Rural Workforce Development:
Challenges and Strategies in the Technology Sector

COLUMBIA BASIN RDI
RURAL DEVELOPMENT INSTITUTE

KNOWLEDGE BRIEF
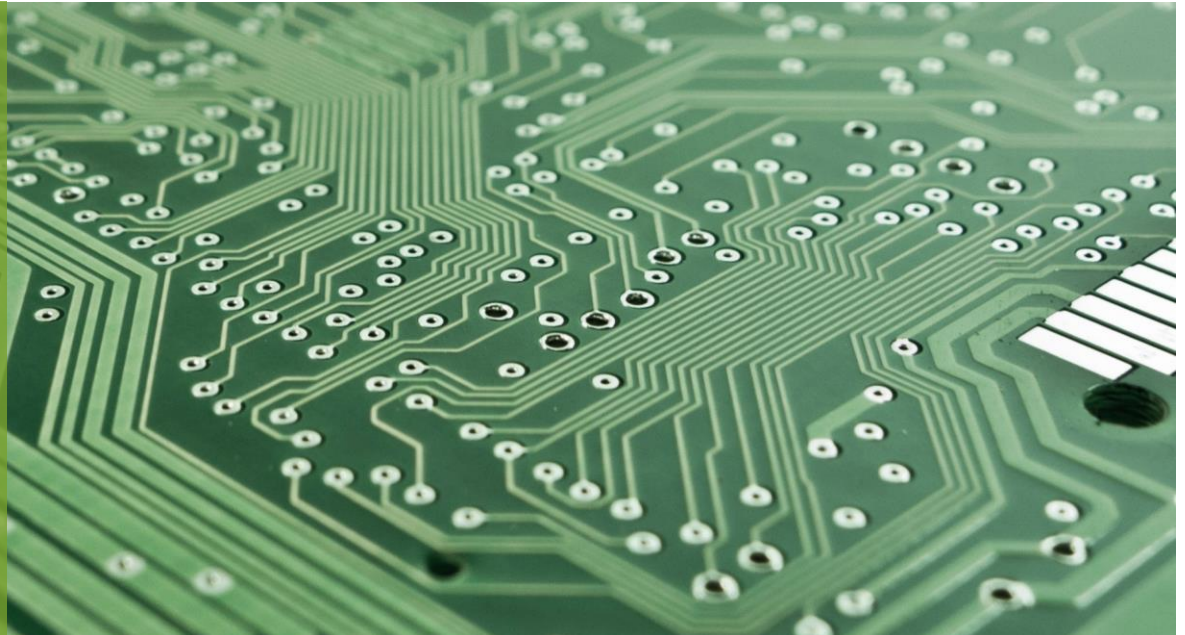
INTRODUCTION

The technology sector is a rapidly growing part of the Canadian economy. Today, approximately 600,000 Canadians work in the field of technology.[1] Every year the technology sector employs more and more Canadians and experts are expecting this trend to continue into the foreseeable future.[2] In the past, the technology sector has often been thought of as a one industry sector. However, the Canadian technology sector is diversifying and includes numerous industries: aerospace manufacturing, architecture and engineering design, information and community technology, chemical and pharmaceutical manufacturing, computer science and programming, machinery and specialized manufacturing, and scientific research and development.

British Columbia (BC) is seeing rapid growth in the technology sector.[3] BC is home to two of the country's major emerging technology hubs - Victoria and Vancouver are both nationally and globally recognized as technology hubs.[4] As the sector continues to grow in urban areas, spillover growth is evident in rural areas of the province. While rural communities have traditionally been driven by natural resource based economies, many rural economies are starting to diversify to include technology workers – both as part of existing sectors (e.g., research and development within traditional industry), as well as standalone (e.g., technology startups, remote workers).[5] As the technology sector begins to establish itself in rural areas, workforce development planning will become increasingly important to ensure the needs of companies are met and the sector can grow and be sustained.

The purpose of this knowledge brief is to provide an overview of the various workforce development challenges associated with the technology sector in Canada, particularly in rural BC areas like the Columbia Basin-Boundary. This brief will explore strategies and examples of how these challenges might be addressed.

CHALLENGES FOR WORKFORCE DEVELOPMENT IN THE TECHNOLOGY SECTOR

Workforce development is defined as "the co-ordination of public and private sector policies and programmes that provide individuals with the opportunity for sustainable livelihood and helps organizations achieve exemplary goals, consistent with societal context".[6] Workforce development planning is an important step in preparing to achieve workforce development goals. Workforce development planning looks at a number of factors in order to create a plan that will meet the current demand as well as prepare for the future requirements.[7]

As a relatively new sector, technology workforce development planning is just beginning to take shape. Factors involved in workforce planning include: the goals of individual firms, the current workforces' skills and talent, and any shortages that exist in the current labour market. From there, practitioners and planners can create a plan that addresses both the goals and the shortages. Identifying initial workforce planning and development goals is necessary in order to ensure the needs of developing technology firms are met now and in the future. Additionally, technology firms are in need of a quality workforce with the right skill set, in order to take their companies to the next level.[8] Ensuring there are training programs and recruitment ability to produce and retain high quality talent should be the primary goal of technology workforce. However, technology workforce development is not without its challenges. Below is an overview of the current workforce planning challenges in the technology sector.

EMERGING SECTOR

Technology is a relatively new sector that is rapidly developing and growing. Currently, the technology sector makes up only 4.8% of all employment in BC.[9] According to a recent report about the state of Canada's Technology Sector, a consequence of the sector being young is that a high proportion of small companies exist within the marketplace.[10] These small companies typically employ between 5-10 people.[11] In 2016, it was reported that 95% of all technology companies in BC had fewer than 10 employees.[12] One of the consequences of having a large number of small companies is that BC lacks "role model" companies.[13] A role model company is categorized as a larger company that competes on the global scale. Due to their ability to compete on a global scale, role model companies tend to bring investor and consumer attention to the region.[14] Additionally, larger firms can drive profitability in the sector and can help foster a healthy market ecosystem that encourages new investment and innovation.[15] Young companies need to be given the tools to grow and become "role models", otherwise BC risks losing small companies to other provinces with better resources and support.[16]

An additional challenge associated with the emerging nature of the technology sector is tracking workforce growth outside of large urban areas. While technology industries may start moving to more rural regions in the province, tracking workforce growth in the sector can be challenging in more rural areas. This is because standard labour market tracking may not accurately represent the growth. Labour Force Surveys suppress numbers under 1,500, which means that early growth in rural technology industries might not be captured.[17]

LACK OF CAPITAL INVESTMENT

The technology sector in BC currently has a deficit of capital investment. Capital investment is extremely important for young companies, particularly where secure funding opportunities are needed in order to sustain and grow company brands.[18] The technology sector is still relatively new and there are currently a limited number of funding opportunities available for the growing number of young companies in BC.[19]

Traditionally, there are two types of capital used within the technology sector. First, there is angel capital, which refers to individuals or firms that fund or financially support young companies. Traditionally, angel capital also offers other valuable resources, such as mentorship.[20] With a lack of angel investors in BC, young technology companies are not only missing out on crucial capital, but also the associated valuable mentorship connections. The second type of investment is venture capital. Venture capital investment typically provides capital investment for small high-risk firms.[21] Venture capital gives young firms support and financial security to continue to grow and pursue their goals. In the BC technology sector, there is a lack of both angel and venture capital opportunities. This lack of capital investment makes it harder for young technology companies to establish themselves in both the national and global market.

LACK OF EDUCATION AND TRAINING OPPORTUNITIES

The technology sector requires skilled employees who have experience working with technology. In BC, there is a shortage of talented individuals to fill available positions within growing companies. This lack of talent is one of the main challenges for the sector.[22] There are two main reasons for this problem. First, there are not enough post-secondary programs offered by universities to provide the sector with the talent that is required.[23] The current curriculum in many post-secondary programs requires modernization in order to keep up with the rapidly changing and growing technology field.[24] Second, there are not enough students entering into technology related programs. Currently only 17.2% of BC graduates focus on technology and related fields.[25] This problem is exacerbated in the rural setting because talent recruitment can be challenging. Rural areas typically have smaller populations of skilled workers and consequently employers have to compete for potential employees.[26] As the technology sector continues to grow there will be an increasing demand for highly educated and trained candidates to fill new positions.

INSUFFICIENT INFRASTRUCTURE

In order for the technology sector to thrive and develop in rural regions of BC, there must be basic technology related infrastructure in place to support the demands of the sector.[27] The two basic pieces of infrastructure that are needed to support the technology sector are adequate high-speed internet coverage and cellular service. Currently, there are regions in rural BC that do not have access to high-speed internet, as well as significant cellular 'dead zones'.[28] Although the government's goal is for all BC residents to have access to high speed internet by 2021, the current lack of access is an economic barrier for some rural areas.[29] In addition to a lack of access to high speed internet, many rural customers pay much higher rates than their urban counterparts.[30] These factors limit access to the internet for some individuals and businesses.[31] In terms of cellular service, there are large swaths of BC that are not within cellular range.[32] While some of this area in uninhabited, there are rural communities located in these cellular 'dead zones'. Insufficient technological infrastructure limits economic and business opportunities in rural regions.[33]

STRATEGIES FOR WORKFORCE DEVELOPMENT

Workforce development planning is integral to rural economies. Workforce planning aims to identify and grow workforce requirements in order to meet the needs of businesses within a region.[34] Effective workforce planning requires a comprehensive understanding of the current and future demands of the labour market and a continued review of progress. In the technology sector, workforce planning generally strives to ensure there is enough skilled talent to fill the positions available. Technology is a rapidly growing sector that continually requires more and more trained talent to fill positions and grow firms. Technology workforce planning requires a strong human resource perspective that aims to predict sector growth.[35] Below is an overview of the workforce development strategies specific to the technology sector.

TALENT ATTRACTION

As the technology sector expands and grows in both rural and urban BC, new talent is needed and existing talent needs to be retained in order to supply firms with the employees they need.[36] In order to address talent needs, companies can use tools such as talent attraction programs. These types of programs are typically day long events. They offer workshops for both employers and employees and facilitate networking between companies and prospective talent. For example, the BC Tech Association has been using talent attraction programs to support companies as they seek talent and train new staff. Dedicated programs like these give companies the tools they need to identify strong talent, deal with human resource issues, and retain their newly hired staff.

> **FIRST NATIONS TECHNOLOGY COUNCIL**
>
> The First Nations Technology Council has started a program called *Bridging to Technology*. The goal of the program is to provide professional development training that allows participants to expand their existing skill set. The program is 14 weeks long and was developed in partnership with the Nicola Valley Institute of Technology. The program has a specific BC focus and at the end of the program participants can complete a work experience placement in a relevant company. Programs like *Bridging to Technology* help deepen BC's talent pool and encourage residents to join the technology sector.

Another approach to talent attraction is creating facilities that invite leading minds to the region. An example of this is the Midas Lab in Trail, BC. The Midas lab is an applied research lab that is accessible to West Kootenay companies, entrepreneurs, and students. A facility like this fosters a networking environment. Beyond attracting talent to the region, Midas also provides training opportunities to locals. They offer a number of courses, many with a technology focus, that can help students increase their skills and become highly employable.

> **ATTRACTING DIVERSE TALENT**
>
> Women are often under-represented in the technology sector. The Canada-BC Job Grant, which aims to help technology companies train new hires and provide professional development for existing staff, is creating a specific funding program to train new and existing female employees. The goal of this grant it to attract more women into the sector.
>
> Additionally, organizations like the Kootenay Association for Science and Technology and the BC Tech Association have created networks for women working in the technology sector. They have also developed courses, such as Ladies Learning Code, which are designed to encourage women to join the sector and deepen the talent pool.

KNOWLEDGE BRIEF

EDUCATION DEVELOPMENT

Skilled, effective, and efficient talent is key to expanding and developing the technology workforce in rural regions. In order to supply the market with talent there must be effective, quality education and training opportunities available to students, both young and old.[37]

There are two primary ways to increase the number of talented graduates from post-secondary programs within the technology sector. First, education and training programs need to increase the number of required co-op terms at the post-secondary level. The co-op terms allow students to work in the field while completing their studies. Students graduate with strong skills and considerable experience as a result of participating in mandatory co-op terms. These students would be attractive to employers because of their strong skill set and proven ability to perform quality work.[38]

In the Columbia Basin-Boundary region, Selkirk College and the College of the Rockies both provide technology related programs. A challenge of integrating co-op terms into more rural colleges is the small number of firms available to take on students. However, as more technology related companies move into the Columbia Basin-Boundary region, it may become easier to expand co-op programs.

MANDATORY CO-OP TERMS AT THE UNIVERSITY OF WATERLOO

The University of Waterloo has championed cooperative education in technology related programs and has earned the reputation of producing highly skilled and talented graduates. Waterloo requires all students enrolled in technology related programs to complete mandatory co-op terms. These co-op terms provide students with the equivalency of two years of hands-on experience before they graduate from their university program. The exceptional amount of hands-on learning completed by students during their co-op terms has allowed Waterloo to produce high quality talent through their technology programs.

In BC co-op programs are offered, however, few are mandatory for the completion of a technology degree. Using the University of Waterloo's success with mandatory co-op terms as a guide, BC's schools could look towards implementing a similar system in their technology programs.

ASSOCIATION FOR CO-OPERATIVE EDUCATION BC/YUKON (ACE)

The ACE BC/Yukon aims to match potential employers up with young talent. ACE can be especially helpful in rural regions, where co-op opportunities can be few and far between. ACE aims to recognize and adapt to the needs of students and industry partners alike. The goal is to create vibrant professional networks. They highlight the benefits of co-op terms for both students and employers, including new innovation, quality research, and developing ongoing relationships. ACE firmly believes that co-op terms give students a professional edge going forward in their relevant field.

Second, post-secondary education and training curricula in the field of technology needs to be modernized. The field of technology is dynamic and rapidly changing. Universities, colleges, and other training institutions need to be able to keep up with these rapid changes.[39] Creating strong academic programs is one way of diversifying and increasing the talent pool available to companies and this in turn, can allow companies to innovate and grow.[40] With a newer and constantly evolving sector like technology, it is important to ensure it is supported by effective modern education programs that set students up to enter the workforce.

COLLABORATION

Collaboration is an important workforce development strategy. It is valuable not just between companies within and across sectors, but also between companies and other institutions like local government, academic institutions, and other civil and non-profit organizations. For example, rural business networks and collaboration are noted as key to the success of companies.[41] As a result, key components of workforce development strategies include collaboration between firms, training institutions, and community based organizations, particularly in the early stages of the sector.[42] Connections between companies in the technology sector will facilitate the flow of information and advice.[43] This can result in benefits such as cost reductions for individual firms in terms of training and infrastructure setup.[44]

In the rural setting, there can be barriers to collaboration. These can include the geographical distance between firms and scarcity of potential partners.[45] In order for collaboration to work effectively in these situations it is increasingly important that the pre-existing networks are identified and included in collaboration plans.[46] It is important to build on the foundation that already exists in the community in order to develop the most effective workforce development system.

KAST AND BC TECH ASSOCIATION

Technology associations are an excellent way to foster collaboration between firms within the sector. The Kootenay Association for Science and Technology (KAST) is a great example of technology sector collaboration that is currently underway in the Columbia Basin-Boundary region. KAST works to foster connections between science and technology firms in order for the sector to remain competitive on a provincial and national level.

On a provincial level, the BC Tech Association is an example of how organizations like KAST can make a difference. Throughout the province the BC Tech Association works to provide collaboration, learning, and growth opportunities for firms within the technology sector of BC. The BC Tech Association regularly runs 'Connection Days' for industry leaders, customers, and talent to boost connections between the various players in the technology field.

PLANNING AND PREPARING FOR GROWTH OF THE SECTOR

The BC technology sector is projected to keep growing. The forecasted annual employment growth is +2.3% between 2016 and 2020.[47] This continued growth is exciting and could create economic possibilities for the Columbia Basin-Boundary region. However, while there is predicted growth in the sector, there is very little information available about how that growth will look in rural regions. This is a challenge for rural communities that want to welcome technology companies into their region.

While there is information indicating that the technology sector will experience growth in BC, there is little information about what that growth will look like in more rural regions. Rural communities can prepare for the expected growth by creating an attractive area for technology companies. This can be done by increasing infrastructure to support companies and by expanding local talent. As technology growth begins in rural communities, it is important for community planners and industry leaders to monitor the needs of the sector to address growth issues and opportunities that may arise.[48]

RECOMMENDATIONS AND CONCLUSION

The technology sector has historically been situated in urban hubs like Silicon Valley. However, the technology sector grows, there is spill over into more rural regions and this provides an exciting opportunity for rural economies to diversify. The Columbia Basin-Boundary region is an attractive location for technology companies due to affordability, natural environment, and amenities.[49] In order for the Columbia Basin-Boundary region to participate in the growth of this new sector, the region needs to expand and deepen its talent pool and establish stronger infrastructure. This can be accomplished through actions like:

- Incorporating collaborative talent attraction and development strategies to aid in financial or settlement support for potential employees.
- Deploying employees to better suited roles to improve their career development.
- Using the Learning Outcomes tool for employee retention.
- Promoting a diverse workforce to increase diversity and equal opportunity.

REFERENCES AND RESOURCES

[1] BC Government, "#BCTECH Strategy: One-Year Renewal and Update," 2017.

[2] C. Lamb and M. Seddone, "The State of Canada's Tech Sector, 2016," 2016.

[3] Ibid.

[4] Kathrine Richardson, "Attracting and Retaining Foreign Highly Skilled Staff in Times of Global Crisis: A Case Study of Vancouver, British Columbia's Biotechnology Sector," *Population, Space and Place* 22, no. 5 (July 2016): 428–40, https://doi.org/10.1002/psp.1912.

[5] Gary P. Green, *Workforce Development Networks in Rural Areas : Building the High Road* (Edward Elgar, 2007).

[6] R Jacobs and J Hawley, *International Handbook of Education for the Changing World*, ed. Rupert. Maclean and David. Wilson (Springer Netherlands, 2009), https://doi.org/10.1007/978-1-4020-5281-1_167.

[7] Allan. Schweyer, *Talent Management Systems : Best Practices in Technology Solutions for Recruitment, Retention, and Workforce Planning* (Wiley, 2004).

[8] BC Tech Association, "A 4-Point Plan for Growth: Scaling up BC's Technology Ecosystem," 2016.

[9] Lamb and Seddone, "The State of Canada's Tech Sector, 2016."

[10] BC Tech Association, "A 4-Point Plan for Growth: Scaling up BC's Technology Ecosystem."

[11] Lamb and Seddone, "The State of Canada's Tech Sector, 2016."

[12] Ibid.

[13] BC Tech Association, "A 4-Point Plan for Growth: Scaling up BC's Technology Ecosystem."

[14] Ibid.

[15] Ibid.

[16] Ibid.

[17] BC Government, "About the Labour Force Survey - Province of British Columbia," 2016, https://www2.gov.bc.ca/gov/content/data/statistics/employment-labour/about-labour-force-survey.

[18] BC Government, "#BCTECH Strategy: One-Year Renewal and Update."

[19] KMPG, "British Columbia Technology Report Card," 2016.

[20] Lamb and Seddone, "The State of Canada's Tech Sector, 2016."

[21] Ibid.

[22] Richardson, "Attracting and Retaining Foreign Highly Skilled Staff in Times of Global Crisis: A Case Study of Vancouver, British Columbia's Biotechnology Sector."

[23] BC Tech Association, "A 4-Point Plan for Growth: Scaling up BC's Technology Ecosystem."

[24] Ibid.

[25] Ibid.

[26] BC Government, "Building on Our Rural Advantages," 2017.

[27] Government of British Columbia, "Internet in BC," 2016,
https://www2.gov.bc.ca/gov/content/governments/about-the-bc-government/communications-technology/internet-in-bc.

[28] Ibid.

[29] Laxmi Prasad Pant and Helen Hambly Odame, "Broadband for a Sustainable Digital Future of Rural Communities: A Reflexive Interactive Assessment," *Journal of Rural Studies* 54 (2017): 435–50, https://doi.org/10.1016/j.jrurstud.2016.09.003.

[30] Government of British Columbia, "Internet in BC."

[31] Network BC, "Network BC Connectivity Map," 2017,
https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=3c113c8d5a414a53ad4fef8709a153a0.

[32] Government of British Columbia, "Internet in BC."

[33] Green, *Workforce Development Networks in Rural Areas : Building the High Road*.

[34] Henry O'Lawrence, "The Workforce for the 21st Century," *Issues in Informing Science and Information Technology* 14 (2017): 067–085.

[35] Lamb and Seddone, "The State of Canada's Tech Sector, 2016."

[36] Rodger W. Bybee and Bruce Fuchs, "Preparing the 21st Century Workforce: A New Reform in Science and Technology Education," *Journal of Research in Science Teaching* 43, no. 4 (April 2006): 349–52, https://doi.org/10.1002/tea.20147.

[37] Colleen Nevison et al., "Using Learning Environments to Create Meaningful Work for Co-Op Students," *Higher Education Research & Development* 36, no. 4 (June 7, 2017): 807–22, https://doi.org/10.1080/07294360.2016.1229268.

[38] Bybee and Fuchs, "Preparing the 21st Century Workforce: A New Reform in Science and Technology Education."

[39] O'Lawrence, "The Workforce for the 21st Century."

[40] Nathan Young, "Business Networks, Collaboration and Embeddedness in Local and Extra-Local Spaces: The Case of Port Hardy, Canada," *Sociologia Ruralis* 50, no. 4 (August 16, 2010): 392–408, https://doi.org/10.1111/j.1467-9523.2010.00521.x.

[41] Ibid.

[42] Ibid.

[43] Green, *Workforce Development Networks in Rural Areas : Building the High Road*.

[44] Young, "Business Networks, Collaboration and Embeddedness in Local and Extra-Local Spaces: The Case of Port Hardy, Canada."

[45] Green, *Workforce Development Networks in Rural Areas : Building the High Road*.

[46] Innovation Science and Economic Development Canada, "Canadian ICT Sector Profile 2016," 2016, https://www.ic.gc.ca/eic/site/ict-tic.nsf/eng/h_it07229.html.

[47] KMPG, "British Columbia Technology Report Card."

[48] Gregory M. Spencer et al., "Do Clusters Make a Difference? Defining and Assessing Their Economic Performance," *Regional Studies* 44, no. 6 (July 30, 2010): 697–715, https://doi.org/10.1080/0034400903107736.

[49] Edward J. Malecki, "High Technology and Local Economic Development," *Journal of the American Planning Association* 50, no. 3 (September 30, 1984): 262–69, https://doi.org/10.1080/01944368408976593.