be legal entities capable of entering into legally binding agreements. Eligible applicants must also meet the principles and criteria outlined in the Applicant guide, such as: ▪ Providing a minimum of 50 percent of the funding towards eligible project costs ▪ Total Agriculture and Agri-Food Canada funding requested does not exceed $10 million ▪ Combined government funding being applied towards total eligible project costs does not exceed 75 percent **Eligible activities** ▪ Commercialization of innovative agricultural, agri-food or agri-based products, technologies, processes or services where the innovations will be introduced to the market when the project is completed ▪ Adoption of innovative agricultural, agri-food or agri-based products, technologies, processes or services where recent innovations are adopted and adapted to existing operations ▪ Demonstration of innovative agricultural, agri-food or agri-based products,	maximum of $10 million. Contributions will be repaid over a period of up to 10 years following project completion. The amount to be repaid and the schedule of payments will be set out in the negotiated contribution agreement. Repayments will normally begin 1 year following the completion of the project. Interest is not charged on the contribution funding, with the exception of late payments and debts owed to the Crown, should such situations arise.

Funder	Fund	Description	Eligibility	Amount
		If approved, support is available in the form of repayable contributions.	technologies, processes or services, where all necessary testing and piloting has been completed, and which involve one or more of the following: ○ Demonstration to a targeted user in order to secure a key customer necessary to penetrate the market; ○ Production of samples for market validation; or, ○ Creation of a reference or showcase site for pre-commercial demonstration.	
Canada Media Fund	Experimental Stream-Innovation Program	Projects funded through the Experimental Stream's Innovation Program are Canadian interactive digital media content and software applications that are innovative and leading-edge.	The Experimental Stream's Innovation Program will fund a variety of innovative, interactive content/applications, including but not limited to: ▪ Web applications ▪ Mobile applications ▪ Software applications with a connection to the Canadian cultural sector ▪ Videogames, whether for PC, console, handheld console, mobile, or other platforms ▪ Interactive Projects that contain audiovisual content **An eligible Applicant to the CMF is either:** **1) A company that**	Successful applicants receive funding in an amount appropriate to the needs of the project and subject to a Maximum Contribution of the lesser of 75% of the project's Eligible Costs or $1.5 million.

Funder	Fund	Description	Eligibility	Amount
			▪ Is for-profit: i.e. a taxable Canadian corporation, within the meaning of the Income Tax Act (Canada); Note: Not-for-profit corporations are not eligible Applicants to the CMF, however coproductions or partnerships between for-profit and not-for-profit corporations may be allowed where the not-for-profit corporation holds a minority interest in the project; in such a case the CMF will only contribute to the Eligible Costs related to the for-profit corporation. ▪ Is Canadian-controlled as determined for the purposes of sections 26 to 28 of the Investment CanadaAct; and ▪ Has its head office based in Canada. or **2) A Canadian Broadcaster** An eligible Applicant must own and control all the rights necessary to produce and exploit the project that is the subject of the application at every stage of the project's life-cycle, including Prototyping; entities that provide services but do not own the applicable rights are not eligible to be applicants to the CMF. **An Eligible Project must meet the following criteria:** ▪ Its underlying rights are owned, and significantly and meaningfully developed, by Canadians.	

Funder	Fund	Description	Eligibility	Amount
			▪ It is produced in Canada, with at least 75% of its Eligible Costs being Canadian costs, however, some flexibility will be granted for Eligible Costs devoted to marketing & promotion activities. ▪ c)It is, and remains throughout its production, under Canadian ownership and Canadian executive, creative, and financial control. Digital media coproductions are eligible if they comply with the Framework for international digital media coproduction.	
Sustainable Technology Development Canada	SD Tech Fund	The SD Tech Fund supports projects that are pre-commercial and have the potential to demonstrate significant and quantifiable environmental and economic benefits in one or more of the following areas: climate change, clean air, clean water and clean soil.	To be eligible for funding, applicants must: ▪ Be a Canadian company developing a new and novel technology with significant and quantifiable environmental benefits that will provide a significant retained Canadian benefit following execution of the project. ▪ Have a defined project and be looking to demonstrate a pre-commercial technology. ▪ Have a strong end-user, value proposition and be able to validate the market and commercialization potential of the technology. ▪ Form a consortium that includes at least one other partner (recommended that applicants seek partners who are either end users or able to validate the need and market for the technology).	Funding of up to 33% of eligible projects costs (up to 40%). An average contribution of $2 million to $4 million, with funds disbursed over the life of the project up to a five-year period.

Funder	Fund	Description	Eligibility	Amount
Mitacs	Mitacs Accelerate	Mitacs Accelerate pairs businesses with Masters, PhD and PDF interns to overcome innovation challenges. Interns complete research and develop tools, models, technology or solutions to support the host business' challenges.	▪ Full-time students at all Canadian colleges and full-time grad students at all Canadian universities ▪ Full-time graduate students in select Mitacs partner countries (visit the Accelerate International tab for more details) ▪ Canadian citizens, permanent residents, and international students over the age of 18 ▪ All academic disciplines ▪ Eligible businesses and not-for-profit organizations operating in Canada ▪ Under the Accelerate Entrepreneur initiative, eligible intern-owned start-ups at approved incubators. Contact accelerate@mitacs.ca to confirm your start-up's eligibility. ▪ For-profit businesses operating outside of Canada	Matching funds from Mitacs up to $7,500 per 4 - 6 month internship unit. Cluster stream available for additional funding support if the business leverages 6+ internship periods from 3+ interns. Funding includes intern stipend and research costs.

B.2 Non-financial Support Programs Available to Saskatchewan Tech Companies

Organization	Program	Description
Co.Labs Incubator	Co.Labs Incubator	Co.Labs is a technology incubator that provides all the tools necessary to grow and scale a tech startup in Saskatchewan. Co.Labs offers the following services:

Organization	Program	Description
		▪ MENTORSHIP - connect startups with world class tech entrepreneurs who have been through the same grind and won. ▪ PROGRAMMING - connect startups with the tools to accelerate their venture - including market validation, market intelligence, and prototype development. ▪ COMMUNITY - connect startups with each other - building a network of high impact Saskatchewan tech entrepreneurs.
Innovation Saskatchewan	Innovation Challenge	The Innovation Challenge is a program that harnesses the ideas and expertise of startup technology companies, together with government, to rapidly solve public sector challenges and create enhanced citizen experiences.
Tech West Canada	Tech West Canada	Tech West Canada is collaboration across the four western provinces and funded through Western Economic Diversification to help western Canadian companies accelerate growth in foreign markets using large-scale international events as a medium for business development.
Women Entrepreneur Saskatchewan	Association Membership	WESK has helped thousands of women start, purchase and expand their businesses through by providing training and resources for success.
Government of Canada - Innovation, Science and Economic Development Canada	The Accelerated Growth Service	The Accelerated Growth Service, is led by Innovation, Science and Economic Development Canada in collaboration with the National Research Council of Canada Industrial Research Assistance Program (NRC IRAP) and nine other federal organizations. The Accelerated Growth Service helps growth-oriented Canadian businesses expand by helping them access the key government services they need to grow, such as financing, exporting, innovation, and businesses advice. Each Accelerated Growth Service partnership provides businesses with: ▪ A dedicated advisor that helps bring the right partners to the table; ▪ Connections to government programs and services that support business growth; and ▪ A tailored and coordinated growth plan. NRC IRAP participates in the Accelerated Growth Service through its network of industrial technology advisors, who provide participating businesses with a suite of NRC IRAP services aligned with their growth strategy.

Organization	Program	Description
Government of Canada	Canadian Technology Accelerators	The Canadian Technology Accelerator initiative helps Canadian companies with an existing technology, product or service explore opportunities in foreign markets. Canadian Tech Accelerators are open to innovative Canadian tech companies that can demonstrate: ▪ Traction in the Marketplace: You have at least a minimum viable product (MVP), along with quantifiable evidence of maturity (revenue, investment, or number of users). Life Sciences and Health companies must have a proof of concept and be post-seed. ▪ Product Market Fit: You can define your target audience, articulate the problem you solve, and demonstrate differentiation of your product/service. ▪ Strong & Experienced Executive Management Team: You can commit to send at least one senior member (C-level or Founder) to take part in the program and have the financial resources to cover in-market costs. ▪ Potential to Scale: You have a well thought out go-to-market plan for the CTA location along with KPIs to match.
Raj Manek Mentorship Program	Raj Manek Mentorship Program	The Raj Manek Mentorship Program is the leading provider of business coaching, mentorship, and complementary tools to small and medium-sized entrepreneurs who demonstrate a strong desire and readiness for personal and professional growth in Saskatchewan and Alberta.
Conexus Credit Union	Cultivator	Cultivator is a business incubator, powered by Conexus Credit Union, built to help high-growth companies launch, grow, and scale in Saskatchewan. Offer assistance through by providing coaching mentorships, product development support, customer discovery support, investor readiness (accessing capital) support, perk and discounts, and hiring support.
Economic Development Regina (EDR)	EDR Business Growth and Expansion Pathfinding	The EDR Business Growth and Expansion Pathfinding service is a way to help the Greater Regina Area's strategic sector companies realize growth opportunities through knowledge transfer and pathfinding, and linking them to the external resources available. This service will help them address areas for improvement across several business function areas.
Community Futures Saskatchewan	The Entrepreneurs with Disabilities Program (EDP)	The Entrepreneurs with Disabilities Program (EDP) helps people with disabilities or health conditions start or expand businesses in rural Saskatchewan. This program

Organization	Program	Description
		is open to anyone with a viable business idea who has a self declared disability or a health condition.
Community Futures Saskatchewan	Indigenous Business Development Services Program (IBDS)	The Indigenous Business Development Services (IBDS) Program offers support for Indigenous entrepreneurs in Saskatchewan.
Startup Lloydminster	Business Model Canvas	The goal of Startup Lloyd is not only to ensure a small business survives the start-up period, but also continues to grow and thrive long after their launch. The Business Model Canvas allows businesses to work with a business advisor to get clear on many aspects of a business including: customers, revenue streams, key activities, and more.
Startup Lloydminster	Mentorship	The goal of Startup Lloyd is not only to ensure a small business survives the start-up period, but also continues to grow and thrive long after their launch. We have a variety of mentors to support our entrepreneurs in a variety of areas.