



Ontario's Next Gen Industry



Addressing Labour Demand and Growth in the Creative Technology Sector



Research prepared for



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Preface

Interactive Ontario (IO) is the trade association representing the video game and interactive digital media (IDM) sector in Ontario. IO's members produce, commercialize and export interactive digital entertainment and edutainment such as video games, extended reality applications (VR, AR, MR) and eLearning content. IO's mission is to inspire, unite and enable Ontario's IDM industry to achieve long-term growth and prosperity. Through advocacy, connections, insights, resources, programs, and building meaningful partnerships with the industry and its stakeholders, IO is dedicated to positioning Ontario as a leader on the world stage.

Partners

The Information and Communications Technology Council (ICTC) is a not-for-profit, national centre of expertise for strengthening Canada's digital advantage in a global economy. Through trusted research, practical policy advice, and creative capacity-building programs, ICTC fosters globally competitive Canadian industries enabled by innovative and diverse digital talent. In partnership with an expansive network of industry leaders, academic partners, and policymakers from across Canada, ICTC has empowered a robust and inclusive digital economy for over 30 years.

Toronto is home to more than three million people whose diversity and experiences make this great city Canada's leading economic engine and one of the world's most diverse and livable cities. As the fourth largest city in North America, Toronto is a global leader in technology, finance, film, music, culture, and innovation, and consistently places at the top of international rankings due to investments championed by its government, residents and businesses.

With the support of

The Ontario government.

The London Economic Development Corporation (LEDC) is the lead economic development agency for London. Working with business, government, academic institutions, and industry partners, LEDC supports the growth of existing businesses, attracts new businesses to London, and strives to ensure companies have the talent, resources, and business conditions they need to continue scaling.

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Designed by Nick Routley.



Glossary

Augmented reality (AR): Interactive real-life experiences enhanced by digital elements—such as visual overlays or other sensory projections. The purpose of AR is to expand a user’s understanding of, or interaction with, his or her environment.

Virtual reality (VR): Simulated experiences that can resemble—or differ completely—from the real world. Virtual reality typically takes the form of 3D simulations, presented by way of a headset and motion sensors.

Mixed reality (MR): The combination of AR and VR, which allows users to see both the real world and virtual objects simultaneously.

Extended reality (XR): The umbrella term for augmented reality, virtual reality, and mixed reality. XR, AR/VR, and VR/AR are often used interchangeably.

AAA/Triple A: This is an informal term used to describe high-budget, high-profile games or the game studios that produce these games. Typically, these “blockbuster” games require large publishers with larger development and marketing capacities.

User Interface (UI): This refers to the point of human-to-computer interaction. This encompasses a range of different types of user interaction, whether through graphics interface, menu-driven navigation, or voice. UI design shapes the look or style to create an interface that users find easy and enjoyable to use.

User Experience (UX): This encompasses aspects of the user’s interaction with products and services. This often describes UX design, which includes the larger experience (such as acquiring and integrating a product).

Creative Technology: Creative technology is a general term used to describe the interdisciplinary field that encompasses elements of art, design, and media developed with digital technologies. This can include computer graphics, digital production, and augmented reality technologies. To benchmark the creative technology industry in Ontario, this report will focus on video game development, XR (encompassing both Augmented Reality and Virtual Reality), immersive digital experiences, and esports.

Interactive Digital Media (IDM): This is a broad category that typically describes products that can be used interactively by an individual through integrated digital applications or data files, for information or entertainment purposes. Examples may include apps, games, cross-platform entertainment, or virtual environments.

Virtual Production: Combines physical and virtual filmmaking techniques that allow VFX to be captured on set, on camera, in real time. It is enabled by real-time photo-realistic graphics engines (using video game technology). The real-time 3D game engines can create realistic sets to be displayed on large LED walls behind physical sets.



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Executive Summary

Ontario is one of Canada's leading technology regions. The country's most populous province, Ontario is home to a robust and diversified digital economy, propped up by a highly educated and diverse talent base. Moreover, the province's digital economy boasts a long history of homegrown business success, coupled with a strong capacity for investment attraction —among others, these factors have earned it the title of second largest information technology (IT) cluster in North America. A core contributor to the province's booming digital economy is creative technology. An interdisciplinary field where elements of computer science, design, art, entertainment, and social sciences converge, creative tech has gained momentum in recent years. Ontario has seen notable growth in areas including video games, immersive technology, and esports. Combined with regional advantages in creative and cultural industries, Ontario is one of Canada's leading creative technology hubs.

This report examines strengths, opportunities, and key considerations in Ontario's creative tech sector and labour market. With an established ability to weather the storm of the pandemic and drive resilient and high-quality labour market opportunities, the province's creative tech sector is poised for continued success.



Core takeaways of this research include the following:

Creative technology talent demand persists despite economic headwinds.

The sector continues to experience strong demand for talent in a variety of roles, some that are transdisciplinary in nature. Notably, both technical and artistic roles posted strong demand despite the pandemic, a slowing Canadian and global economy, and increased competition. Many roles require at least a high-level understanding of the underlying technology driving applications and services, as well as strong so-called “soft skills” like collaboration, critical thinking, and project management; this often necessitates workers with a blend of what are referred to as technical and human skills.

The crunch for intermediate and senior-level talent is especially acute. These employees bring crucial technical skills, irreplaceable lived experience, domain knowledge, and the ability to lead teams. These workers are also necessary for the development of the overall talent pipeline, including training junior staff and helping them progress to intermediate roles. Despite a stark need across the sector, these workers are in short supply.

The fast growth of the industry and increasing digitization across the economy creates recruitment and retention challenges for creative tech employers. Talent competition occurs across studio size and region, with large companies often acting as key attractors—prospects of higher salaries, career mobility, and brand recognition are all core variables influencing competition. Moreover, the sheer pace of the industry, coupled with increasing digitization across all sectors, presents added recruitment and retention pressures for creative tech employers. Although a cooling global economy may help battle wage inflation in the near-term, the rise of remote and hybrid work has given employees greater freedom to work for companies outside of Canada. That said, hybrid and remote work also present opportunities for Ontario employers to broaden their talent pool.

Ontario’s creative tech sector is a healthy blend of small—and often independent—studios and large multinationals. A balanced presence of small and large studios is essential to economic growth, investment attraction, diversity, and labour market resiliency. Research shows that along with other spillover effects, large companies can attract more (and senior) talent to a given region, which also benefits smaller companies that may not have the brand power or other pull factors to affect this shift themselves. Smaller companies are known for conceptualizing and developing original IP, bringing innovation and ingenuity to the marketplace. Continuing to attract large-scale investment while supporting small studios is essential to long-term stability in the sector.



Local post-secondary institutions provide high-quality programs that help learners make careers in tech, but existing educational pathways need further adaptation to meet evolving real-life labour market needs. Developing and maintaining adaptable and flexible curriculums is always a challenge for training institutions, namely in fields like technology that are subject to rapid evolution and change. Although creative tech employers work with post-secondary institutions to develop and source new grads, they also value alternative pathways of skill development, including micro-credentials and programs like work-integrated learning.

A focus on equity, diversity, and inclusion (EDI) opens opportunities and broadens the talent pool, but diversity is not synonymous with inclusivity. The creative tech sector is home to employees from around the world. Moreover, current demographic trends point to a future where 40% of Canadians will be from a racialized group. However, despite a comparatively diverse talent pool, creative tech employers note significant opportunities to enhance inclusivity. Key measures include closing the gender gap, battling systemic biases, and improving participation—including in leadership positions—from underrepresented groups.

Immigration is an essential talent stream for creative technology employers. It is an especially important mechanism of sourcing senior-level talent that is in short supply. However, macroeconomic factors including housing availability and affordability in creative tech hubs like Toronto affect the sector's ability to attract and retain international talent. Although these realities require broader policy responses and mitigation measures, increased clarity on immigration sponsorship processes and timelines for creative technology roles can support employers in securing internationally educated professionals.

Investing in Ontario creative tech pays dividends and requires a multi-faceted approach. Ontario's creative technology sector is well positioned to succeed, but changing macroeconomic forces and unyielding competition requires an all-sector approach to support its continued success. This includes targeted incentive programs and clear information about varied creative tech career pathways. This approach is key to attracting and retaining talent in the long run.





Introduction

The Creative Technology Sector in Ontario

The prevalence of world-class technology companies, a strong track record of investment-attraction, and the abundance of local creative and digital talent make Ontario an ideal candidate for a leading role in the Canadian creative technology sector. With over 300,000 tech workers and nearly 25,000 firms, Ontario is North America's second-largest IT cluster after California.⁷ Toronto, Ottawa, and Waterloo are the province's leading tech hubs, respectively ranking 3rd, 13th, and 24th, for the top tech talent cities in North America in 2022.⁸ These cities boast a high concentration of world-renowned educational institutions, start-up and scale-up services like incubators and accelerators, private sector investment in the form of venture capital⁹ and FDI, and a history of public sector support. Factors like these play roles in further attracting investment—primary research by ICTC with would-be investors in Canada's AI ecosystem highlights that correlation; investors see these elements as “signals” of opportunity and growth potential.¹⁰

Home to roughly 50% of Canada's IT workforce,¹¹ Ontario is a top Canadian producer of creative and cultural content. Video game and interactive media companies represent the largest part of the province's creative technology sector, and Ontario's video game industry also plays a substantial role outside of the province: as of 2021, nearly one-third of Canadian video game studios are based in Ontario.¹² Although some existing research examines labour market trends in the creative tech sector in other provinces,¹³ this study is the first-of-its kind for Ontario.

- ⁷ “Ontario showcases vibrant tech sector on the global stage,” Government of Ontario, June 22, 2020, <https://news.ontario.ca/en/release/57324/ontario-showcases-vibrant-tech-sector-on-the-global-stage>
- ⁸ “Scoring Tech Talent 2022” CBRE, March 2022, <https://www.cbre.ca/insights/books/scoring-tech-talent-2022/03-which-are-the-top-ranked-tech-talent-markets>
- ⁹ “2022 Canadian Venture Capital Market Overview”, CVCA, H1 2022. https://www.cvca.ca/assets/files/reports/h1-2022-vc-pe-canadian-market-overview/CVCA_VC_H1_2022_FINAL.pdf
- ¹⁰ Alexandra Cutean, Rosina Hamoni, Chris Herron, Kiera Schuller, “Betting on Red and White: International Investment in Canadian AI”, Information and Communications Technology Council, August 5, 2020. <https://www.digitalthinktankictc.com/reports/betting-on-red-and-white>
- ¹¹ “Information Technology,” Invest Ontario, 2021, <https://www.investontario.ca/information-technology#map-title-ICT>
- ¹² “The Canadian Video Game Industry 2021,” Entertainment Software Association of Canada, October 2021, <https://theesa.ca/resource/the-canadian-video-game-industry-2021/>
- ¹³ Alexandra Cutean, Ryan McLaughlin, Khiran O'Neill, and Trevor Quan, “Benchmarking the Creative Technology Ecosystem in British Columbia”, Information and Communications Technology Council, DigiBC, January 2021. <https://www.digitalthinktankictc.com/ictc-admin/resources/admin/creative-tech-report.pdf>



In 2021, ICTC, in partnership with DigiBC (the Creative Technology Association of British Columbia) released the report *Benchmarking the Creative Technology Ecosystem in British Columbia*. This report identifies that British Columbia's creative technology sector has grown steadily year over year, and with it, came a strong and unyielding demand for diverse talent. The most in-demand roles are found primarily across digital/technical and creative/artistic categories. The study confirms that future industry growth and innovation depends on increased access to skilled talent at all levels.¹⁴

This report explores similar concepts, with a focus on creative technology in Ontario. Ontario's leadership in the digital sphere, coupled with unique industry characteristics warrants an in-depth understanding of creative tech talent needs, skill evolution, ecosystem support structures, and opportunities for future growth and success. This report's findings are informed by mixed methods, including primary and secondary research. Primary research consists of key informant interviews with employers and post-secondary leaders, analysis of job board data on in-demand jobs, and an employer survey. Secondary research includes a robust literature review and environmental scan, and analysis of relevant secondary datasets.

Part I begins by examining the different creative technology industries in Ontario and highlights key developments and successes.

Part II draws from an employer survey and data on in-demand jobs and skills to showcase trends related to hiring demand, top roles, and skills.

Part III explores creative technology education and training in the province, including industry perspectives on employment pathways and learner outcomes. It also dives into equity, diversity, and inclusion (EDI), retention, immigration considerations, and pathways forward.

Part IV concludes with key considerations to steer further investment-attraction and homegrown success stories in Ontario's creative tech sector

¹⁴

Ibid.





PART I

What is Creative Technology?



Defining creative technology as a sector requires an analysis of the local context and nature of companies within a given ecosystem. In provinces like British Columbia and Quebec, there are close relationships or overlaps between VFX (short for visual effects that refer to the imagery created, manipulated, or enhanced with computer technology),¹⁵ XR (a term that includes Virtual Reality and Augmented Reality), and animation industries. Furthermore, while creative technology plays a leading role in the entertainment industry, many companies also offer products or services to other sectors. For example, the growing digitization of the retail sector has spurred the rise of the “phygital”; here, traditional in-store experiences are enhanced with the use of technology including augmented and virtual reality.¹⁶ Immersive technology is also increasingly leveraged to improve both efficiency and safety in traditionally high-touch sectors like natural resources and manufacturing.¹⁷

This report focuses on video game development, XR (encompassing both Augmented Reality and Virtual Reality), immersive digital experiences, and esports (electronic sports competitions in multiplayer video games). Although Ontario is also known for its strength in film and production (with competitive incentives and record-breaking revenues in 2021¹⁸), the VFX and animation industries are well-researched and supported through Film Ontario and Ontario Creates.

¹⁵ Alyssa Maio, “What is VFX? Defining the term and creating impossible worlds,” *studiobinder*, February 21, 2021. <https://www.studiobinder.com/blog/what-is-vfx/>

¹⁶ Mansharn Toor, Chris Herron, “Striving to be Smarter: The Evolution of Intelligent Retail in Canada”, *Information and Communications Technology Council*, September 8, 2022. <https://www.digitalthinktankictc.com/reports/striving-to-be-smarter>

¹⁷ Alexandra Cutean, Mairead Matthews, Tyler Farmer, “Spanning the Virtual Frontier: Canada’s Immersive Technology Ecosystem”, August 27, 2020. <https://www.digitalthinktankictc.com/reports/spanning-the-virtual-frontier>

¹⁸ “Ontario’s film and TV production industry raked in a record \$2.88 billion last year,” *blogTO*, March 2022, <https://www.blogto.com/film/2022/03/ontarios-film-tv-industry-record-last-year/>



Video Game Development

Video games are an important part of Canadian life. According to the Entertainment Software Association of Canada (ESAC), in 2022, 53% of Canadians reported playing video games regularly, averaging nearly 8 hours of play per week.¹⁹ ESAC and other research further notes that online gaming saw a significant uptick during the pandemic, and it continued to remain popular, even as lockdowns were lifted, and health restrictions were eased.²⁰ Offering a form of community and interaction, gamers make connections and even long-lasting relationships with fellow players.

Video games took their beginnings from a need to better understand the capabilities of computers; as early as the 1960s, they acted as programming case studies and spurred public interest in a new field— computer science.²¹ Games like Tennis for Two, tic-tac-toe, Spacewar, and Pong were some of the industry’s pioneers, and in the decades to come, games evolved from the arcade, to personal computers, gaming consoles, and phones. In recent decades, video games have been revolutionized by several core technological advancements. While AI-powered interactive experiences have been a core component of gaming for decades now, 3D game development tools like Unreal Engine and Unity²² enable developers to create realistic and immersive gaming experiences more quickly. For example, Unreal Engine 5 (UE5) offers a universal lighting engine²³; this helps generate more detailed, dynamic, and engaging scenes, while drastically cutting down time spent by workers in roles like software engineering or character rigging. Next, the launch and sophistication of smartphones, alongside the growth of social media and expansion of app stores (a platform for game developers to sell consumers) have broadened social gaming communities.²⁴ ESAC research further corroborates this shift; according to their 2022 essential gaming facts, nearly three quarters of Canadians play games online, half of them with other people.²⁵

In 2021, Canada was home to 937 active video game studios, the majority based in four provinces: Ontario, Quebec, BC, and Alberta. Despite the macroeconomic upheaval caused by the pandemic, the presence of video game studios increased by 35% from 2019,²⁶ and much of this growth occurred in Ontario and Quebec. Today, Ontario is home to 298 video game studios, the greatest number of studios of any region in Canada.²⁷

¹⁹ "Bringing Canadians Together through Gaming: Essential Facts 2022", Entertainment Software Association of Canada, Nov 2022, https://theesa.ca/wp-content/uploads/2022/11/EF2022_EN.pdf

²⁰ Ibid.

²¹ "Video Game History", Smithsonian. <https://www.si.edu/spotlight/the-father-of-the-video-game-the-ralph-baer-prototypes-and-electronic-games/video-game-history>

²² "The Ground-breaking Tech Behind the Gaming Revolution," Newswatch, January 16, 2023, <https://newswatchtv.com/2023/01/16/the-ground-breaking-tech-behind-the-gaming-revolution/>

²³ Devin Coldeway, "Why should you care about Unreal Engine 5?", TechCrunch, April 11, 2022. <https://techcrunch.com/2022/04/11/what-is-epic-games-unreal-5/>

²⁴ Kaavya Karthikeyan, "The History, Evolution, and Future of Mobile Gaming," Gameopedia, n.d., Accessed February 01, 2023, <https://www.gameopedia.com/the-history-evolution-and-future-of-mobile-gaming/>

²⁵ "Bringing Canadians Together through Gaming: Essential Facts 2022", Entertainment Software Association of Canada, Nov 2022, https://theesa.ca/wp-content/uploads/2022/11/EF2022_

²⁶ "The Canadian Video Game Industry 2021", Entertainment Software Association of Canada, October 2021. <https://theesa.ca/wp-content/uploads/2022/07/esac-2021-final-report.pdf>

²⁷ "The Canadian Video Game Industry 2021," Entertainment Software Association of Canada, October 2021, https://www.nordicity.com/de/cache/work/169/ESAC_The%20Canadian%20Video%20Game%20Industry%202021.pdf



Ontario's video game industry is characterized by a blend of independent studios and multinationals. Independent (commonly referred to as indie) game studios have experienced strong growth over the last 10-15 years,²⁸ enabled in part by the boom in mobile gaming and direct-to-consumer marketing.²⁹ A number of Ontario-based indie studios persist today, and many are thriving. Big Blue Bubble, Capybara Games, Drinkbox Studios, Uken Games, and Digital Extremes (DE) are just a few examples.

London, Ontario-based Digital Extremes (DE) was founded in 1993 and, over the last two decades, has become a major player in the video game industry. Today, DE employs over 400 people across Canada and the US. The studio reached critical and commercial success with the free-to-play action game, *Warframe*[®], that today supports a global community of 70+ million registered players across all major gaming platforms.³⁰

Provincial tax credits and other incentive structures have been the cornerstone for the growth of Ontario creative tech.³¹ In 1998, the Ontario Interactive Digital Media Tax Credit (OIDMTC) was created to support corporations with permanent establishments in the province. This credit renders Canadian-owned or foreign-owned studios potentially eligible for a refundable tax credit on qualifying expenditures incurred on productions, games, or digital media products.³² Competitive tax regimes are common policy levers, and research has long-established their links to innovation and investment attraction.³³ Some tax regimes target corporations (i.e., the OIDMTC); others, like the Dutch 30% ruling³⁴ (a regime offering expats a temporary income tax deduction) target individuals; and others yet, like Quebec's recently implemented Deduction for the Commercialization of Innovations (IDCI)³⁵ aim to boost IP development, management, and commercialization. Regardless of intended audience, such structures have proven key to economic growth and innovation in host regions. In Ontario, numerous studios, including Behaviour Interactive, Certain Affinity, Electronic Arts, Gameloft, Keywords/Snowed In Studios, and Ubisoft have leveraged the OIDMTC to invest in the province's gaming industry.

Extended Reality: Virtual and Augmented Reality

Virtual reality (VR) and augmented reality (AR) are collectively referred to as Extended Reality (XR).³⁶ VR immerses a user in a computer-generated simulation, typically through the use of a headset, while AR layers computer-generated enhancements over an existing reality that is presented in a user's field of view.³⁷

- 28** Allison Cross, "Ontario sees surge in gaming industry," *Toronto Star*, Mar 4, 2011. https://www.thestar.com/business/2011/03/04/ontario_sees_surge_in_gaming_industry.html?rf ; Robin Ghosh, "Developing Toronto: Building the city's indie video game landscape," *StartUp HERE Toronto*, January 22, 2021. <https://startupheretoronto.com/sectors/creative-industries/developing-toronto-building-the-citys-indie-video-game-landscape/>
- 29** *Ibid.*
- 30** *Ibid.*
- 31** Peter Nowak, "Canada's indie video game makers are blasting the big boys—and winning," *Canadian Business*, November 15, 2013, <https://archive.canadianbusiness.com/technology-news/the-app-effect/>
- 32** "Ontario Interactive Digital Media Tax Credit", Government of Canada. <https://www.canada.ca/en/revenue-agency/services/tax/businesses/topics/corporations/provincial-territorial-corporation-tax/ontario-provincial-corporation-tax/ontario-refundable-media-tax-credits/ontario-interactive-digital-media-tax-credit.html>
- 33** "Tax Incentives for Research and Development: Trends and Issues", OECD. <https://www.oecd.org/sti/inno/2498389.pdf>
- 34** "Expat break to be shortened", Government of the Netherlands. <https://www.government.nl/topics/income-tax/shortening-30-percent-ruling>
- 35** "Quebec further tweaks patent box regime", KPMG, January 12, 2022. <https://kpmg.com/ca/en/home/insights/2022/01/quebec-further-tweaks-patent-box-regime.html>
- 36** "Business Intelligence: Ontario's computer animation and visual effects companies, 2018," *Computer Animation Studios of Ontario (CASO)*, January 2019, https://www.nordicity.com/de/cache/work/121/Nordicity_CASO_Ontario_Animation_VFX_Industry_2018_Report.pdf
- 37** "Creative Disruption: The impact of emerging technologies on the creative economy," *World Economic Forum*, February 2018, https://www3.weforum.org/docs/39655_CREATIVE-DISRUPTION.pdf

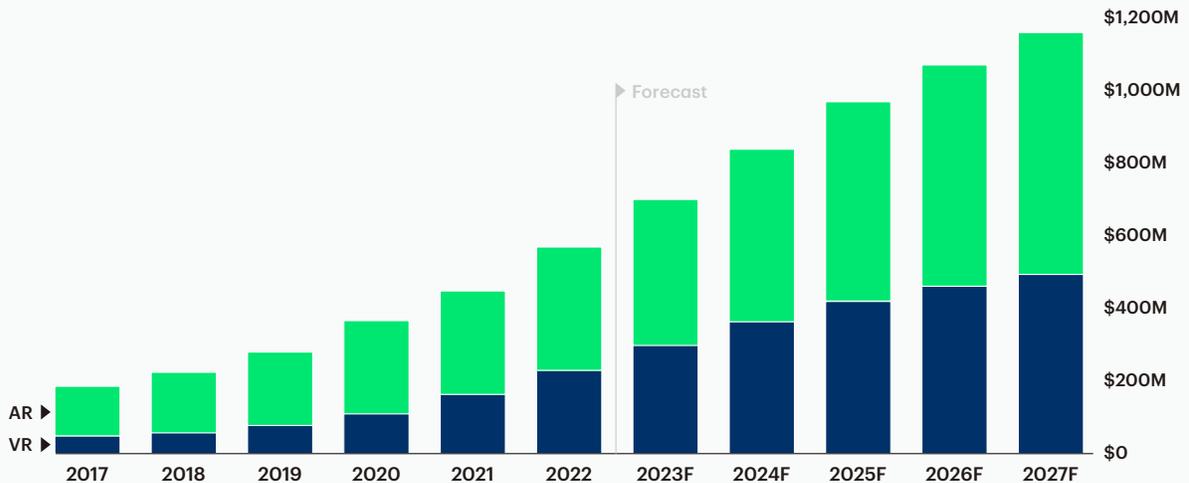


The growth of the mobile gaming industry and the increase in consumer electronic devices have been key factors in growing the global AR and VR market.³⁸ Further potential expansion of AR and VR to other sectors including manufacturing, energy, retail, and logistics, presents opportunity. For example, recent research by McKinsey suggests that oil & gas companies stand to cut costs by up to 25% a barrel through the implementation of certain digital technology, including augmented reality.³⁹

Dark Slope is a Toronto-based virtual production and metaverse gaming company, employing over 30 people.⁴⁰ A homegrown success story, in 2022 Dark Slope launched an immersive location-based entertainment (LBE) VR simulator experience with branching narratives based on the Transformers universe.⁴¹ This four-player, co-operative VR simulator ride is deployed to over 100 Dave & Buster's locations across North America.⁴²

A relatively nascent industry, there is limited data on the XR ecosystem. However, some Canadian data exists at the national level (see Figure 1), providing an overall picture of industry size and composition. Today, AR is responsible for the largest share of XR economic activity, making up nearly 60% (\$330 million USD) in 2022. However, VR's share of the Canadian XR marketplace has grown since 2017 and expected technology developments and economies of scale point to future scaling. Notably, the cost of VR hardware (e.g., headsets)⁴³ is set to decrease while the sophistication of software running the technology is expected to improve. By 2027, VR's share of the total XR market is expected to grow to 43% from 23% in 2017.

Figure 1. **Canadian XR Revenue by Consumer Segment, Annually**⁴⁴



Source: Statista

³⁸ Md K Shrawawanty, Y Vineet, "2022 Augmented and Virtual Reality Market," Allied Market Research, September 2022, <https://www.alliedmarketresearch.com/augmented-and-virtual-reality-market>

³⁹ Thomas Hansmann et. al "Harnessing Volatility: Technology transformation in oil and gas", McKinsey, September 1, 2022. <https://www.mckinsey.com/capabilities/operations/our-insights/harnessing-volatility-technology-transformation-in-oil-and-gas>

⁴⁰ Based on open access data on the company's website and social media presence, accessed February 01, 2023.

⁴¹ "Dark Slope secures CAD \$1.7M in funding to support development of VR Kaiju game," Auganix, August 19, 2022, <https://www.auganix.org/dark-slope-secures-cad-1-7m-in-funding-to-support-development-of-vr-kaiju-game/>

⁴² "Transformers: Deception Invasion," Dark Slope, Accessed February 1, 2023, <https://darkslope.com/productions/transformers-decepticon-invasion/>

⁴³ Ibid.

⁴⁴ Aggregated totals of all revenue sources per XR segment inclusive of total revenue sources for advertising, software, and hardware purchases. Full data available per market segment and revenue source available at "AR Hardware – Canada," Statista.com, January 2023, Accessed February 01, 2023, <https://www.statista.com/outlook/amo/ar-vr/ar-hardware/canada?currency=USD&locale=en#methodology>





A Look Ahead: Opportunities in Virtual Production

In recent years, XR's presence in the production field has grown.⁴⁵ Virtual production uses large screens and moving CGI (computer-generated images) elements in real time to immerse film and TV cast and production crews.⁴⁶ Although a relatively recent development, virtual production is expected to bring cost savings and accelerate time to market.⁴⁷ Toronto is home to one of the largest virtual production studios in the world, Pixomondo (PXO).⁴⁸ PXO chose Toronto for several reasons including its virtual production capacity—namely the access to large-scale LED facilities—as well as the city's supply of skilled talent.⁴⁹ Schools like Conestoga College and Sheridan College are well-known for churning out graduates with skills in areas like Virtual Reality Production⁵⁰ and Virtual Production using Unreal.⁵¹ Sheridan College's Screen Industries Research Training (SIRT) Centre is an added feature, preparing new grads for careers in virtual production. A federal government-appointed Technology Access Centre (TAC), SIRT aims to expand the city's creative tech talent base. The innovation centre offers access to in-house experts and R&D funding, among other core elements that can support both start-ups and scale-ups.⁵²

- ⁴⁵ Etan Vlessing, "Virtual production is driving a post-covid boom in Canada, *The Hollywood Reporter*, January 31, 2022, <https://www.hollywoodreporter.com/movies/movie-news/virtual-production-covid-canada-1235080848/>
- ⁴⁶ Katie Winter, "How AR and VR are changing film: A look at the revolutionary stagecraft," *Arts Management and Technology Laboratory*, July 2021, <https://amt-lab.org/blog/2021/7/how-ar-and-vr-are-changing-film-a-look-at-the-revolutionary-stagecraft-the-volume>
- ⁴⁷ Allan Cook, Nick Huang, Robin Tarufelli, Jordan Wiggins, "The future of content creation: Virtual production," *Deloitte*, 2020, <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/us-tmt-the-future-of-content-creation-virtual-production.pdf>
- ⁴⁸ "Pixomondo building world's largest virtual production studio in Toronto," *Animation World Network*, October 01, 2020, <https://www.awn.com/news/pixomondo-building-worlds-largest-virtual-production-studio-toronto>
- ⁴⁹ Etan Vlessing, "New Toronto virtual production studio planned by Pixomondo, William F. White," *The Hollywood Reporter*, July 21, 2021, <https://www.hollywoodreporter.com/business/business-news/pixomondo-william-f-white-to-open-second-toronto-virtual-production-studio-1234985927/>
- ⁵⁰ "Virtual Reality Production," *Conestoga College*, accessed Dec 2022, <https://www.conestogac.on.ca/fulltime/virtual-reality-production>
- ⁵¹ "Virtual Production: Unreal Engine On-set Technician," *Sheridan College*, accessed Dec 2022, <https://caps.sheridancollege.ca/products/virtual-production-unreal-engine-onset-technician.aspx>
- ⁵² "Canada's Technology Access Centres," *Tech-Access*, accessed Nov 2022, <https://tech-access.ca/about/>



Immersive Experiences

Immersive experiences refer to the use of digital technologies to entertain or educate audiences. One modern-day example of this are large-scale digital interactive projections, like the Immersive Van Gogh Exhibit, which transforms the artist's oil pastel paintings into virtually projected landscapes—this enables spectators to explore a building immersed in Van Gogh's art. Another example is the Disney Animation Experience, which allows visitors to experience a 360-degree panorama and 600,000 cubic feet of projections of new and classic animations.⁵³ A popular Ontario-based immersive experience is found at the Royal Ontario Museum (ROM) in Toronto. The ROM integrates large-scale digital environments through exhibits like AR dinosaurs and dynamic digital wall murals,⁵⁴ engaging visitors of all ages.

Canada's immersive tech movement has roots in several well-established industries, including defence and enterprises application,⁵⁵ with some companies dating back to the 1980s. Immersive experiences are still used in the defence sector today for training and drills⁵⁶; they enable combat forces, logistics professionals, and others to practice responses to different scenarios and in different environments. Notable growth in start-ups, investment, and employment marks the early-to mid-2000s; by 2015, immersive technology was flourishing in Canada, with Ontario playing a key role. Although 2016 onward saw more investment in immersive tech shift to the U.S.,⁵⁷ on the whole, Ontario's immersive technology ecosystem can be considered relatively mature.

As such, Ontario is home to numerous immersive tech success stories. Founded in 2007, Stitch Media is an award-winning studio developing immersive stories through a blend of technologies. One of their recent projects, Manimals is an interactive digital theatre show about the chaos of online dating. The experience combines live improv, audience interaction, and gaming technology. Performed over Zoom, the audience plays a game on a custom app and the data is fed real-time to the performers.⁵⁸ Lighthouse Immersive and FORREC are two more examples of homegrown immersive tech success stories. Lighthouse is behind several popular experiences, like Le Musk— a multi-sensory production leveraging cinema, motion, and scent— and the Disney Animation and Van Gough immersion experiences that alone have attracted millions of visitors. FORREC delivers immersive technology-based storytelling experiences for popular attractions including theme parks, water parks, and resorts.

53 "Immersive Disney exhibition coming to Toronto this holiday season," *To Do Canada*, October 6, 2022. <https://www.todocanada.ca/experience-the-enchanted-world-of-disney-at-this-immersive-exhibition-coming-to-toronto-this-holiday-season/>

54 "ROM leads way in transforming Museum experience with augmented reality," *Royal Ontario Museum*, accessed Nov 2022, <https://www.rom.on.ca/en/about-us/newsroom/press-releases/rom-leads-way-transforming-museum-experience-augmented-reality>

55 Alexandra Cutean, Tyler Farmer, Mairead Matthews, "Spanning the Virtual Frontier: Canada's Immersive Technology Ecosystem," *Information and Communications Technology Council (ICTC)*. August 2020, https://www.ictc-ctic.ca/wp-content/uploads/2020/09/ARVR_Report_ENG_Sept29.pdf

56 "Transforming Defence Using Augmented and Virtual Reality", *WIPRO*, <https://www.wipro.com/innovation/transforming-defense-using-augmented-and-virtual-reality/>

57 Alexandra Cutean, Tyler Farmer, Mairead Matthews, "Spanning the Virtual Frontier: Canada's Immersive Technology Ecosystem," p. 27.

58 "Manimals," *Michelle Hudson Creative*, n.d., accessed February 1, 2023, <https://michellehudsoncreative.wordpress.com/tickets-now-on-sale/>



Esports

Esports, or electronic sports, refers to “video games that are played in a highly organized competitive environment.”⁵⁹ Esports revolutionized how consumers watch, follow, and engage with video games, so much so that they transformed online gaming into a spectator sport.⁶⁰ With this, a range of employment pathways have surfaced, many that were largely nonexistent just a decade ago. In fact, research from 2021 finds that 36% of Canadian adult gamers and 28% of teen/kid gamers engaged with esports; 70% of teen gamers report considering esports as a potential career.⁶¹ However, gamers themselves represent just the tip of the iceberg for the esports ecosystem, which is made up of publishers, tournament organizers, teams, professional and amateur players, fans, and communities.⁶²

Over time, esports has come to be known as a spectator sport. Toronto-based Waveform Entertainment, which employs over 60 people, is a key player in the esports ecosystem; they produce arena size live-events and service tournaments for the likes of companies like Cineplex, Ubisoft, Red Bull, and Twitch.⁶³ The growth and popularity of competitive gaming is also reflected at the international level: some tournaments offer prize pools of over USD \$30 million,⁶⁴ and the global esports industry earned a valuation of more than USD \$1 billion in 2021—a 50% increase from just a year earlier in 2020.⁶⁵ Increasing digitization is only expected to further boost this upward trajectory; the deployment of next generation networks like 5G⁶⁶, coupled with growing access to gaming devices leads some to estimate that the global market value of esports to hit USD \$2.8 billion by 2028.⁶⁷

While sponsorship accounted for 63% of global esports revenues in 2021, other sources include media rights, publisher fees, merchandise, tickets, and digital services.⁶⁸ An interesting case study in fundraising, Toronto-based OverActive Media recently raised capital through an Initial Public Offering (IPO),⁶⁹ rather than relying on sponsorship revenue.⁷⁰

Esports is gaining ground and attention in Ontario, specifically. For example, in 2022, a first-of-its-kind investment by the government of Ontario put forward \$1 million (CAD) over two years for post-secondary scholarships in esports and related programs.⁷¹

⁵⁹ Marc Leroux-Parra, “Esports Part 1: What are Esports?,” *Harvard International Review*, April 24, 2020. <https://hir.harvard.edu/esports-part-1-what-are-esports/>

⁶⁰ “The Guide to esports,” *The Interactive Software Federation of Europe (ISFE)*, 2021, <https://theesa.ca/wp-content/uploads/2022/07/Guide-to-Esports-ISFE-ESA-ESA-C-IGEA.pdf>

⁶¹ “Bringing Canadians Together through Gaming: Essential Facts 2022,” *Entertainment Software Association of Canada*, https://essentialfacts.ca/wp-content/uploads/2022/11/EF2022_EN.pdf

⁶² “The esports revolution is already here: what Canadian businesses need to know,” *Zeifmans*, April 13, 2022, <https://www.zeifmans.ca/blog/the-esports-revolution-is-already-here-what-canadian-businesses-need-to-know/>

⁶³ “Who we work with,” *Waveform.com*, n.d., accessed February 1, 2023, <https://waveform.gg/who-we-work-with/>

⁶⁴ “The esports revolution is already here: what Canadian businesses need to know,” *Zeifmans*, April 13, 2022, <https://www.zeifmans.ca/blog/the-esports-revolution-is-already-here-what-canadian-businesses-need-to-know/>

⁶⁵ “10 Notable esports Statistics,” *Influencer Marketing Hub*, accessed Nov 2022, <https://influencermarketinghub.com/esports-stats/#toc-6>

⁶⁶ “Ontario Secures \$340 Million Telecommunications Expansion Project”, *Government of Ontario*, October 17, 2022, <https://news.ontario.ca/en/release/1002397/ontario-secures-340-million-telecommunications-expansion-project>

⁶⁷ “The Global Esports Market is expected to reach a value of USD 2.8 Billion by 2028, at a CAGR of 14.50% (2022-2028),” *SkyQuest Technology*, June 6, 2022, <https://www.globenewswire.com/en/news-release/2022/06/06/2456862/0/en/The-Global-Esports-Market-is-expected-to-reach-a-value-of-USD-2-8-Billion-by-2028-at-a-CAGR-of-14-50-2022-2028-SkyQuest-Technology.html>

⁶⁸ Christina Gough, “Global revenue of the esports market 2022, by segment,” *Statista*, Sept 22, 2022, <https://www.statista.com/statistics/490358/esports-revenue-worldwide-by-segment/>

⁶⁹ Paul Senra, “Overactive Media Completes \$40 million raise,” *Overactive Media*, April 13, 2021, <https://overactive-media-group.prezly.com/overactive-media-completes-40-million-raise>

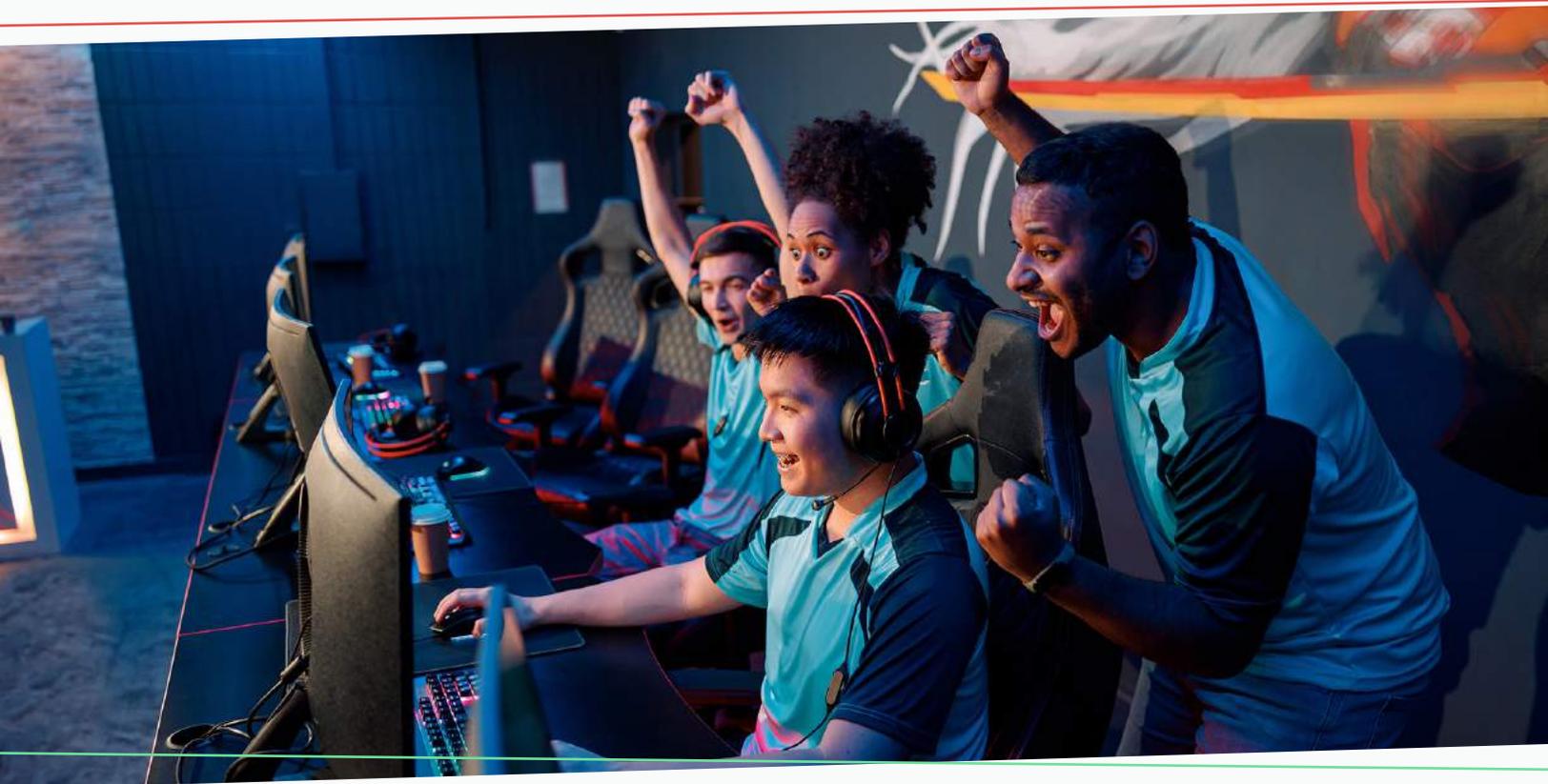
⁷⁰ “The Guide to Esports,” *ISFE Esports*, July 2022, <https://theesa.ca/wp-content/uploads/2022/07/Guide-to-Esports-ISFE-ESA-ESA-C-IGEA.pdf>

⁷¹ “Ontario Establishes Esports Scholarship,” *Government of Ontario*, March 11, 2022, <https://news.ontario.ca/en/release/1001754/ontario-establishes-esports-scholarship>



Ontario also has an amateur gaming league, Ontario esports League, which acts as both a marquee brand and a facilitator of social and competitive gaming across the province. The Ontario esports League provides opportunities for all skills and abilities, servicing Ontario's 7.6 million gamers.⁷²

Toronto is Ontario's central esports hub. OverActive Media, the city's esports darling, recently announced plans to expand its operations; this includes construction of a \$500-million (CAD), 7,000-seat entertainment venue on the Exhibition grounds. A work-in-progress, the expected completion date of this endeavor is 2025.⁷³ Toronto is also home to Toronto Defiant, Toronto Ultra Franchises, and Enthusiast Gaming, alongside an estimated 20 other esports startups.⁷⁴ Founded in 2014, Enthusiast Gaming employs more than 200 people. Like OverActive, Enthusiast Gaming also raised capital in 2018 with an IPO.⁷⁵ As of Q3 2022, Enthusiast reported growth of 17% YOY and record subscription revenue of \$3.8 million.⁷⁶ University-private partnerships have also been known to spur growth in the field. A key example is Toronto Metropolitan University's Red Bull Gaming Hub, which includes classes on topics like video game development, esports broadcasting, and virtual production.⁷⁷



⁷² "Ontario Esports League," OESL, accessed November 01 2022, <https://www.oesl.ca/>
⁷³ Steven Loung, "OverActive Media to build \$500M esports, entertainment venue in Toronto," SportsNet, February 2, 2021, <https://www.sportsnet.ca/more/article/overactive-media-build-500m-esports-entertainment-venue-toronto/>
⁷⁴ "Esports Startups in Toronto," Tracxn, August 14, 2022, <https://tracxn.com/explore/esports-Startups-in-Toronto>
⁷⁵ "Enthusiast Gaming," Wikipedia, Nov 3, 2022, accessed February 1, 2023, https://en.wikipedia.org/wiki/Enthusiast_Gaming
⁷⁶ "Enthusiast Gaming Announces Third Quarter Results," GlobeNewswire, November 14, 2022, accessed February 01, 2023, <https://www.globenewswire.com/en/news-release/2022/11/14/2555498/0/en/Enthusiast-Gaming-Announces-Third-Quarter-2022-Results.html>
⁷⁷ Bradly Shankar, "Unpacking Canada's booming gaming industry with the head of ESA Canada," Mobile Syrup, November 13, 2021: <https://mobilesyrup.com/2021/11/13/the-canadian-video-game-industry-2021-esac-jayson-hilchie-interview/>





PART II

Analysing Talent Development and Demand

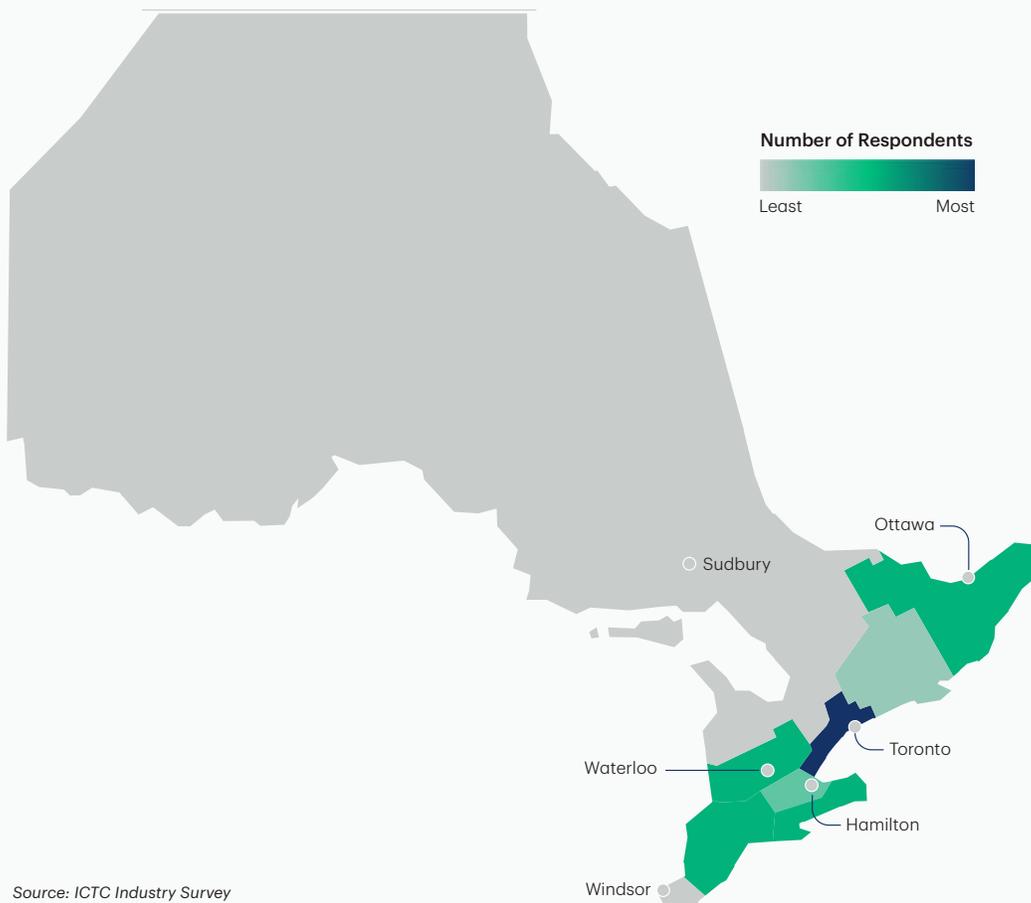


To better understand Ontario's creative technology industry, ICTC conducted primary research in the form of semi-structured interviews with employers and educators (representing universities, colleges, and training institutions), an employer survey (representing small to large studios across creative tech industries in Ontario), an industry roundtable, and web scraping of in-demand jobs and skills.

A total of 22 interviews were completed with subject-matter experts, covering a range of topics, including regional strengths, challenges and opportunities, the state of the local labour market, the local training and education landscape, and equity, diversity, and inclusion (EDI).

ICTC's Survey of Creative Technology Employers in Ontario, September 2022 (hereafter, ICTC Industry Survey), received 100 responses from senior leaders at Ontario creative tech companies. Survey questions included those on talent demand, talent supply, hiring challenges, recruitment and retention strategies, and equity, diversity, and inclusion (EDI). Most respondents were from the Greater Toronto Area (GTA), the central hub for Ontario creative tech. Outside of the GTA, responses came from areas including Kitchener-Waterloo, Niagara, Ottawa, and London.⁷⁸

Where are Respondents Located?



⁷⁸ Fifty-nine respondents were located in the GTA, nine in the Ottawa region, eight in the Kitchener-Waterloo region, eight in the London region, seven in the Niagara region, five in the Hamilton region, two in Eastern Ontario, and one identified as being remote and not belonging to any of the above regions.



Four categories of creative tech occupations cut across different industries under the creative technology umbrella. These groupings consist of technical roles, artistic and creative roles, design roles, and operational roles.⁷⁹ However, skill requirements can overlap regardless of category. Where human skill needs are often cut across all roles and categories, in-demand technical skills for roles like UI programmers are also found in roles like gameplay designers, and riggers. As such, despite what may be considerable overlap between technical, design, and creative roles, for the sake of measurement, ICTC has grouped them according to the category that their in-demand skills most closely resemble.



Artistic and Creative Roles

EXAMPLES

2D/3D artist, animator, lighting engineer, CG (computer graphics) supervisor, rigger, volume operator, motion capture supervisor, VFX supervisor, professional gamer, motion capture manager, real time compositor



Design Roles

EXAMPLES

level designer, UI designer, gameplay designer, virtual camera operator, layout supervisor, LED engineer, narrative designer



Operational Roles

EXAMPLES

Community manager, project manager, digital support agent, engagement analyst, marketing coordinator, HR, finance

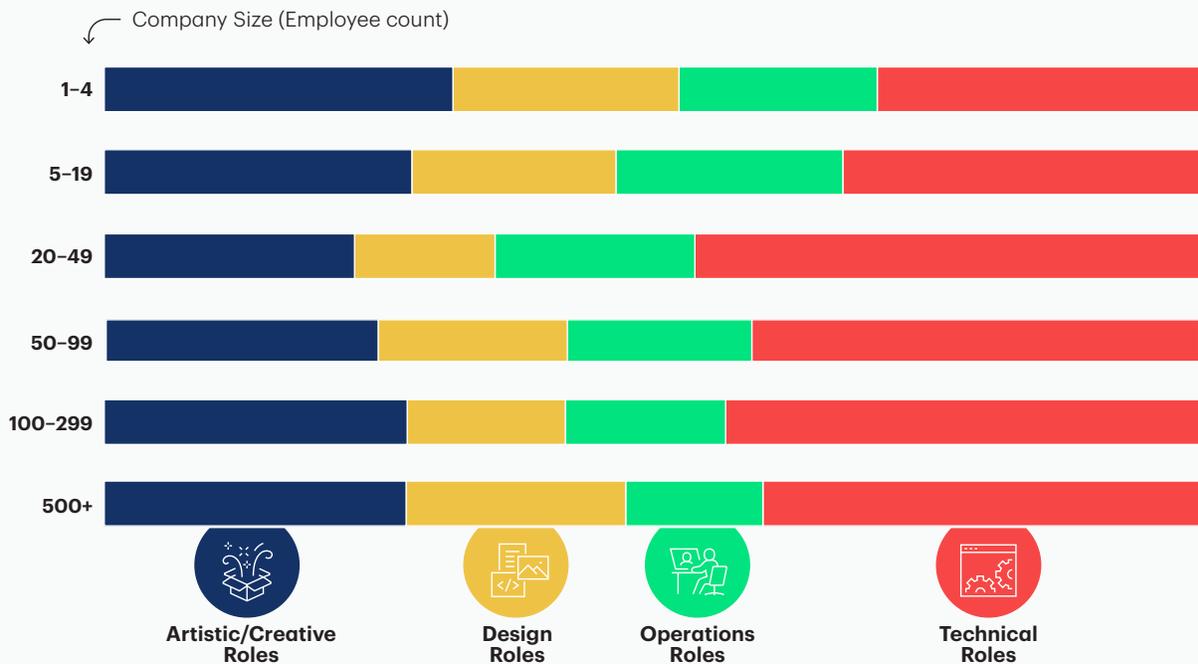


Technical Roles

EXAMPLES

UI (user interface) programmer, developer, render programmer, virtual production engineer, technical director, engine operator, systems administrator

Figure 2. Roles Distribution by Company Size, Ontario



Source: ICTC Industry Survey

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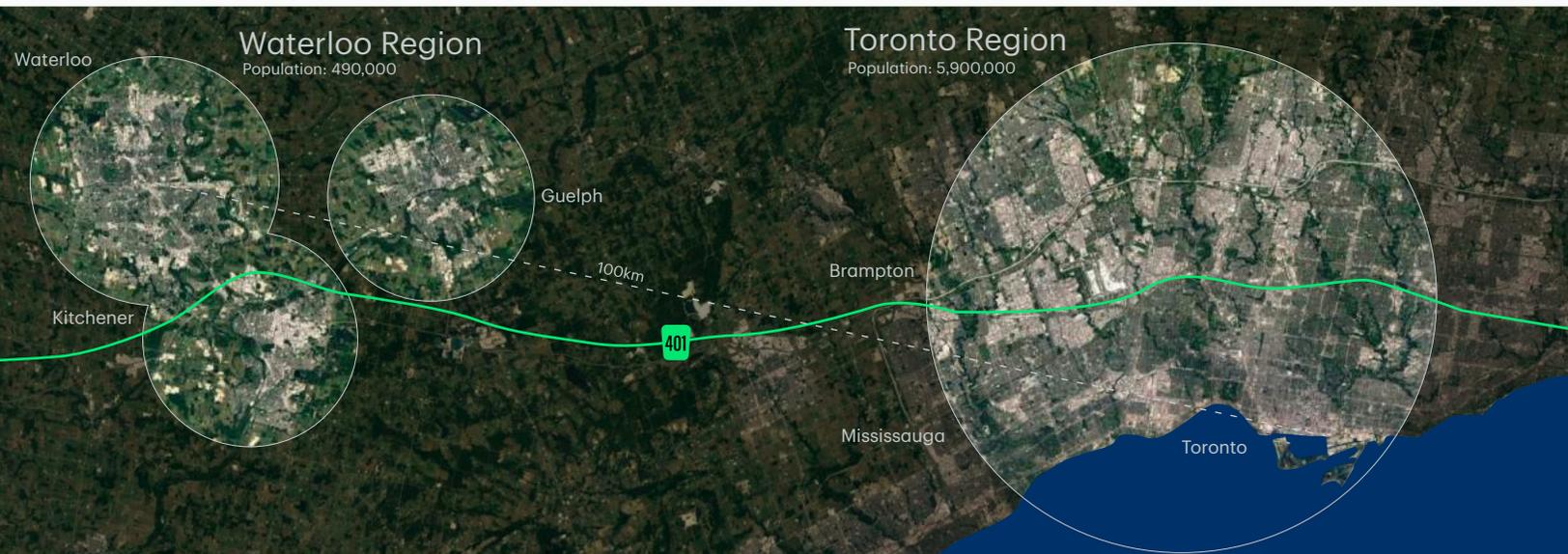
These four categories were provided and defined by Interactive Ontario for use in the survey and interviews with industry experts.



Technical roles represent the largest portion of total employment in creative tech, and they are the fastest growing. Survey respondents indicate that as studios grow in size, the representation of the technical workforce grows faster than other roles. Particularly, mid and senior-level technical talent become increasingly in-demand. Similarly, the reverse is true; operations roles represent a larger proportion of the workforce in smaller studios. Although an adequate supply of technical talent is essential to help studios grow, other roles—namely creative and design roles—become increasingly necessary as they scale up. As the subsequent sections explore, competition for talent and supply of talent is largely at the intersection of where a studio is on its growth trajectory, where it is located, and the type of other studios it competes with.

Regional Talent Availability and Competition Within and Outside of the Toronto-Waterloo Corridor

According to interviewees and survey respondents, talent with computer science and other digital backgrounds is especially in-demand in Ontario's creative technology sector. However, accessing and retaining this particular talent proves challenging for a number of reasons. Employers note a three-tiered challenge in the competition for talent: first, creative tech studios compete with each other; second, studios compete with bread-and-butter tech companies (i.e., software, hardware); and third, studios compete with companies from other sectors that are increasingly digitizing (i.e., energy, manufacturing, transportation, etc.). Put otherwise, the demand for talent with core digital and technical skills—namely experienced workers— is felt across the entire economy. Referring to this multi-layer competition, one interviewee notes “an emerging trend” where computer science graduates find employment with finance companies like Citadel Capital or Main Street Capital.



The highway corridor between Toronto and Waterloo hosts Ontario's largest concentration of tech firms and, as a result, is a region with a high demand for computer science and other STEM skill sets; this corridor reports employing approximately 200,000 technology sector workers.⁸⁰ To parse the profusion of competitive firms, survey respondents were placed into two groups: within the Toronto-Waterloo Corridor and outside the corridor.

Figure 3. **Talent Availability in the Toronto-Waterloo Corridor**

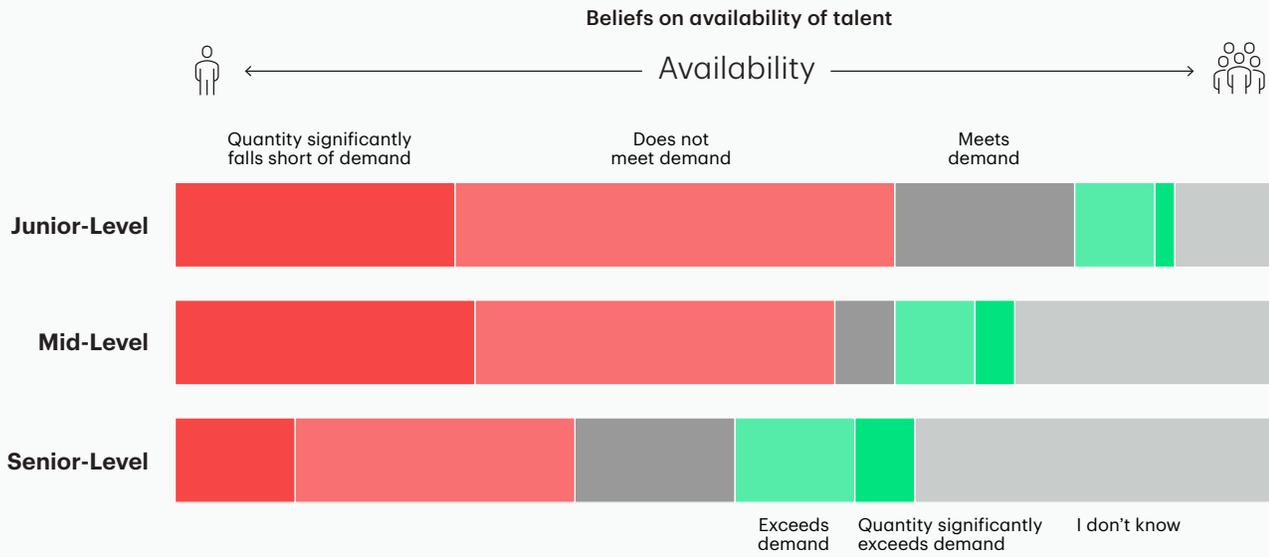
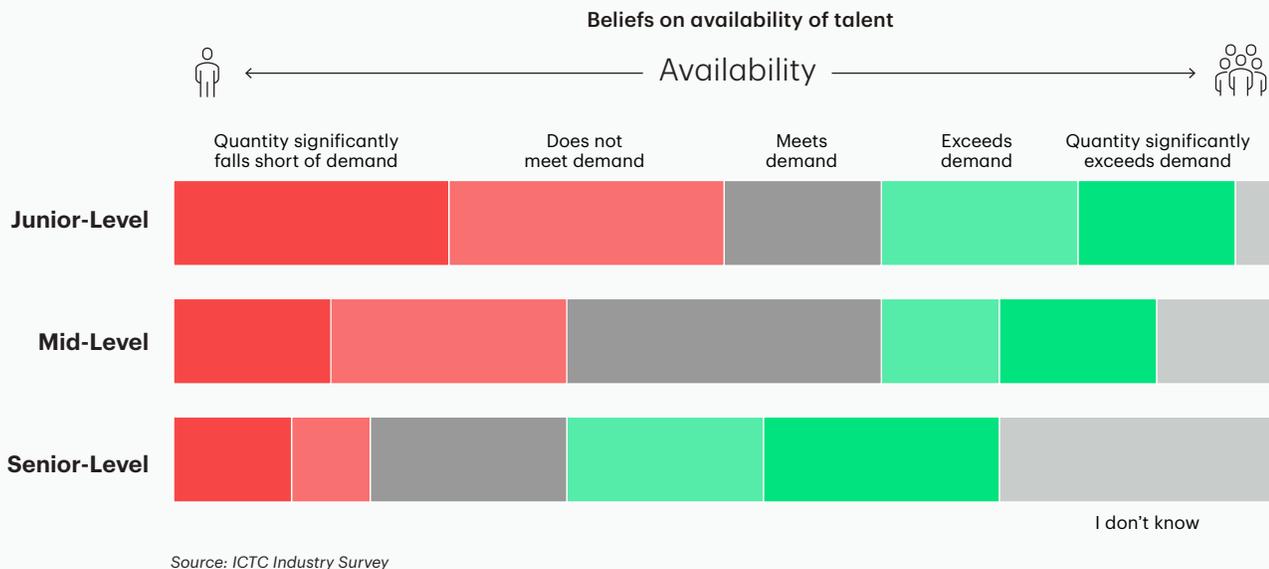


Figure 4. **Talent Availability Outside of the Toronto-Waterloo Corridor**



80

"The Corridor - Toronto - Waterloo Region," accessed Nov 2022: <https://thecorridor.ca/>



ICTC Industry Survey respondents in the Toronto-Waterloo Corridor perceive creative technology talent to be less plentiful than studios based outside of this region. About 65% of surveyed Corridor employers believe their region does not have enough qualified labour to meet demand. Although the most acute needs are in technical roles (thereby requiring workers with computer science or other digital backgrounds), the talent shortage is expressed as significant across all creative tech occupational categories. Unsurprisingly, survey respondents and interviewees within the Corridor are most concerned about this shortage, and reference what appears to be a growing trend of international competition for the limited talent that does exist. The issue of “brain drain” is not unique to creative tech or Ontario, however. A study by Brock University and the University of Toronto found that in recent years, two-thirds of computer science graduates left Canada to work internationally, with most landing in the United States.⁸¹ One interviewee accentuates this point, noting that some graduates “are chasing jobs in California [for] perceived higher status in terms of technical capability and pay.” Whether this kind of “exodus” slows under the circumstances of a continuing and potentially worsening recession remains to be seen. However, according to the Bank of Canada, during times of poor or declining economic performance, workers tend to place greater value on job security over high salaries.⁸²

In the rest of Ontario, meanwhile, about half of employers surveyed note a supply crunch. While 50% is still a high proportion of employers reporting talent availability challenges, overall, respondents from outside the Corridor (i.e., from cities/communities other than the GTA and Kitchener-Waterloo) relayed more of a balance; in fact, over 10% of employers felt that talent availability “exceeded demand,” for available roles in their regions; another 54% said talent availability is “adequate”.

Employer Perceptions of Talent Quality Within and Outside of the Toronto-Waterloo Corridor

To measure beliefs about the quality of creative technology talent, ICTC Industry Survey respondents were again grouped according to their location, inside and outside of the Corridor. This time, respondents were asked to reflect on the quality of talent across levels of seniority rather than across regions. The two subpopulations show greater agreement on this question. Overall, Ontario studios believe the quality of talent to be “fair” or better. However, employers perceive high-quality talent (i.e., fair or better) at senior levels to be generally less available.

This belief is especially pronounced for employers inside the Corridor. Here, approximately 30% of respondents believe that available senior-level talent is poor or very poor; this estimate is notably larger than both junior-level and mid-level talent and is in stark contrast to perceptions of senior talent quality in B.C.⁸³ For firms outside of the Corridor, there is a stronger belief that the quality of talent available is high across all levels, although nearly a quarter of respondents still describe senior talent as poor in quality. By contrast, most respondents outside the Corridor rate junior talent as fair to very good.

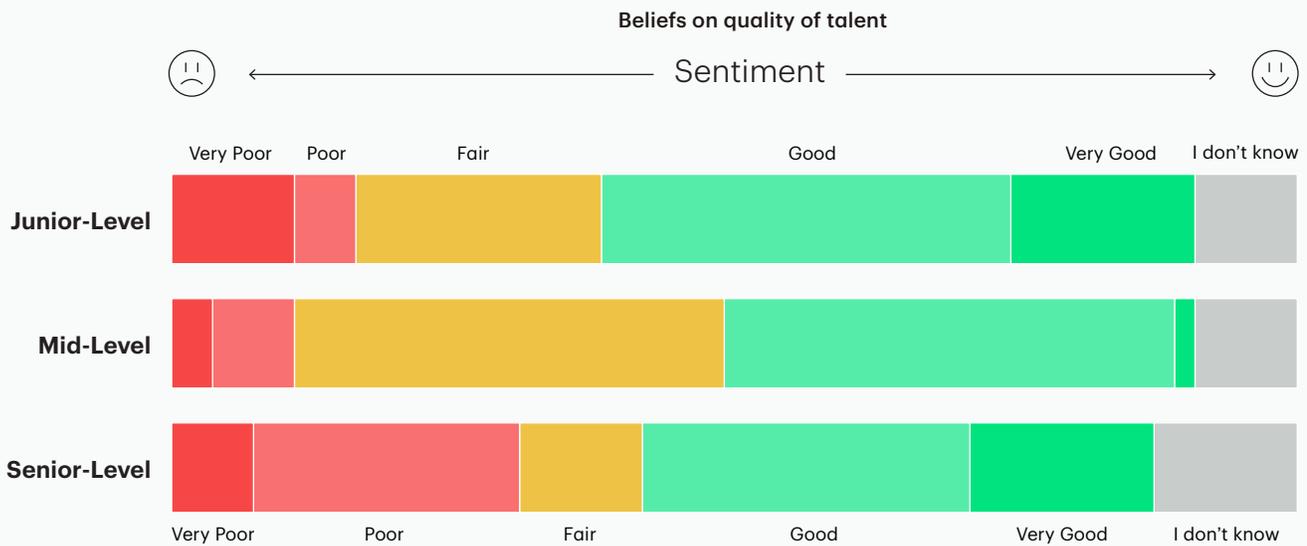
⁸¹ Zachary Spicer et al, “Reversing The Brain Drain,” Brock University, <https://brocku.ca/social-sciences/political-science/wp-content/uploads/sites/153/Reversing-the-Brain-Drain.pdf>

⁸² Tiff Macklem, “Restoring labour market balance and price stability”, Bank of Canada, November 10, 2022. <https://www.bankofcanada.ca/2022/11/restoring-labour-market-balance-and-price-stability/>

⁸³ Alexandra Cutean, Ryan McLaughlin, Khiran O’Neill, and Trevor Quan, “Benchmarking the Creative Technology Ecosystem in British Columbia”, Information and Communications Technology Council, DigiBC, January 2021. <https://www.digitalthinktankictc.com/ictc-admin/resources/admin/creative-tech-report.pdf>

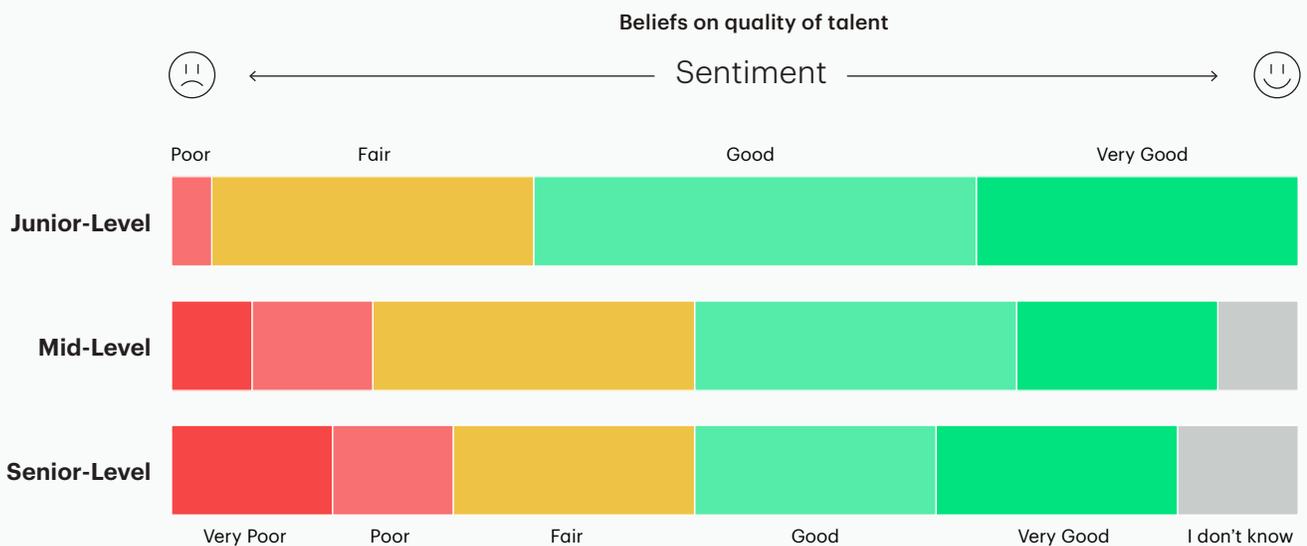


Figure 5. **Talent Quality in the Toronto-Waterloo Corridor**



Source: ICTC Industry Survey

Figure 6. **Talent Quality Outside the Toronto-Waterloo Corridor**



Source: ICTC Industry Survey

Interviews with key industry stakeholders also identify a skill shortage or mismatch among junior talent, despite a generally positive rating of quality. Although interviewees felt that junior talent is capable and eager to learn, core skill sets—both technical and human—were often missing.

Taken together, the *distribution of roles* in creative technology companies, the *quality*, and the *availability* of talent illustrate a labour market with high levels of competition for a limited supply of high-quality talent. The survey findings mirror insights from interviews with industry experts: broadly, there is not enough skilled talent to go around, specifically at senior levels.



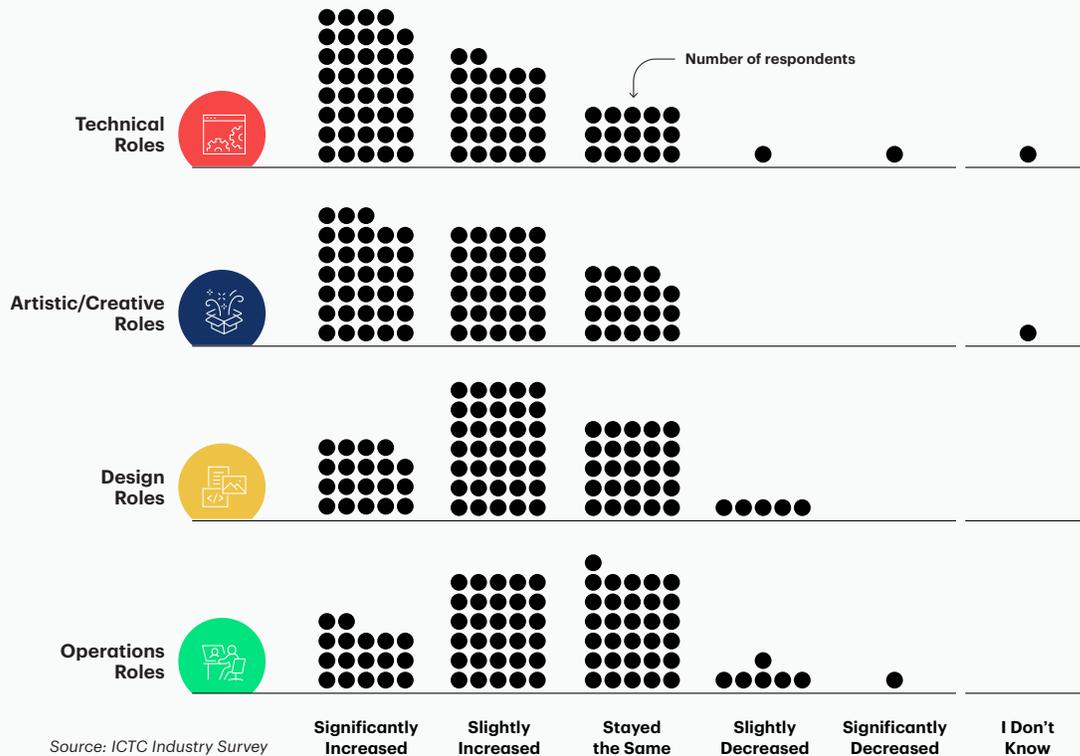
Hiring Plans: In-Demand Roles and Skills

The following draws on the ICTC Industry Survey, job boards in Ontario, and industry interviews to paint a picture of recent and expected hiring plans for the sector across technical, artistic, design, and operational roles. Once again, skill needs may overlap across role categories, and occupational groupings serve as estimations.

Changes in Talent Demand Over Time

The majority of ICTC Industry Survey respondents (78%) indicate that the demand for technical labour has increased over the past three years. Similarly, 74% of respondents note that demand for artistic and creative talent has slightly or significantly increased. By comparison, 64% and 55% of respondents note a slight or significant increase in demand for design and operational talent, respectively. Unlike the more specialized technical, creative, and design roles, operations roles provide broad-based support to organizations or teams. Roles in this category include operations managers, administrative professionals, and human resources professionals.

Figure 7. Talent Demand Over the Last Three Years



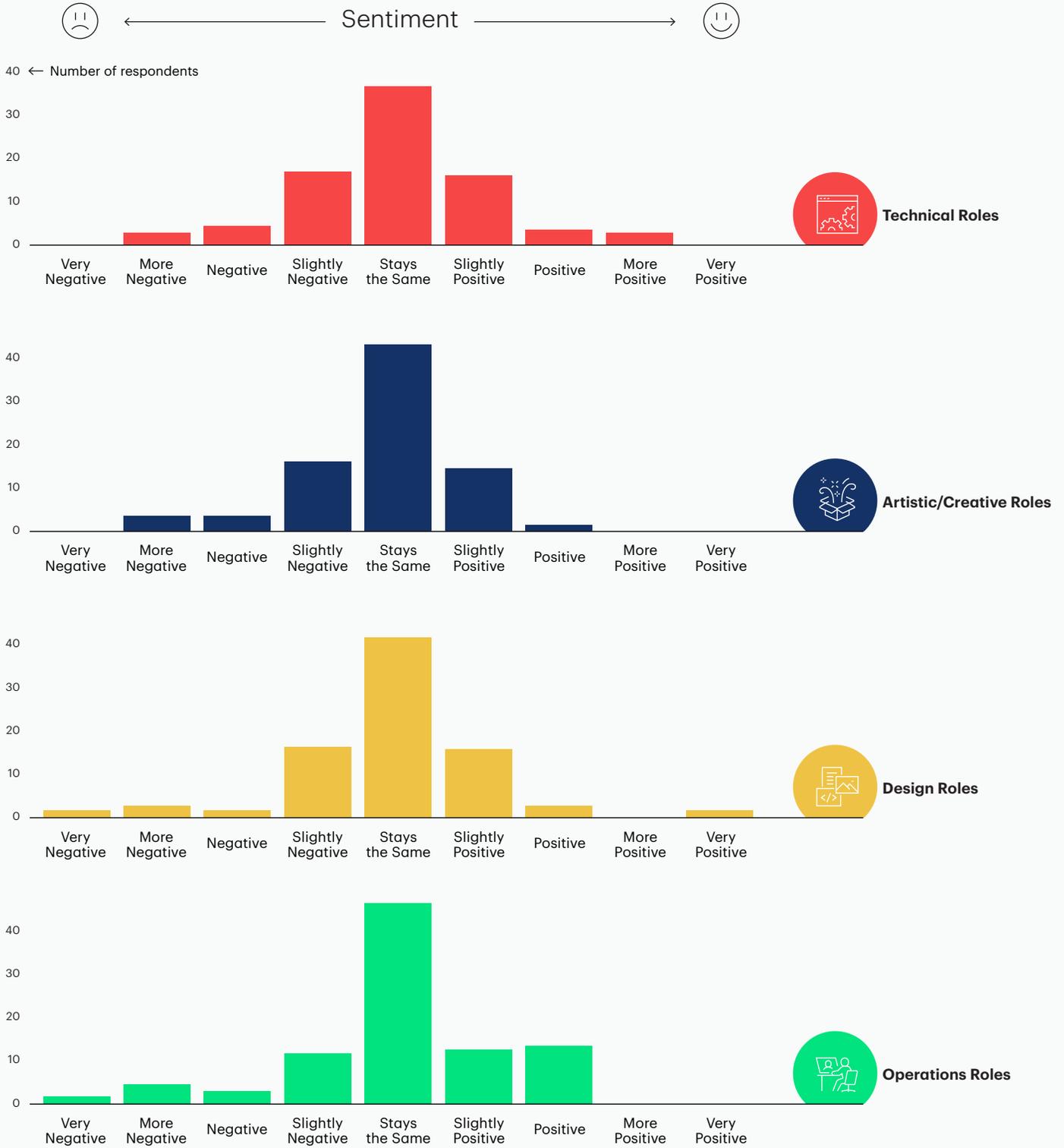
Looking forward, demand for talent is expected to stabilize over the next three years. Interviewees and survey respondents note that the surge in demand for content was supercharged by the pandemic, bringing with it an unprecedented demand for talent. Although most respondents believe demand will fall a little as “normal life” resumes, overall, it will remain high. Some expect that the video game industry especially will continue to see heightened demand. Recent research by PwC forecasts that the gaming industry will be worth more than USD \$320 billion by 2026.⁸⁴

84 PwC, “Perspectives from the Global Entertainment & Media Outlook 2022-2026”.
<https://www.pwc.com/gx/en/industries/tmt/media/outlook/outlook-perspectives.html>



Figure 8. Talent Demand Over the Next Three Years

Beliefs on future demand for talent compared to the past three years



Source: ICTG Industry Survey

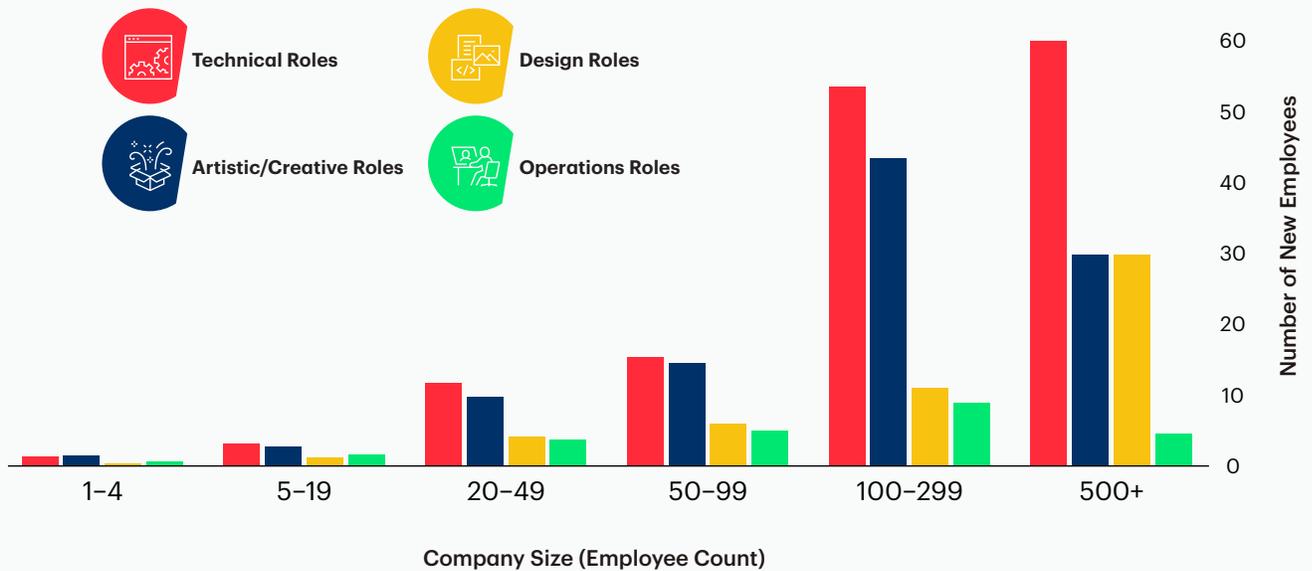


The continued need for workers is further complicated by the reality of a talent crunch across experience levels. First, junior talent that meets the needs of the sector is in high demand and short supply. At the same time, senior talent—needed to mentor, coach, and train junior talent—is also low. Survey findings point to a shortage of both junior and senior talent over the next three years. Survey respondents and interviewees also highlight the interconnectedness of senior and junior talent, the imbalance of which causes bottlenecks. This connection was echoed across numerous interviews. One video game developer states, “If you want to engage new people fresh out of school, you need to have the support structure in place. You need to have the senior people to mentor them.”

Industry roundtable discussions elaborate on this notion of a bottleneck. Employers expressly highlight that the growth and success of the sector depends on that senior-junior relationship, noting that senior-level talent is essential to quell both economic and labour market pressures—because they take on and lead new projects—and bolster and nurture the junior-talent pipeline. Aligning with data on employer perceptions of talent availability described earlier, nearly half of respondents note acute challenges sourcing senior talent.

Demand for talent is not uniform across creative tech studios, however. Unsurprisingly, ICTC’s Industry Survey highlights that larger studios hire talent across the board (different roles and at different seniority levels), and expect to continue to do so over the next three years. Large firms also said that much of their talent demand will be in technical, artistic, and creative roles.

Figure 9. **Expected Hiring Over the Next Three Years by Role**



Source: ICTC Industry Survey



Filling In-Demand Positions

Throughout interviews with industry stakeholders, difficulty finding talent for in-demand roles was often mentioned as a key challenge. The ICTC Industry Survey further validates these comments. Approximately 58% of respondents express notable challenges filling in-demand roles over the last 12 months; on average, roles stayed open for three months before a suitable candidate was sourced. By comparison, it is estimated that, on average, it takes 30 days to fill a tech role in North America.⁸⁵

Ontario creative technology industry experts repeatedly stress competition for talent as a notable barrier to growth. This echoes various existing research on this topic, including a recent study by Vaco that identifies talent shortages as the biggest barrier to business success.⁸⁶ However, labour market descriptors like “high competition” and “demand” are broad categories that may hide other structural underlying problems. To uncover specific factors influencing the ability to source talent, survey respondents were asked to elaborate on perceived barriers to hiring. Here, respondents note a lack of technical skills as well as limited work experience in the available labour force. On top of this are high salary expectations and, generally, a low volume of applicants. Although wages are beginning to cool as Canada navigates the start of a recession, wage inflation was a core characteristic of the global tech market from 2020-2022. A recent survey by the Canadian Council of Innovators finds that in 2022, some Canadian tech employers saw wage expectations climb as high as 20% above 2021 levels.⁸⁷

To better understand applicant volumes, survey respondents identified their top channels of recruitment. Word of mouth is the primary method of attracting candidates. This preference stems from a tight-knit industry (and thereby trust in referrals), but it is also considered a cost-and-time-savings strategy for studios. Interviews with industry experts also highlight the broad use of informal recruitment channels (e.g., referrals, word of mouth) but stress that many take an omnichannel approach to attract qualified candidates. That is, while trust plays a key role in sourcing candidates via informal channels, most employers simultaneously post roles on job boards, leverage social media, and even work directly with educational institutions and recruitment agencies.

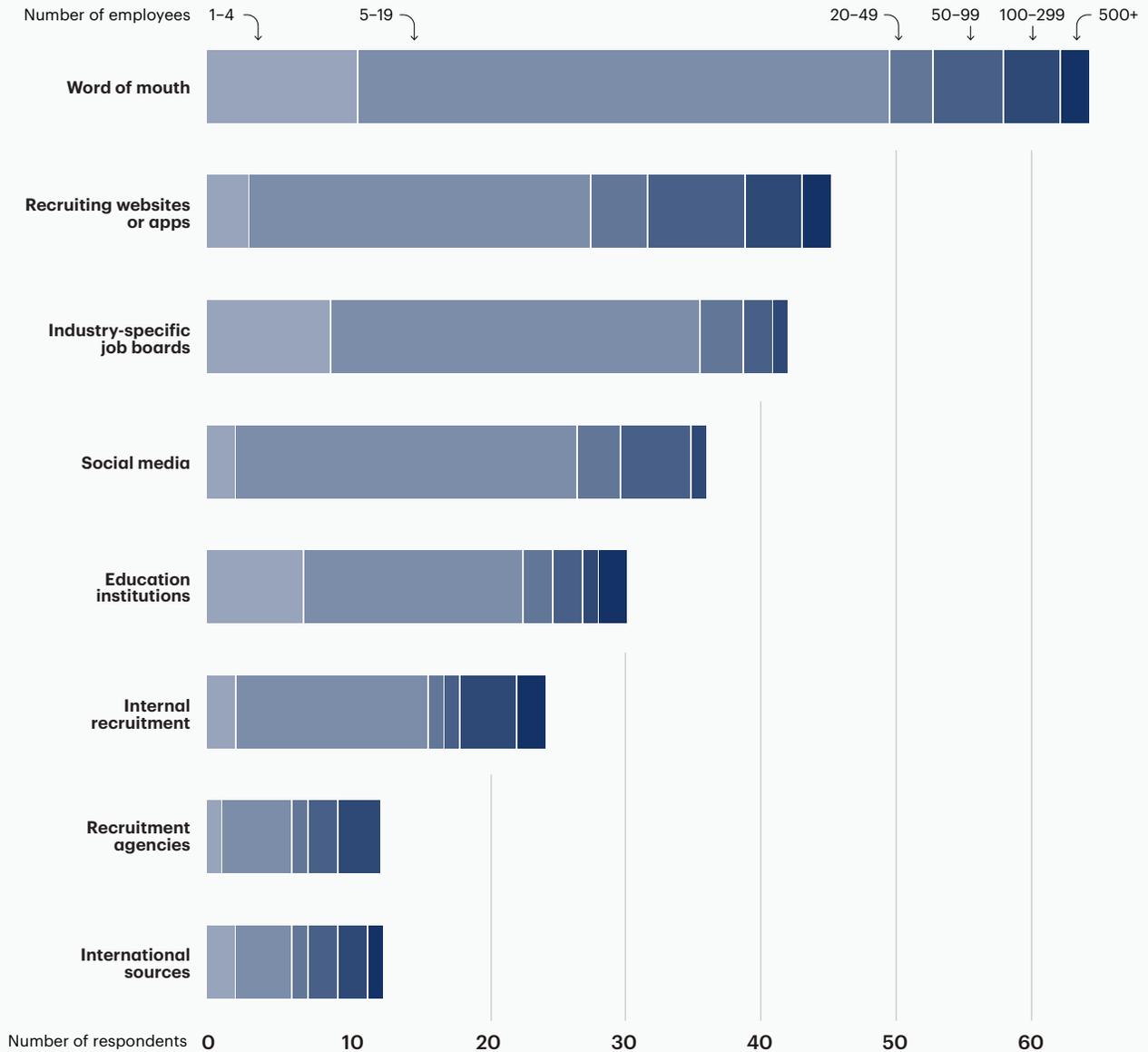
⁸⁵ Nikoletta Bika, “What is the average time to hire by industry,” *Resources for Employers*, accessed Dec 2022, <https://resources.workable.com/stories-and-insights/time-to-hire-industry>

⁸⁶ Vaco, “Transformation Trends for 2022”. <https://resources.vaco.com/trends-in-transformation-report>

⁸⁷ “Talent and Skills Strategy”, *Canadian Council of Innovators*, 2022, <https://www.dropbox.com/s/rtaul2s0swmnqbu/CC%20Talent%20%26%20Skills%20Strategy%202022.pdf?dl=0>



Figure 10. **Top Recruitment Channels**



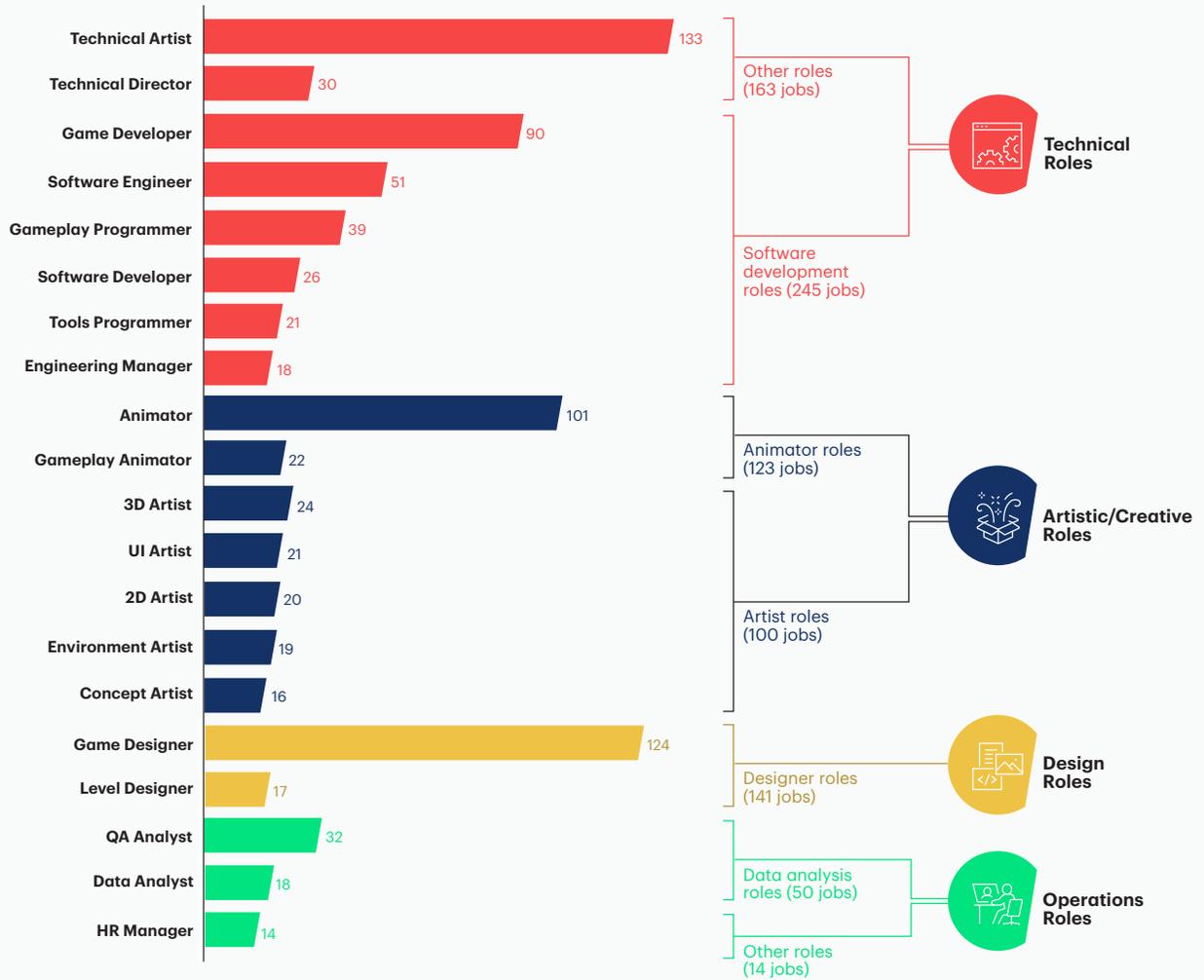
Source: ICTC Industry Survey

Roles and Skills

Demand for specific roles and skills varies according to the needs of each tech firm. The following represents the top 20 in-demand jobs in Ontario’s creative technology sector. Again, while roles are categorized as “technical”, “artistic”, “design” and “operational”, in reality, skill overlaps exist. For example, many artistic roles have technical components, and many design roles have artistic qualities. The categorizations below are completed according to the groups that skill profiles most closely resemble.



Figure 11. Top 20 In-demand Roles in Ontario's Creative Tech Sector, Job Board Postings⁸⁸



Source: ICTC Industry Survey

⁸⁸ Collected from six months of web scraping by ICTC across relevant job boards, leveraging in-demand jobs identified via secondary research, key informant interviews, and survey responses.





Terminology and Job Postings: The Shaky Onramp for New Entrants

Some industry interviewees said that difficulties in hiring can stem from the quickly evolving nature of the sector and the tendency of creative tech roles to have overlapping expectations. Rapidly changing job requirements and different terminology for job titles across different tech firms add further complexity.

Take for example the programming roles noted above: Game Developer, Software Engineer, Gameplay Programmer, and Software Developer. Industry experts suggest notable overlap in skill and work expectations for these roles, despite different job titles (or end products).

This lack of clarity can act as a barrier to workers entering the industry. That is, if prospective applicants cannot easily align their skill sets to in-demand roles, they may be less likely to apply. One interviewee shared two scenarios where this was the case:

We needed somebody to help with audio. So, we hired a co-op student who had a bit of experience in their free time and brought him [in]. As we were working with him, we found out that he was phenomenally technically inclined, big scripting background, programming background, and we ended up hiring him. We ended up promoting him to a technical audio designer. He didn't even know this role existed.

[Another intern came in for an interview with an] art background, and the first thing she said was: 'Well, I don't think I can do this.' She wasn't particularly interested because she's an artist and she wants to do art. I said, 'No pressure, but do you want to have a conversation with our lead technical artist about the role so you can understand it more?' After the conversation, she said: 'I'm already doing like 90% of the stuff that [the role requires], I just had no idea that this specific role existed.'



The most in-demand occupational grouping in the sector is software development/programming. Jobs within this grouping include game developers, software engineers, gameplay programmers and more. The most in-demand single job title is the technical artist. Demand is measured by both volume of hiring (i.e., number of jobs needed to fill) and skill sets in short supply (i.e., lack of candidates with specific skills). The following tables outline the skills most associated with technical artists and game designers.

Table 2. Top Skills in Technical Artist Job Postings

Top Technical Skills	Top Human Skills
Python	design thinking
C++	oral communication
C#	guiding others (mentoring)
Maya	reliability
Unreal Engine	time management
Unity	problem solving
VFX	project and task planning
Perforce	creativity
Houdini	innovation
Blender	working in creative teams
3ds Max	written communication
SQL	leadership
JavaScript	independent work
Git	teamwork
MaxScript	creative thinking
Atlas	ability to learn

Table 3. Top Skills in Game Designer Job Postings

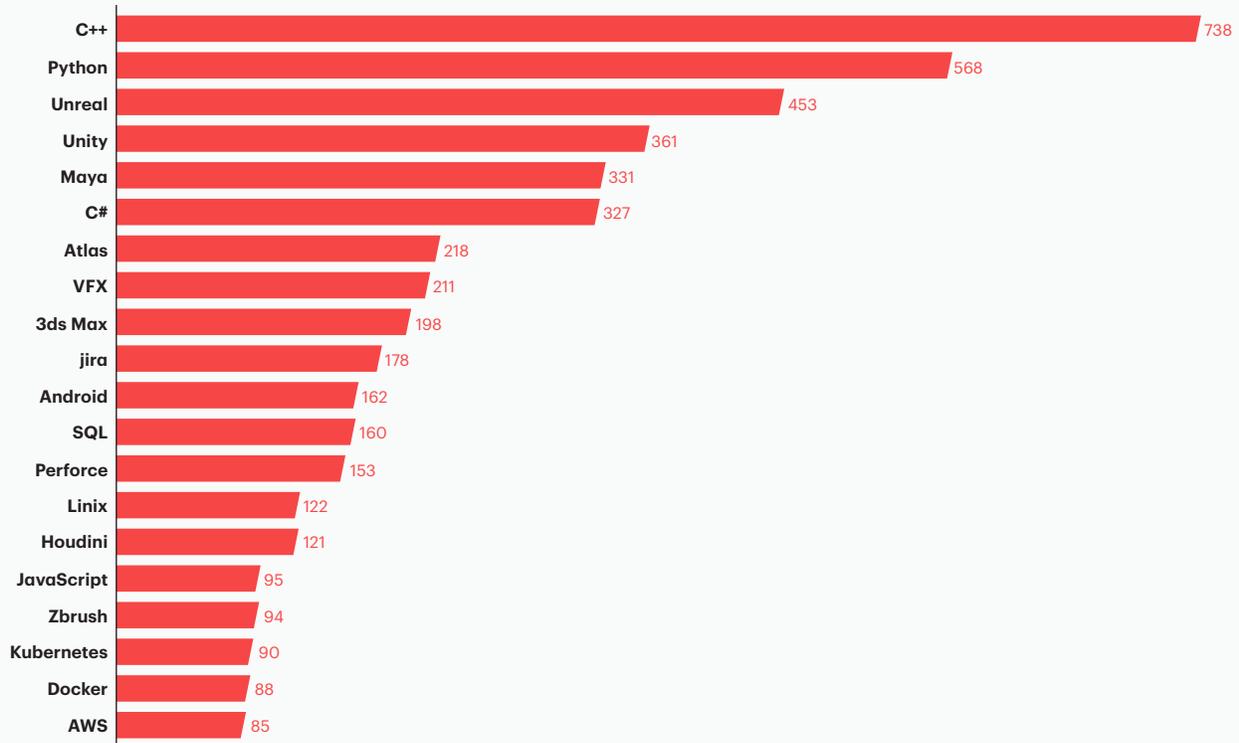
Top Technical Skills	Top Human Skills
C++	design thinking
Unreal Engine	oral communication
Unity	leadership
C#	guiding others (mentoring)
Jira	creativity
Atlas	reliability
Lua	working in creative teams
Python	teamwork
Maya	project and task planning
Figma	problem solving
Jenkins	written communication
C	working independently
Linux	negotiation
ZBrush	critical thinking
3ds Max	time management

Source: ICTC Job Posting Analysis



General communication skills, teamwork, and creativity are some of the most in-demand human skills for technical artists and game designers. Across all roles, however, employers note a need for deeper technical knowledge, namely for new entrants. One interviewee poignantly states that new graduates are well equipped to handle software through Guided Users Interfaces (GUI)—necessary for Maya or Unreal Engine, for example—but they often lack the technical skills to troubleshoot and engage with the underlying code.

Figure 12. **Top Skills for In-Demand Roles in Ontario’s Creative Tech Sector**



Source: ICTC Job Posting Analysis

Across all creative tech in-demand roles, top technical skills include C++, Python, and Unreal. Despite the demand for Unreal, many industry experts suggest that the current post-secondary curriculum tends to favour Unity—that is, many new grads have proficiency in Unity, and less so in Unreal. This gap means that further training is required on the part of the employer.

Industry experts also stress the importance of human skills across all roles but note weaknesses in this area as well. Where technical skill gaps were most often identified for new graduates, industry experts highlight a lack of human skills at levels of talent, including senior staff. Core gaps for senior staff are associated with coaching, mentoring, and leadership. One industry expert notes that this gap has led to their studio creating two tracks for senior staff: the senior technical-track, where individuals are expected to work in a solo capacity and act as an in-house technical expert; and senior leadership-tracks, where individuals are expected to possess strong technical skills but also mentor staff and lead teams.



Impact of COVID-19

The COVID-19 pandemic greatly accelerated pre-existing trends in the digitalization of the workplace and the widespread adoption of remote work.⁸⁹ Like other industries, the overall creative technology sector adapted and rapidly pivoted to new ways of work, addressing public health needs, and providing workforce flexibility.



> Of all the industries that rapidly shifted to remote work due to COVID-19, the video game development industry seemed to be particularly well positioned to continue operating successfully. Video game studios produce almost exclusively digital goods unencumbered by supply chain constraints—any delays they encounter are therefore due mostly to collaboration challenges. Moreover, with much of the world's population stuck at home, video game purchases themselves exploded—in 2020 the industry grew by more than 20% to \$180 billion in revenue.⁹⁰

However, in practice, the early phases of this transition were not necessarily smooth. One-third of Canadian video game developers experienced pandemic-related delays in completing project release schedules. Delays include those that studios did not have direct control over (like supply chain bottlenecks—including semiconductor shortages that still persist today—lockdowns, and restrictions), as well as dynamics like rocky transitions, communication issues, difficulty doing ad hoc problem solving without sharing physical spaces, burnout, and other home-office challenges.⁹¹

Nearly three years since the onset of the pandemic, companies have largely adapted to these challenges, and there is a growing acceptance and proficiency with flexible arrangements, including remote and hybrid work.⁹² Remote and hybrid work has also fundamentally altered the dynamics of recruitment and retention. These structures grant workers enhanced flexibility, allowing them to find employment in other cities, provinces, or even countries, without uprooting their homes. Indeed, many interviewees note increased labour mobility and a higher volume of opportunities outside the province or in other countries as contributing to increased competition and wage inflation.

While a more expansive market poses new retention hurdles, it also helps Ontario employers leverage previously inaccessible talent pools. Just as employees have more flexibility to choose when and where they work, employers also have greater flexibility to source and secure talent from across Canada, and in some cases, other countries altogether. However, this too is not without challenges. Putting aside tax implications of engaging a remote workforce (namely workers outside of the province as well as outside of Canada), remote workforces present larger challenges for data security and IP maintenance, a central concern for the creative tech sector. This is particularly relevant for companies that run on a work-for-hire basis, often needing to adhere to strict client privacy and security policies. In some cases, sensitive projects can still only be completed at secure workplace facilities.

⁸⁹ Trevor Quan et al., "Emergent Employment: Canadian Findings on the Future of Work" (Ottawa: Information and Communications Technology Council, August 2021), <https://www.digitalthinktankictc.com/reports/emergent-employment>.

⁹⁰ Ben Waber and Zanele Munyikwa, "Did WFH Hurt the Video Game Industry," *Harvard Business Review*, Aug 3, 2021, <https://hbr.org/2021/08/did-wfh-hurt-the-video-game-industry>

⁹¹ "State of the Game Industry 2020: Work from Home Edition," *Games Developers Conference*, 2020, https://images.reg.techweb.com/Web/UBMTechweb/%7B1a6b8923-9882-4822-9582-65cbf2342797%7D_GDC20_Report_SOTI_WFH_Edition_-_Gen.pdf

⁹² James Batchelor, "The industry has embraced remote working. Now what?" *Games Industry.biz*, May 3, 2022, <https://www.gamesindustry.biz/the-industry-has-embraced-remote-working-now-what>



Another primary, and still largely unanswered, question in the shift to remote and hybrid work is the impact on productivity. A recent U.S.-based study of 30,000 remote tech workers finds that six out of 10 report being more productive at home (while 14% felt less productive).⁹³ However, an Asian study of 10,000 tech employees highlights a 30% increase in hours worked for remote employees, with a slight decrease in average output.⁹⁴

Other considerations include remote work's impact on company culture and values. Creative tech employers pride themselves on creating a fun and creative work environment, and many feel that this was at least partially lost when going to remote work. Recent research by Dropbox echoes these sentiments: surveying over 4,000 workers from seven countries including Canada, the study identifies that remote and distributed work can boost productivity, but true innovation is blocked by a lack of human connection.⁹⁵

Interviewees also note that junior employees benefit from hands-on learning or one-on-one coaching that is provided in-person. A recent Generation Lab survey of college students (n=500) corroborates this sentiment; new grads expressly identify "in-person manager feedback" as a key and unique benefit of working in-office.⁹⁶ Along those lines, recent research by PwC finds that remote work may actually hinder the performance and career progression of younger workers. According to the 2021 US remote work survey (n=1,200) more than one third of respondents with fewer than five years of work experience identified feeling less productive working from home.⁹⁷ Some interviewees echo these research findings, saying that remote work could extend the average time needed for a junior employee to reach senior levels. A blended approach, where new entrants are onboarded in-person, then shift to a hybrid work arrangement (some days in-person, some remote) may be an ideal scenario to balance flexibility, productivity, and career advancement.

COVID-19 and Immigration Challenges

Another added complication for creative technology companies is COVID-19's continued impact on immigration. Access to talent through immigration is viewed as a crucial component for the continued growth of the sector,⁹⁸ and fast-tracked immigration programs have been identified as a need for this industry.⁹⁹ Unfortunately, COVID-19 disruptions have worsened the immigration backlog, and continuing visa delays are impacting access to training for foreign students as well,¹⁰⁰ with up to 169,000 students waiting on study permits.¹⁰¹ Meanwhile, Immigration, Refugees and Citizenship Canada (IRCC) has accumulated a total backlog of over 1.8 million applications.¹⁰² These issues were emphasized throughout employer interviews, and immigration considerations are highlighted in the subsequent section.

93 Rebecca Stropoli, "Are We Really More Productive Working From Home?" *Chica*
<https://www.chicagobooth.edu/review/are-we-really-more-productive-working-home>

94 Rebecca Stropoli, "Are We Really More Productive Working From Home?"

95 Drew Pearce, "we may be more productive but remote work is still missing this", *Dropbox*, August 10, 2020.
<https://blog.dropbox.com/topics/work-culture/what-remote-work-is-missing>

96 Erica Pandey, "Younger employees fear being left behind by remote work", *Axios*, July 13, 2021,
<https://www.axios.com/2021/07/13/gen-z-remote-work>

97 "US Remote Work Survey", PwC, January 12, 2021, <https://www.pwc.com/us/en/services/consulting/business-transformation/library/covid-19-us-remote-work-survey.html>

98 Bradly Shankar, "Unpacking Canada's booming gaming industry with the head of ESA Canada

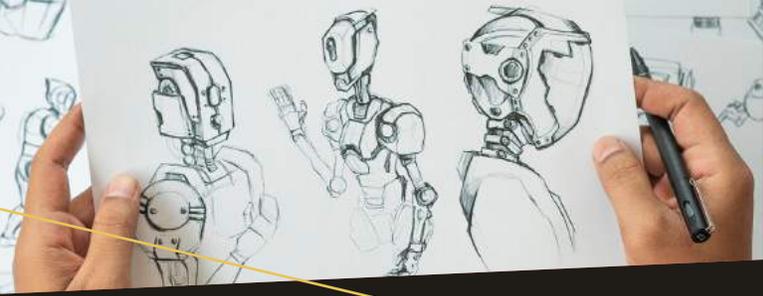
99 "Canada's video game industry: A national champion making a global impact.", *Investing News Network*, Nov 8, 2021:

<https://investingnews.com/news/gaming-investing/canadas-video-game-industry-a-national-champion-making-a-global-impact/>
100 Continuing visa delays putting Canada's competitiveness at risk., "ICEF Monitor, Sept 7, 2022: <https://monitor.icef.com/2022/09/continuing-visa-delays-putting-canadas-competitiveness-at-risk/>

101 Saba Aziz, "Thousands of students are stuck in Canada's immigration backlog. What's being done?" *Global News*, Aug 26, 2022: <https://globalnews.ca/news/9087398/canada-international-students-visa-delays/>

102 Laura Schemitsch, "No more excuses for our immigration backlog," *The Canadian Bar Association*, Feb 4, 2022: <https://nationalmagazine.ca/en-ca/articles/law/opinion/2022/no-more-excuses-for-our-immigration-backlog>





PART III

Developing Talent



Education and Training for Creative Technology Careers

Each year, over 65,000 students graduate from science, technology, engineering, and math (STEM) programs in Ontario.¹⁰³ STEM programs—and especially technology programs—play a key role in supplying talent for the creative tech sector.

Employers in this study said they frequently seek computer science majors, more so than students from specialized video game and creative tech programs like game design or game development. The reason for this preference hinges on a perception that computer science graduates have a broader portfolio of digital and technical skills, including proficiency in multiple programming languages. In other words, employers view computer science graduates as having a more general skill set, allowing them to take on different roles, depending on need. The preference for generalists is even more pronounced among smaller studios, where limited resources often means that employees are required to take on a variety of different tasks, or “wear multiple hats”. Employers also said that a deeper understanding of programming languages is important for troubleshooting. One interviewee notes that students from programs other than computer science sometimes lack strong fundamentals of programming, which is ultimately needed to course correct or tackle complex problems: “If something goes wrong or they need to dig into the code, they’re not as strong.”

However, not all students interested in pursuing creative technology careers have STEM backgrounds. During the 2017-2018 year, over 35,000 students were enrolled (across all years) in gaming and game-related programs in Ontario; 75% of students were based in the Toronto region.^{104, 105, 106}

Interviewees note several important characteristics of the Ontario education pipeline supporting the creative tech sector. Ontario’s post-secondary institutions are well-regarded, and interviewees especially praise the strength of programs from institutions like the University of Waterloo, Toronto Metropolitan University, Algonquin College, Sheridan College, George Brown College, and Toronto Film School. As an added benefit, many of these schools have affiliated incubators or tech hubs, including TMU’s DMZ, and Sheridan’s Virtual Production Innovation Hub. However, despite graduates from these and other programs being regarded as “bright” and “capable,” employers did not always view them as fully “job-ready”. Often, employers note missing skills related to practical application (namely in programs that do not have co-op or work-integrated learning components, or where students choose not to engage in these experiences.) Employers provide several examples of students being proficient with different software products, but in controlled classroom settings. This is an important distinction, as classroom settings lack several real-life characteristics including shifting business priorities, competing deadlines, and the role of cross-functional teamwork. While employers understand that part of their role is to train junior talent, even limited experience—including a few co-op terms, or capstone projects—can enhance job readiness and reduce ramp-up time.

103 Statistics Canada, “Table 37-10-0233-01 Post-secondary graduates, by International Standard Classification of Education, institution, and program and student characteristics” accessed Nov 2022: <https://www150.statcan.gc.ca/t1/tb1/en/cv.action?pid=3710023301>

104 Mike Minotti, “How Toronto is becoming its own Canadian hub for game development,” *Venture Beat*, May 14, 2017: <https://venturebeat.com/games/how-toronto-is-becoming-its-own-canadian-hub-for-game-development/>

105 “Interactive Digital Media,” *Invest Ontario*, accessed Nov 2022: <https://www.investontario.ca/digital-media#map-title-DM>

106 “Jam City Expands Global Operations to Toronto, Canada with the Acquisition of Bingo Pop from Uken Games,” *JamCity*, Nov 28, 2018: <https://www.jamcity.com/uken/>





The colleges and universities can't train all the young people to work at all 1,000 [creative tech] companies. They train them with the base skills, and then we have to be able to bring them up [to speed].

These concerns about job readiness aren't unique to Ontario or the creative technology sector. Recent research by ICTC identifies similar challenges in B.C.,¹⁰⁷ and a 2022 U.S.-based survey finds that employers rated U.S. college graduates lower on measures of proficiency and career readiness (compared to the graduates' self-evaluations).¹⁰⁸

Keeping Curricula Current with Changing Technologies

While interviewees describe students as lacking the necessary skills to “hit the ground running” from day one, citing a deficiency in both technical and human skills, most recognize the institutional challenges that oftentimes prevent traditional post-secondary institutions from rapidly responding and adapting curricula to suit evolving industry needs. Interviews with post-secondary institutions suggest that it can take as long as 10 years to develop a new degree program and produce graduates; six of those years are used to complete the planning, development, and regulatory approval. Core skills described as deficient include programming, familiarity with multiple engines,¹⁰⁹ and human skills, including time management, communication, teamwork, and adaptability.

Employers also note mismatches between current preferred technologies (for their companies/their specialization) and those taught in school. Several employers highlight that the Unity game engine is typically taught in post-secondary programs, while Unreal (which they also leverage) is not. Although this gap might easily be remedied by on-the-job learning, most studios build proprietary programs and solutions on top of game engines like Unreal or Unity; a lack of fundamental knowledge of either of these makes the learning curve that much steeper.



We've hired a few juniors and a few co-ops, and I don't think any of them knew Unreal coming in, unless they had taught themselves on their own time. For us, that's an onboarding consideration, right? When we're going to hire people, this is six more weeks, essentially, that we have to spend with someone on top of onboarding them to the project.

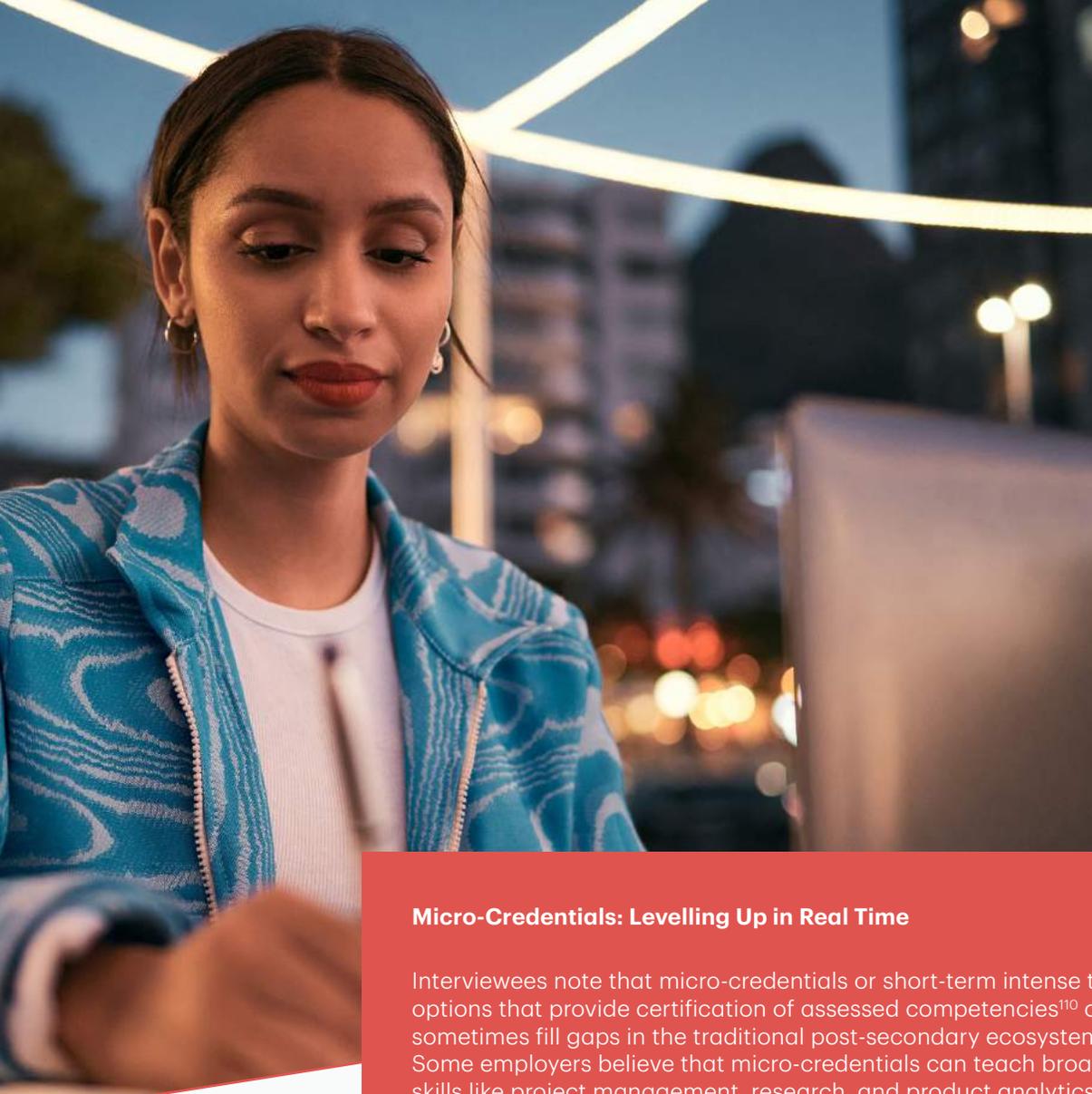
Unlike technical skills, human skills are more subjective and, as a result, more difficult to train. New entrants often require dedicated on-the-job training and mentoring to get up to speed with these skill sets, which often involves a larger (more resource-intensive) and longer-term investment on the part of the employer. While most employers recognize the need to train junior employees, interviewees also identify the need for post-secondary institutions to develop curricula that can teach at least the fundamentals of these skills. For example, close collaboration in development teams and strict project timelines are central components of the sector; to succeed, new entrants need at least some baseline of interpersonal skills, including team working and time management.

¹⁰⁷ Alexandra Cutean, Ryan McLaughlin, Khiran O'Neill, & Trevor Quan, “Benchmarking the Creative Technology Ecosystem in British Columbia”, Information and Communications Technology Council, DigiBC, (January 2021), Canada, <https://www.digitalthinktankictc.com/ictc-admin/resources/admin/creative-tech-report.pdf>

¹⁰⁸ Mimi Collins, “Recruiters and Students have Differing Perceptions of New Grad Proficiency in Competencies,” National Association of Colleges and Employers, Oct 2022, <https://www.naceweb.org/career-readiness/competencies/recruiters-and-students-have-differing-perceptions-of-new-grad-proficiency-in-competencies/>

¹⁰⁹ In addition to Unreal Engine and Unity, many creative tech firms build proprietary engines using the aforementioned engines. Knowing how to use multiple engines signals that candidates understand the fundamentals of this part of the development process.





Micro-Credentials: Levelling Up in Real Time

Interviewees note that micro-credentials or short-term intense training options that provide certification of assessed competencies¹¹⁰ can sometimes fill gaps in the traditional post-secondary ecosystem. Some employers believe that micro-credentials can teach broader skills like project management, research, and product analytics, while others find value in micro-credentials for specialized digital skills or for domain knowledge in emerging technologies.

Other possible uses of micro-credentials include programs to help junior and mid-level staff learn the coaching and development skills needed to grow into senior-level positions. Depending on the technical skill, micro-credentials can both fall short and be of benefit. Being short in duration, some argue that the depth and rigour of skills gained through micro-credentials can be limited. On the other hand, the timeliness of micro-credentials can make them ideal for teaching new or novel skill sets, or specific components of broader skill categories (i.e., training for specific game engines). In fact, one interviewee notes that micro-credentials can be part of a larger strategy to help students transition their knowledge from one platform to another, for example from Unity to Unreal.

110

"National framework for microcredentials," Colleges and Institutes Canada, accessed Nov 2022: <https://www.collegesinstitutes.ca/policyfocus/micro-credentials/>



Equity, Diversity, and Inclusion in Ontario's Creative Tech Sector

Equity, diversity, and inclusion (EDI) in the workplace is an important component of a sound business strategy, as much as it is a critical consideration to ensure economic opportunity for underrepresented groups.¹¹¹ Toronto's diverse and cosmopolitan nature as a global city inherently produces a relatively diverse workforce—a strength articulated by EDI experts consulted in this study. The technology sector has historically placed a strong emphasis on immigration and sourcing a skilled international workforce, and many companies now focus on tackling the underrepresentation of groups including women, LGBTQIA2+, and people with disabilities.¹¹² Expanding the supply pool is a core solution to address acute labour shortages in creative tech.

Improving equity, diversity, and inclusion in Ontario's creative technology sector also improves company performance, whereby diverse employees contribute to the final product. As one interviewee notes, the presence of diverse perspectives in the video game industry improves the quality and maturity of the narratives and makes the final products welcoming to all gamers. This is echoed by industry data that indicates games with more diverse characters (empowered by diversity in game development) draw in a larger audience, including new players to the platform or franchise.¹¹³ A more diverse and inclusive workforce in creative tech also enables companies to better understand their customers.¹¹⁴ Improved workforce diversity reflects the diversity of gamers and consumers of digital media. For example, recent research finds that in the US, 46% of gamers are women, 20% are Latin, 15% are Black, 5% are Asian, 16% are LGBTQIA2+, and 31% have a disability (including mental health).¹¹⁵ Indeed, research has found that diverse companies can generate higher revenues, improved team performance, and greater innovation.¹¹⁶

Yet, according to the ESAC 2021 Industry Survey, most video game studios in Canada (56%) have not developed initiatives to support equity, diversity, and inclusion (EDI).¹¹⁷ Ontario has the highest employment of women in video game studios across Canada (26%),¹¹⁸ but the industry still experiences a clear gender gap.

Despite nearly all employers in this study acknowledging shortfalls and committing to "do more" to improve representation, several issues are at the heart of this challenge in creative technology. First, some believe that creative technology shares some of the same challenges to diversity as the technology sector writ large: as one interviewee commented, "the problem we have, like the tech industry, is people working far, far too many hours."

¹¹¹ "Diversity Wins: How inclusion matters," McKinsey, May 19, 2020:

<https://www.mckinsey.com/featured-insights/diversity-and-inclusion/diversity-wins-how-inclusion-matters>

¹¹² Maryna Ivus and Maya Watson, "Gender Equity in Canada's Tech Ecosystem: Attracting, Retaining, and Supporting Entry- and Mid-Level Talent," (Ottawa, ON: Information and Communications Technology Council (ICTC), May 2022).

¹¹³ Dean Daley, "Gaming industry members discuss why we need more diversity in video games," MobileSyrup, June 16 2021, <https://mobilesyrup.com/2021/06/16/why-do-we-need-more-diversity-in-video-games/>

¹¹⁴ "The Why Behind DE&I Initiatives: Examples, Benefits, Definition, and more," workhuman, Nov 4, 2022: <https://www.workhuman.com/blog/dei-initiatives/>

¹¹⁵ Minh Tue Le Ngoc, "Diversity, Equity & Inclusion in Games: Gamers Want Less Toxicity in Games and Want Publishers to Take a Stance," Newzoo, April 8, 2022: <https://newzoo.com/insights/articles/newzoos-gamer-sentiment-diversity-inclusion-gender-ethnicity-sexual-identity-disability>

¹¹⁶ Kellie Wong, "Diversity and Inclusion in the Workplace: Benefits and Challenges," Achievers, Sept 14, 2022: <https://www.achievers.com/blog/diversity-and-inclusion/>

¹¹⁷ "The Canadian Video Game Industry 2021," Entertainment Software Association of Canada, Oct 2021:

https://www.nordicity.com/de/cache/work/169/ESAC_The%20Canadian%20Video%20Game%20Industry%202021.pdf

¹¹⁸ "Canada's Video Game Industry – A National Champion Making a Global Impact," Canada's Video Game Industry, accessed Nov 2022: <https://canadasvideogameindustry.ca/>



While consistently long hours may be more common at larger studios, in the broader tech sector, expectations around flexibility, and low boundaries between work and personal life—some that were heightened during the pandemic—are known to be challenging for employees with caregiver responsibilities.¹¹⁹ Another interviewee comments that smaller studios often do not offer full time hours to junior employees, disincentivizing staff with dependents, or staff needing full time hours to eventually apply for Canadian permanent residency. Overall, interviewees describe issues related to security, precarity, and expectations of flexibility. Research on improving gender equity in technology workplaces has noted that, where possible, offering employees control over their own schedules, introducing family care policies (including childcare and elder care support), and identifying workplace stressors and job demands that are likely to cause burnout will improve employee experiences and therefore representation in technology.¹²⁰

Another issue relates to representation in senior positions. One interviewee comments that they saw a lot of “quota-focused” diversity efforts that failed to address “the fact that senior positions are held by men or white men” and related aspects of studio culture. Other work on inclusion in the technology sector has noted that whether demographic data collection is aggregated or disaggregated can impact how meaningful a data-oriented inclusion strategy is.¹²¹ For example, aggregate data may report that 30% of a company’s employees are women, while disaggregated data (securely collected with employee consent by an HR team) can examine what departments and seniority levels women are in, how many women of colour there are, how many are senior women of colour, if they identify as neurodiverse, and whether they are receiving equitable pay and advancement opportunities. This type of data collection can be difficult for small studios to implement confidentially and appropriately: however, it remains a significant and often underexplored opportunity for larger organizations. In this study’s survey of creative technology employers, only 13% of respondents report collecting detailed demographic data.¹²²

While creative technology employers interviewed in this study focus their comments on workplace culture, a number of strategies exist to improve diversity in hiring and recruitment, including inclusive website language, EDI policy transparency, inclusive job posting language, transparent and standardized hiring processes, salary transparency, and partnerships with organizations serving or representing equity-deserving groups.¹²³ Reciprocal partnerships that are community-led are a key part of the future of diversity in technology (e.g., where an industry partner supports priorities identified by an Indigenous student group or a newcomer settlement agency, rather than simply asking for access to skilled talent in the community).¹²⁴ According to creative technology employers surveyed in this study, 32% report partnering with organizations that supported employment opportunities for diverse candidates.¹²⁵

119 For example, in a recent Boston Consulting Group survey of 1200 technology leaders, 44% of women respondents “spent more than 20 hours per week on caregiving activities, whereas that was true for only 33% of men respondents.” Further, “41% of women of color reported a negative impact on their work-life balance [due to the COVID-19 pandemic], whereas only 28% of white women noted the same.” BCG, “The Pandemic’s Lasting and Surprising Effects on Women in Tech,” August 11, 2022, <https://www.bcg.com/en-ca/publications/2022/how-the-pandemic-continues-to-affect-female-leaders-in-tech>

120 Maryna Ivus and Maya Watson, “Gender Equity in Canada’s Tech Ecosystem: Attracting, Retaining, and Supporting Entry- and Mid- Level Talent,” Information and Communications Technology Council (ICTC), May 2022.

121 For example, see: “Indigenous Leadership in Technology: Understanding Access and Opportunities in British Columbia,” First Nations Technology Council, Information and Communications Technology Council, Reciprocal Consulting Inc., (2022), Canada, <https://www.digitalthinktankictc.com/reports/indigenous-leadership-in-technology-understanding-access-and-opportunities-in-british-columbia>

122 n = 77.

123 Maryna Ivus and Maya Watson, “Gender Equity in Canada’s Tech Ecosystem: Attracting, Retaining, and Supporting Entry- and Mid- Level Talent,” Information and Communications Technology Council (ICTC), May 2022

124 “Indigenous Leadership in Technology: Understanding Access and Opportunities in British Columbia,” First Nations Technology Council, Information and Communications Technology Council, Reciprocal Consulting Inc., (2022), Canada, <https://www.digitalthinktankictc.com/reports/indigenous-leadership-in-technology-understanding-access-and-opportunities-in-british-columbia>

125 n = 77.



In interviews, several employers discuss partnering with higher education organizations to help support creative technology talent development (including equity-deserving students) upstream. Indeed, this activity is highly visible in Ontario's creative technology ecosystem: in order to encourage more diversity in creative technology-related studies, several studios have developed capacity-building initiatives to engage girls and women in game making. An example is DMG Toronto and their establishment of an EDI committee for the Games Institute at the University of Waterloo.¹²⁶ DMG Toronto is a not-for-profit video game arts organization founded in 2012 that aims to help marginalized communities (including women, non-binary, femme and queer people)¹²⁷ break into game development and other tech roles.¹²⁸ Another such organization is Femme Gaming, a hub for women and marginalized genders to come together to showcase their gaming skills and compete. Additionally, an initiative funded by the Ontario Trillium Foundation,¹²⁹ Egale Canada, an organization for LGBTQIA2+ people, and OverActive Media, a global esports and entertainment organization, are teaming up to bring LGBTQIA2+ inclusion to esports, focusing on solutions for youth and young adults in Ontario.¹³⁰

The Ontario XR industry also provides new and promising opportunities for inclusion by supporting Indigenous voices and sustainable tourism practices. VR presents the opportunity to provide a unique experience for users to immerse themselves in unfamiliar cultures and enable communities to remotely showcase cultural traditions to an expanded audience. An example is the Three Sisters VR Experience, which showcases Indigenous oral stories and provides opportunities for users to learn about the traditional agricultural methods of the Six Nations tribe.¹³¹ The work of Six Nations and their development of the Three Sisters VR Experience has been recognized by the largest AR & VR industry awards show in the world and has been nominated for the best use of AR or VR technologies to make a meaningful and positive impact.¹³²

Other examples of initiatives that focus on advancing underrepresented groups in creative technologies include the Scale Up Immersive Accelerator and the Indigenous Screen Office grant for immersive work. An initiative collectively managed by the OYA Black Arts Coalition (OBAC), Canadian Film Centre's Media Lab (CFC Media Lab), and Dark Slope Studio, the accelerator provides funding, mentorship, and access to technologies for a four-month cohort of Black Canadian creators in the immersive industry through funding from the Canadian government's Black Entrepreneurship Program (BEP) Ecosystem Fund.¹³³ The Indigenous Screen Office joined forces with Google to offer a \$500,000 grant for initiatives that support digital, interactive, and immersive content by Indigenous creators.¹³⁴

Similar progress can be seen in post-secondary institutions offering creative technology training. For example, one interviewee comments that their creative arts school was introducing mandatory truth and reconciliation coursework. A new Mohawk College program also aims to make the gaming industry better for women and people of colour; this will include an ethics course as well as addressing diversity and inclusion in the classroom.¹³⁵

- 126** Anti-Racism, Decolonization, Equity, Diversity and Inclusion Committee," University of Waterloo Games Institute, accessed Nov 2022: <https://uwaterloo.ca/games-institute/our-ecosystem/anti-racism-decolonization-equity-diversity-and-inclusion>
- 127** Chad Sapieha, "Dames Making Games' Damage Camp set to help create an "alternative system" for marginalized game gamers," *Financial Post*, Sept 17, 2017: <https://financialpost.com/technology/gaming/dames-making-games-damage-camp-set-to-help-create-an-alternative-system-for-marginalized-game-makers>
- 128** "In the Media," DMG Toronto, accessed Sept 2022: <https://dmg.to/press>
- 129** "EGALE CANADA, OVERACTIVE MEDIA TEAM UP TO BOOST INCLUSION IN ESPORTS FOR LGBTQI2S YOUTH," *OverActive Media*, Oct 2020: <https://overactive-media-group.prezly.com/egale-canada-overactive-media-team-up-to-boost-inclusion-in-esports-for-lgbtqi2s-youth>
- 131** *Ibid.*
- 132** "Three Sisters VR Experience," AWE, accessed Nov 2022: <https://auggies.awexr.com/gallery/gljOajoa/OLeMxbaD?search=2b0913e8b54532ce-4>
- 133** "13th Annual Auggie Awards," AWE, accessed Nov 2022: <https://www.awexr.com/usa-2022/auggie> <https://www.awexr.com/usa-2022/auggie>
- 134** *Ibid.*
- 135** "ISO Kicks off Digital, Interactive and Immersive Strategy with \$500k Google.org Grant and New Collaborations with MIT and NFB", Indigenous Screen Office, <https://iso-bea.ca/iso-kicks-off-digital-interactive-and-immersive-strategy-with-500k-google-org-grant-and-new-collaborations-with-mit-and-nfb/>





EDI at Interactive Ontario

Interactive Ontario is encouraging diversity in the video game and interactive digital media sectors through initiatives like the Career Fair for Emerging Black Professionals and Students, which has been running since 2018. This is implemented through:

- 1 **Career Profiles** – Black industry experts sharing insights and inspiration from their careers
- 2 **Learning Modules** – professional development and career readiness modules on topics like building a LinkedIn/Resume profile, portfolio development, interviewing tips and job search advice, confidence building and networking
- 3 **The Career Fair for Emerging Black Professionals and Students** – a virtual hiring fair to increase opportunities for Black professionals and post-secondary students in these fields¹³⁶

Another important dimension of EDI is inclusion and opportunity for people with disabilities. The term neurodiversity is used to describe people with “autism, attention deficit/hyperactivity disorder (ADHD), dyslexia, dyspraxia, and other neurodivergent characteristics.”¹³⁷ The tech sector increasingly recognizes that some neurodivergent individuals have qualities that are highly suitable for technical roles, including roles with highly structured tasks and workflows.¹³⁸ The strength of neurodiverse individuals has also been noted in the gaming industry and various initiatives that exist to challenge stereotypes, such as Ubisoft hosting its third annual Neurodiversity Awareness Week.¹³⁹ Neurodiverse individuals are increasingly represented in video game development; a UK study indicates that 18% of employees in the industry were neurodivergent in 2021, an increase from 11% from the previous year.¹⁴⁰ Discussions with individuals in Ontario’s creative tech sector echoes these findings, where the representation of neurodivergent individuals increased over the years.

Representation of women has also been growing in the screen-based sectors (such as TV, VFX, animation, and games), but still lags for BIPOC (Black, Indigenous and People of Colour) women, namely in film and TV.¹⁴¹ A previous study by Ontario Creates and VICE Media Group reveals a strong desire to see various genders, sexual identities, and ethnicities reflected in the content that young people consume. Not only is diversity a requirement in the subject matter depicted but also in who is creating and supporting this content behind the scenes.¹⁴²

Immigration in Creative Technology

Immigration offers creative technology employers an important way to access skilled talent that is either unavailable or unaffordable in Canada. Several interviewees describe international recruitment as a necessary go-to for mid- and senior-roles, some with established international recruitment teams that regularly advertise around the world.

Nevertheless, the ease of sponsoring an international worker can vary significantly depending on the type of creative technology role a studio wants to fill. One interviewee who had sponsored several employees for work permits notes that for technical roles, the process was relatively streamlined. However, they comment that when “we want to try to bring in artists, it is painful getting them here from an immigration standpoint, [last time] it took eight months to get them here.” They hoped that updates to immigration policy and occupation classifications will improve speed for designers, artists, and game developers: “that would be beneficial for us because there’s not [much] talent [like this] in Canada.” Other interviewees echo similar sentiments, noting that they experience “a lot of friction” in the labour market assessment (LMA) work permit process, and found it “very complicated,” necessitating lawyer fees, which is a barrier for small studios. One interviewee comments that government financial assistance for legal aid would help SMEs access international talent.

137 Sophia Waterfield, “Neurodiversity offers tech leaders an ESG opportunity,” *Techmonitor*, April 2022: <https://techmonitor.ai/leadership/workforce/neurodiversity-tech-esg>

138 *Ibid.*

139 Mikel Reparaz, “How the Games Industry Can Create Better Support for Neurodiversity,” <https://news.ubisoft.com/en-ca/article/56pxij51QcP7lCsPe9tVXT/how-the-games-industry-can-create-better-support-for-neurodiversity>

140 “Neurodivergent conditions of employees in the games industry in the UK 2021,” Statista Research Department, accessed Nov 2022: <https://www.statista.com/statistics/1096492/neurodiversity-of-employees-in-the-games-industry-in-the-uk/>

141 Jill Golick, Nathalie Younglai, “Women in View: On Screen Report”, June 2021, <https://womeninview.ca/wp-content/uploads/WIVOS-2021-FULL-FINAL-May-28-2021.pdf>

142 Vice Media, *Gen Z: The Culture of Content Consumption*, August 2019: https://www.ontariocreates.ca/uploads/business_intelligence/en/genz_the_culture_of_content_consumption.pdf



Overall, employers who participated in this study are aware of the potential opportunity of improving their EDI policies and practices, and many had already instituted policies to help them attract and retain equity-deserving talent. Improving demographic data collection practices, as well as learning from existing research on improving diversity in the technology sector, will help the Ontario creative technology sector benchmark its current status and move forward. Importantly, several interviewees express concerns about “box-ticking exercises” that could lead to a diverse workforce but not necessarily an *inclusive* one. For example, an interviewee in the esports industry notes that the field is becoming more diverse but not necessarily welcoming, which can lead to a hostile or even toxic work environment. Partnerships with organizations that support equity-deserving talent (including student programs, community organizations, and organizations for internationally educated professionals) and provide feedback on business practices can help studios ensure that they are building inclusive and welcoming workplaces.

Retaining and Developing Creative Technology Staff



The video game industry is a passion. You're going into the video game industry because you want to build video games... The tech sector will always pay more than we do.

According to interviewees in this study, the top issue impacting retention is salary competition: as raised throughout this study, creative technology studios are often competing with technology sector employers, and are frequently unable to match or exceed salary offers. The growing cost of living – and especially housing – in key areas like the GTA presents an added hurdle. Nevertheless, strategies other than salary increases exist to retain and develop loyal employees. As described in the section on EDI, workplace culture, work-life boundary-setting, and security can play significant roles in employee retention. Importantly, several interviewees note losing senior talent to other industries because of work-life balance issues, reinforcing that workplace culture impacts worker satisfaction writ large:



If we're losing people, it's because we can't provide decent salaries, stable work, employment, [and/or] flexibility that these people need. [Senior staff] in video games can't do the crunch anymore when they hit their late thirties, early forties... they want to go home and be with the[ir] kids. So, they switch sectors, they go work a 9 to 5 and get paid \$20,000 more. So that's the other issue, it's back to that culture piece.

When asked to report why they thought candidates chose to work at their companies, employers surveyed in this study primarily note that the organization's quality of work (e.g., stimulating challenges, meaningful work; 86%) and workplace environment and culture (e.g., inclusivity, a friendly team; 86%) were the strongest factors in retention. In this multi-select question, only 29% feel that “competitive salary” was a strong draw.¹⁴³

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n = 77.



Furthermore, interviewees describe their own reasons for staying and growing into leaders in creative technology in terms of lifestyle, passion, and creativity. Employers believed that people who stayed in the industry despite the offer of larger salaries in other sectors emphasize the role of culture and lifestyle throughout their interviews, suggesting that done well, creative technology can offer a high quality of work to help offset salary competition.

Employee development and training is also a central issue related to retention. Clarity on employment pathways and progression opportunities can help intermediate-level staff more smoothly progress into leadership positions and drive sustainable growth. In this study, employers note that potential applicants lack awareness of the opportunities in the sector; some state that creative tech careers are “shrouded in mystery,” leaving many qualified candidates—especially new graduates—with an incomplete or inaccurate picture of their potential future in the field. At larger studios, internal processes usually include some level of transparency and clarity related to advancement, including role classifications and career trajectories. For example, as previously noted, one interviewee mentions that their studio promotes people into two different tracks: technical and leadership, each with different skill requirements and expectations. However, for smaller studios, a policy like this, while potentially desirable, may be practically difficult or even impossible to implement when considering limited human and financial resources.

Similarly, some creative technology employers interviewed in this study discuss their approach to encouraging employee life-long learning through professional development allowances as well as internal skills training workshops. Not all organizations have the funding to offer allowances for external training, but providing flexibility for professional development during work hours can also improve employee investment and long-term retention.





PART IV

Growing and Investing in the Creative Technology Sector in Ontario



This report has so far approached the topic of talent in Ontario's creative technology sector from the perspective of employers (demand, competition, recruitment, EDI, and retention) and other stakeholders involved in building skilled creative technology talent, such as colleges and universities. Importantly, talent availability is also influenced by the broader Ontario business ecosystem, regulation and policy, and trends in investment. This section examines the Ontario context more broadly, its relationship with the creative technology sector, and potential avenues for improving the skilled talent gap that creative technology studios currently report.

As discussed in Part I of this study, Ontario is home to the largest number of video game studios in Canada (298), surpassing Quebec as the national leader in 2019.¹⁴⁴ While the province houses 32% of all Canadian video game studios, these companies account for roughly 20% of all video game jobs in Canada.¹⁴⁵ In other words, despite a large volume of companies in Ontario, most are small—and many are micro-sized, employing fewer than four people.



The Ontario video games sector comprises numerous smaller-scale indie studios, whereas other provinces host fewer but larger companies that have a larger labour market impact. In fact, Ontario is home to roughly half as many large companies as Quebec or British Columbia. According to ESAC, in Ontario, there are approximately 7,000 direct employees spread across 298 firms—roughly 24 employees per firm on average. By comparison, Quebec has 13,500 employees across 291 firms (average of 46 employees per firm) and B.C. represents 8,700 employees across 164 firms (average of 53 employees per firm).¹⁴⁶

Other data further explores this reality outside of Ontario. Just over half (54%) of all Canadian video game studios are considered micro, and they contribute less than 1% of total employment across all regions. In contrast, large video game studios (100+ employees) comprise just 6% of all companies but are responsible for 76% of total employment.

The contributions of small and large studios differ, but are equally important in fostering innovation and developing talent. Interviewees, especially those representing small studios, note high labour mobility, competition, and plentiful job opportunities as key challenges to recruitment and retention. Noteworthy, however, is the role that the creative tech sector plays in supporting the province's overall tech talent pipeline. Creative tech studios provide essential training, and continually upskill this talent base.

¹⁴⁴ "Entertainment Software Association of Canada," accessed Nov 2022: <http://theesa.ca/>

¹⁴⁵ "Roadmap to Economic Success: The Video Game and Interactive Digital Media (IDM) industry in Ontario: A key contributor to the economic recovery of the Province," Feb 22, 2022: <https://interactiveontario.com/wp-content/uploads/2022/03/Roadmap-to-Economic-Success-Video-Game-and-IDM-IO-220222.pdf>

¹⁴⁶ "The Canadian Video Game Industry 2021," Entertainment Software Association of Canada, Nov 2021: <https://theesa.ca/wp-content/uploads/2022/10/esac-2021-final-report.pdf>



As previously discussed, software/programming roles are the most in-demand in Ontario's creative tech sector. The very nature of game development means that talent in this space touches several parts of the development pipeline (e.g., networking, user interface, rendering, security, optimization, data management, AI and automation, etc.). As such, workers with experience in the gaming industry are equipped with a strong portfolio of front and back end development skills. This makes them highly attractive to employers across the tech ecosystem, especially after a few years of experience under their belt. ICTC historical data on the Toronto tech job market corroborates the desirability of full stack developers, placing it in the top five in-demand jobs for three years in a row.¹⁴⁷

To this end, interviewees of all sizes comment on the incentives available to them in the Ontario ecosystem—employers appreciate the existence of the Ontario Interactive Digital Media Tax Credit (OIDMTC),¹⁴⁸ and the Interactive Digital Media Fund,¹⁴⁹ noting that the latter is particularly helpful for small studios spinning out their first full game, while the former is a key tool to scaling up studios and attracting foreign direct investments. Some interviewees in larger organizations comment that they examined other jurisdictions' equivalent credits and compare them when making talent acquisition decisions, including in other provinces in Canada. One interviewee notes that greater long-term certainty (that the tax credit would remain in place for a decade or more) would help inform their talent location decision-making.

While tax credits and investment incentives support companies of all sizes in different ways, small studios in Ontario still find it difficult to scale, a challenge many interviewees attribute most to talent availability. Small video game studios play an important role in growing and defining Ontario's video game presence and identity: however, size and capitalization play clear roles in a studio's ability to attract knowledgeable, experienced, and senior staff, and therefore further scale their businesses. Skilled and senior talent scarcity may therefore create a cycle of negative impact, driving up salary competition and preventing small studios from being able to acquire the experienced staff they need to scale and pay higher salaries. As one interviewee comments, "your access to talent is based on your creativity in finding that talent, but also having the capital to bring that talent in and then retain that talent." Accordingly, strategies like workforce development, discussed in Part III, including education and immigration, are essential to reduce labour scarcity, but are not currently producing enough new hires to combat competition. Developing a resilient and long-term talent pipeline strategy is crucial.

¹⁴⁷ <https://etalentcanada.ca/for-job-seekers/employment-data>

¹⁴⁸ "Ontario interactive digital media tax credit," Government of Canada, June 17 2022, accessed February 1 2023, <https://www.canada.ca/en/revenue-agency/services/tax/businesses/topics/corporations/provincial-territorial-corporation-tax/ontario-provincial-corporation-tax/ontario-refundable-media-tax-credits/ontario-interactive-digital-media-tax-credit.html>

¹⁴⁹ "Interactive Digital Media Fund," Ontario Creates, n.d., accessed February 1 2023, <https://www.ontariocreates.ca/investment-programs/content-creation/idm-fund>





Conclusion

Ontario's creative technology sector is primed for continued and sustainable success. Video games, esports, XR, and immersive digital development contributes to economic growth and strong employment opportunities in the province. Creative fields have especially benefited from the technical strengths of the world-class tech sector in the Toronto-Waterloo corridor, and the talent pool is supported by numerous high-quality post-secondary institutions. Moreover, the creative technology sector proved resilient in the face of the pandemic: where other sectors saw large-scale economic and labour market disruptions (employment loss of up to 30% for some), creative tech witnessed a boom in demand, supplying thousands of Ontarians with high-quality employment opportunities during a time of uncertainty. However, future growth and resilience will require balancing the demand and supply of talent.

The expansion of creative tech studios of all sizes and types over the last few decades has raised Ontario's global profile while simultaneously causing a significant talent crunch. Today, many creative tech studios are bottlenecked by a lack of intermediate and senior leaders to nurture and train junior staff, lead teams and crucial projects, and attract new business. The move to remote and hybrid work adds further pressure while creating opportunities to attract talent from other provinces and even other countries. Although immigration bottlenecks and confusion around processes and timelines currently create roadblocks to attract internationally trained workers in certain roles, a focus on equity, diversity, and inclusion (EDI) further expands the pool of available talent. At the same time, zeroing in on EDI provides spillover benefits by improving workplace conditions and creating more inclusive and productive workplaces.



The overall supply of talent is further constricted by what appears to be a general lack of awareness about careers in creative tech, which especially affects the supply of new junior talent. Interviewees note that career pathways in creative tech are not clear for new entrants and worry that this causes individuals to overlook suitable training and opportunities to enter the sector. Although employers recognize that entry-level talent typically requires company investment (training), a strengthened focus on visibility and clarity across the sector is an essential step to bolster the talent funnel.

In a rapidly evolving digital economy, training and education must level up. Traditional educational institutions are well-regarded as developing strong junior talent with core digital and technical skills. However, internal processes, bureaucracy, and regulation can render these institutions slow to respond to the rapidly evolving needs of the industry. Moreover, the need for strong technical foundations and human skills across in-demand roles creates opportunities for alternative training pathways, including micro-credentials and practical application experiences like work-integrated learning.

Lastly, favourable taxation policy and other structures play critical roles in attracting investment, while simultaneously helping homegrown companies scale and become success stories. Key taxation mechanisms that support Ontario creative tech studios of all sizes include the federal Scientific Research & Experimental Development (SR&ED) credit, the Ontario Interactive Digital Media Tax Credit (OIDMTC).

Despite macroeconomic forces and high competition, Ontario's creative technology sector has proven itself as a resilient driver of innovation, creativity, and sustainable job opportunities for Ontarians. Ontario creative tech is on the cusp of exponential growth, and it is positioned for continued success. The sector's future is bright, but this study illustrates core areas of focus, including targeted investments and strategies that are needed to enable the ecosystem to continually thrive.



Appendix

Research Methodology

This strategy was developed using a combination of primary and secondary research.

Secondary Research

A literature review of the creative technology field was completed. This review included Canadian and international literature and data to source relevant information on industries, including video game, esports, VFX, and immersive digital development. This exercise identified national and international labour market trends along with information on topics like training and EDI.

Primary Research

Primary research consisted of key informant interviews, an employer survey, an employer roundtable, and web scraping, including a collection of data from creative technology job postings. These are described in further detail below.

Key Informant Interviews

Key informant interviews (KIIs) were held with a variety of subject matter experts in Ontario. A total of 22 key informant interviews were completed in this study. Representatives were from a range of creative technology companies and post-secondary institutions in the province. KIIs play an important role in gathering novel insights and detailed feedback based on lived experience. This report interviewed 10 individuals in video game studios, six in post-secondary institutions, three in esports companies, two in XR firms, and one in an immersive experience studio.

Industry Survey

From July to October 2022, ICTC, Interactive Ontario, and the City of Toronto circulated an employer survey relating to labour market challenges affecting Ontario's creative technology sector. Of the 126 firms that completed the survey, 100 responses were deemed both within scope and of usable quality.

To reflect the unique characteristics of the industry, namely that firms may identify as belonging to more than one subsector, respondents were allowed to select multiple subsectors: 76.8% of respondents identified as belonging to the video game industry, 19.2% of respondents identified as belonging to the XR industry, 8.8% of respondents identified as belonging to the immersive experience industry, and 8.8% of respondents identified as belonging to the esports industry.

Survey respondents were asked about in-demand roles and skills, expected hiring, hiring challenges, and other topics related to the labour they employ or hope to employ.



Industry Roundtable

In fall 2022, ICTC hosted a roundtable to showcase and validate the preliminary results of this study. Roundtable attendees represented companies of various sizes across all industries in the creative technology sector. During the roundtable, attendees were asked to review and discuss research findings, and ICTC researchers were available to address questions or concerns. Key feedback provided by roundtable attendees was incorporated into the final report.

Web Scraping and Job Data Analysis

From May–November 2022, ICTC’s Data Science team collected key data on jobs and skills for Ontario’s creative technology sector. Leveraging information on the top 20 in-demand jobs across the province, ICTC captured information including the volume of job postings, top technical and human skills, educational requirements.

Research Limitations

As with all research, some limitations exist as part of this study. First, the creative technology sector is subject to different definitions and interpretations. In some cases, this can lead to a broad catchment of companies and operations, including industries like video games, animation, visual effects, esports, XR, digital media, and even film and TV. For this study, the definition of the sector is anchored in four main sub-industries: video game development, extended reality, immersive experiences, and esports. As such, although this study presents a unique glimpse into these industries in Ontario, the definition of the sector makes it incomparable to other studies on this topic, including the ESAC reports and ICTC’s previous creative technology report for the province of B.C.

The employer survey was unable to provide comprehensive EDI data. Respondents were given the ability to skip through certain sections, which biased estimates. The ability to self-select into providing EDI information means survey analysis of the state of EDI in Ontario’s creative tech sector will not accurately reflect trends, beliefs, and areas for improvement.

While ICTC attempted to ensure that the research process for this study was as exhaustive as possible, there are inherent limitations to the sample size and the qualitative nature of the interviews.

