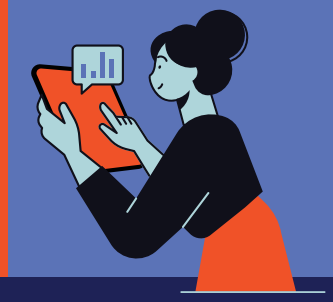

VIRTUAL FRONTIERS

A Study on Alberta's Interactive Digital Media Industry

ICTC CTIC

Research by

ICTC CTIC

Information and Communications Technology Council

Conseil des technologies de l'information et des communications

Canada

Alberta

The Province of Alberta is working in partnership with the Government of Canada to provide employment support programs and services.

Digital Alberta

Preface

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.

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Executive Summary

Interactive digital media (IDM) is becoming a vibrant part of Alberta's economic fabric.

This study offers an in-depth look at Alberta's IDM industry, including its labour market impacts and needs, its economic potential, and the broader Albertan economic context.

Representing 177 studios, IDM in Alberta is characterized by five core subindustries: video games, animation, visual effects and post-production, extended reality (XR), digital models and digital twins. These studios increasingly play a key role in Alberta's economy and labour market. When paired with the province's natural sectoral strengths like energy and healthcare, IDM offers novel innovation opportunities beyond entertainment.

Video games are the dominant IDM subindustry in Alberta, making up more than 55% of all studios. With a broad range of applications across sectors, including education, healthcare, and natural resources, XR is the next largest subindustry, representing over 20% of all studios. Animation, visual effects, and post-production each represent just under 10%, and digital models and digital twins comprise the remaining 5%.

Alberta's IDM industry primarily engages in product-based work, which may insulate it from macroeconomic shifts.

While the industry is dominated by small studios (employing 50 people or less), nearly half engage primarily in product-based work. This means they develop intellectual property (IP) in-house and leverage it to produce products or services. In comparison, the IDM industry in British Columbia (B.C.) sees most studios operating according to a service model through which they develop tailored solutions for external clients. Both business models have benefits and drawbacks. However, the robust presence of product-based work in Alberta may offer a degree of insulation from macroeconomic shifts that can impact the external demands for services and content. That said, approximately 85% of studios cater to clients outside Alberta; clients are primarily located in B.C., Ontario, the United States, and China.

By 2030, Alberta's IDM industry could contribute up to $169M to the province's GDP.

ICTC estimates that approximately 4,500 to 5,200 people are employed in Alberta's IDM industry. Most of Alberta's IDM employment is located in the province's two main hubs of economic activity: Calgary and Edmonton.

While small compared to the overall digital economy—which employed more than 250,000 Albertans in March 2024—IDM employment has consistently outpaced employment growth across the overall economy, averaging 4.8% annually from 2006 to 2024, compared to 1.5%. IDM employment is expected to continue to outpace that of the general economy in the coming years: in fact, ICTC forecasts that by 2030, Alberta's IDM industry could add as many as 3,500 new jobs. If this job growth is realized, Alberta will net an additional $106M to $169M in GDP.

Mid- to senior-level talent is in high demand.

When it comes to hiring, mid to senior-level talent is in high demand. Studios frequently seek talent with a robust base of technical skills and workplace experience that allows them to onboard teams and projects quickly and rapidly produce value.

Examples of in-demand roles include technical roles like gameplay programmers, artificial intelligence (AI) programmers, and engine operators; artistic and creative roles like technical artists, animators, and riggers; and design roles like narrative designers, level designers, and user experience (UX) designers.

While junior-level talent is less sought after—with many employers pointing to gaps in training, including for both technical skills and workplace skills—most companies engaged in this study noted being heavily involved in the entry-level talent world; three-quarters of studios engage with co-op students and interns, and many end up retaining them for full-time work.

Alberta's IDM talent crunch may be due to a lack of critical technical skills and work experience.

Across the board, employers expressed a belief that Alberta's IDM talent crunch is primarily quality-based; that is, the volume of talent may be sufficient, but many lack critical technical skills and the desired work experience needed to succeed in their roles and help studios scale. For junior-level talent especially, employers expressed a significant demand for greater post-secondary alignment with industry needs.

Alberta studios offer competitive wages compared to Toronto, Vancouver, and Montréal.

Despite the relatively small size of the industry in Calgary and Edmonton compared to larger clusters like Toronto, Vancouver, and Montréal, a scan of salaries for key technical, artistic, and design roles across these jurisdictions suggests that Alberta studios punch above their weight and often offer competitive wages.

Fostering a robust ecosystem is key to the future of Alberta's IDM industry.

Beyond talent and skills, other considerations key to the future of IDM in Alberta include scale, competition, and investment attraction.

Building a robust ecosystem that helps IDM companies scale and compete is important, as are structures that enable and incentivize homegrown ecosystem development and investment attraction. The former includes access to capital, funding, and other supports like networks, facilities and equipment, and commercialization and marketing services, while the latter includes taxation incentives, including tax credits. Taxation incentives, combined with a robust labour market, could be essential to putting Alberta on par with other major IDM hubs nationwide.

Alberta's IDM industry is dynamic and continually evolving. Offering novel employment opportunities that blend technology and art, IDM supports sectors including energy, education, healthcare, and more; its contributions are often tailor-made. With a focus on targeted and strategic interventions, including those that enable labour attraction, labour retention, and skill development, Alberta is poised to leave its mark on the world of IDM.

Introduction

Around the world and in Alberta, storytellers, designers, and technologists use interactive digital media (IDM) to transform how we work, learn, and are entertained.

An augmented reality application that overlays a map of your industrial site onto your natural vision, a computer game where scenes and settings change depending on your inputs, and a virtual reality simulator that enables you to practice first responder scenarios in a risk-free environment are all examples of IDM.

The IDM industry encompasses a variety of businesses involved in creating and distributing interactive digital experiences and developing foundational technologies that other companies can use to build and deliver IDM experiences.

While there are several prominent "subindustries" within the IDM industry—namely, video games, extended reality (XR), visual effects (VFX) and post-production, and animation—the umbrella of IDM also includes immersive experiences, interactive storytelling, interactive learning and training simulations, digital models, digital twins, animation, post-production, and supporting technologies, among others.

IDM traces its roots to the entertainment industry, but today, it reaches across many sectors: not only does it play a key role in entertaining people around the world, but it also trains professionals, supports design and engineering processes, helps field workers navigate complex tasks, and enables technological innovation and economic growth.

Like other emerging technologies, IDM plays a considerable role in creating high-quality jobs for Canadians. These include digital roles like game developers and software developers; design-based roles like user experience (UX) designers; roles that blend art and technology like technical artists, graphic artists, and producers; and operational roles like business development specialists and marketing leads.

Canada's largest clusters of IDM activity are found in B.C. (with Vancouver being the central hub), Ontario (primarily in the Toronto area), and Québec (primarily in Montréal). While these clusters represent Canada's largest IDM-related economic and labour market activity, Alberta increasingly plays an important and unique role in Canada's IDM ecosystem. Alongside homegrown success stories in video games and post-production, Alberta's IDM industry also leverages its strengths in energy, manufacturing, and healthcare to offer products and services tailored to these broader sectors.

This study offers an in-depth look at Alberta's IDM industry, including its labour market impacts and needs, its economic potential, and the broader Albertan economic context.

Mixed methods were used to produce this research, including both the collection and analysis of secondary research and data and in-depth primary research via an employer survey; key informant interviews with industry leaders, educators, and ecosystem support networks; and guidance from an advisory committee of established experts in the field.

Section I provides an overview of Alberta's IDM ecosystem, including an estimate of the number of firms in Alberta, their focus and the type of work they do, their size, and their regional distribution. Section II of the report builds on this industry map by discussing labour market trends in Alberta's IDM industry. It provides an estimate of the number of people employed in the province's IDM industry, broken down by subindustry and location. It also includes a forecast of future employment demand over the next five years and provides an estimate of what the IDM industry contributes to provincial GDP. Finally, Section III discusses workforce development pathways in the IDM industry, highlighting existing training and education programs and persistent labour market challenges.

What is Interactive Digital Media?

Interactive digital media (IDM) refers to a suite of technologies and techniques that storytellers, designers, technologists, and other professionals use to deliver interactive digital experiences to users, whether for entertainment, learning, working, or creating. IDM is also sometimes known as *creative technology* or *multimedia*.

In Alberta, the IDM industry is primarily comprised of five main "subindustries," namely, video games, extended reality (XR), visual effects (VFX) and post-production, animation, digital models and digital twins.

Video Games

In 2021, the global video game industry was estimated to have a combined annual direct and indirect economic impact of more than $300 billion, including $200 billion in direct spending and $100 billion in indirect revenue.[1]

Accenture estimated that, in 2021, there were approximately 2.7 billion gamers worldwide, which they expected to increase to approximately 3.1 billion by the end of 2023.[2] This growth can be attributed to new linkages between the gaming community and social media platforms like Twitch; the growth of eSports and competitive gaming; the increasing popularity of mobile games; and the expansion of gaming into new demographic groups.

Canada's video game industry generated an estimated $4.3 billion in revenue in 2021.[3] The vast majority (84%) of this revenue was driven by export markets worldwide, as opposed to local Canadian markets, highlighting the importance of export markets to Canada's video game industry.[4] Canada's video game industry was also estimated to employ 55,300 full-time equivalent workers across Canada in 2021: most were located in Ontario, Québec, or British Columbia, and more than half worked directly for video game studios.[5] Most video game companies in Canada are "micro-sized," meaning they employ less than four employees—in 2021, just 58, or 6%, of video game companies in Canada employed more than 100 workers.[6] While only accounting for a small share of Canada's video game companies, large companies still represent over three-quarters of video game employment.[7]

1 "Global gaming industry value now exceeds 300 billion new Accenture report finds," Accenture, 2021, https://newsroom.accenture.com/news/2021/global-gaming-industry-value-now-exceeds-300-billion-new-accenture-report-finds.

2 Ibid.

3 Entertainment Software Association of Canada (ESAC), "The Canadian Video Game Industry 2021," October 2021, https://theesa.ca/wp-content/uploads/2022/10/esac-2021-final-report.pdf.

4 Ibid.

5 Ibid.

6 Ibid.

7 Ibid.

Image courtesy of Neojac Entertainment

Gaming is an important component of Alberta's IDM industry. In 2021, Alberta had an estimated 88 video game studios.[8] As is discussed in Section II, this number has grown to just under 100, with video games accounting for approximately half of Alberta's IDM firms.

Extended Reality

Extended reality (XR) is an umbrella term for technologies that immerse users in a digital or quasi-digital environment. It includes augmented reality (AR), which enhances a user's real-life experience by overlaying digital information onto their real-world environment (for instance, in the form of visual overlays, sensory projections, audio, and other digital elements); virtual reality (VR), which uses headsets, audio, haptics, interactive controllers, and other sensory technologies to immerse users in a computer-generated, 3D environment, removing as much connection as possible with the real world; and mixed reality (MR), which combines AR and VR, enabling users to interact with both the real world and virtual objects simultaneously. In addition to these main subsets, XR can include digital and creative niches like immersive experiences, installations, and interactive storytelling.

While XR traces its roots to the entertainment sector, it has a variety of use cases beyond entertainment, including retail and marketing, design and engineering, manufacturing, healthcare, aerospace, emergency response, and natural resources.[9] For example, equipment manufacturers report using XR to provide virtual support to line workers within manufacturing facilities, enabling virtual service visits to existing customers, supporting design and engineering, and delivering employee training; many claim that these applications have helped them to achieve cost savings and productivity gains.[10]

In Alberta, several companies have leveraged XR to support use cases in healthcare, health sciences education, aerospace and defence, and manufacturing.[11] Several post-secondary institutions have also embraced XR's application beyond entertainment: Lethbridge College, for example, partners with industry organizations through their Spatial Technologies Applied Research and Training initiative to use XR to solve challenges in agriculture, energy, architecture, health care, cultural heritage, and emergency response.[12]

In terms of market size, Statista reports that Canada's AR and VR market revenue will increase from an estimated US $699 million in 2023 to an estimated US $840 million in 2024.[13] Deloitte, meanwhile, predicts that variants of the metaverse, including AR and VR, could contribute between $45.3 billion and $85.5 billion to Canada's annual GDP by 2035.[14]

8 Entertainment Software Association of Canada (ESAC), "The Canadian Video Game Industry 2021," October 2021, https://theesa.ca/wp-content/uploads/2022/10/esac-2021-final-report.pdf

9 Tyler Farmer and Mairead Matthews, "Spanning the Virtual Frontier: Canada's Immersive Technology Ecosystem," Information and Communications Technology Council (ICTC), August 2020, https://ictc-ctic.ca/reports/spanning-the-virtual-frontier

10 Ibid.

11 "Raytheon Canada," accessed May 2, 2024, https://www.rtx.com/raytheon/what-we-do/raytheon-canada; "Varcoe: 'Big year' for De Havilland as it adds staff, expects to break ground on massive facility in Alberta," Calgary Herald, February 9, 2024, https://calgaryherald.com/opinion/columnists/varcoe-big-year-for-de-havilland-as-it-adds-staff-expects-to-break-ground-on-massive-facility-in-alberta

12 "Spatial Technologies Applied Research & Training," Lethbridge College, accessed May 3, 2024, https://lethbridgecollege.ca/departments/centre-for-applied-research-and-innovation/start

13 "AR & VR - Canada," Statista, accessed May 3, 2024, https://www.statista.com/outlook/amo/ar-vr/canada

14 Lau Christensen and Alex Robinson, "The Potential Global Economic Impact of the Metaverse," Analysis Group and Meta, 2022, https://research.facebook.com/quantifying-the-potential-economic-impact-of-the-metaverse/

Animation, Visual Effects, and Post-production

Animation professionals create visual content, including both 3D and 2D animation. Visual effects (VFX) professionals use digital technology to create, manipulate, and enhance film and television (TV) footage, video game visuals, and other imagery. This may be done in post-production or through virtual production, which combines physical and virtual filmmaking techniques to allow VFX to be captured in real time while on set. While these two subindustries are discussed separately for the remainder of this report, they are discussed together here, given that many existing estimates for market size, GDP contribution, and employment combine them.

Demand for animation products and services has grown with the global consumption of online media, such as TV and film. According to one estimate, the size of the global animation and VFX market was approximately US $179.78 billion in 2024 and is projected to reach approximately US $311.46 billion by 2029.[15] Another estimate suggests that in 2020, Canada's animation and VFX market accounted for approximately 3.5% of the global market share.[16]

In Alberta, the average animation and VFX firm works on both animation and VFX projects and provides services to clients in TV and film, advertising and marketing, education, and government.[17] A recent report estimates that in 2021, Alberta's animation and VFX industries directly and indirectly generated $10 million in GDP.[18] The same report estimates that the province's animation and VFX industries, directly and indirectly, employed approximately 110 workers in full-time roles.[19]

Digital Models and Digital Twins

Digital models, sometimes called 3D models, are digital representations of three-dimensional objects, systems, or processes.[20] They are the foundation of many interactive digital media solutions and can be built either from scratch or from existing images or 3D scans using a 3D engine like Unity or Unreal.[21] Once built, digital models can be incorporated into a vast range of interactive digital media solutions, including VR or AR experiences; mobile, desktop, or web-based apps; video games; and more.

Digital twins take digital models one step further by using big data and Internet of Things (IoT) technologies to associate the digital model with a real-world counterpart. For example, a company building a mixed reality way-finding tool for a mining site would associate different parts of their digital model with real-world data about the site's size, location, topography, layout, etc. IoT sensors can then update different aspects of the 3D model in real-time, such as changes to the mining site's layout or geology.

15 "Animation and VFX Market Size," Mordor Intelligence, accessed May 3, 2024, https://www.mordorintelligence.com/industry-reports/animation-and-vfx-market/market-size

16 Kanchan Samtani and Mandeep Kohli, "Lights, Camera, Action ... the Show Goes On," Boston Consulting Group, December 2020, https://web-assets.bcg.com/2b/d6/90c369a34b229e5d7dce8da4706b/lights-camera-action-cii-report-2020.pdf

17 Nordicity, "Key Frames: A Growth Strategy for Animation and VFX in Alberta," Edmonton Screen Industries Office and Calgary Economic Development, 2023, https://www.calgaryeconomicdevelopment.com/assets/Reports/Sectors/Digital-Media-Entertainment/CED-2023_Animation_Visual_Effects_Strategy-Full-Report.pdf

18 Ibid.

19 Ibid.

20 Tyler Farmer and Mairead Matthews, "Spanning the Virtual Frontier: Canada's Immersive Technology Ecosystem."

21 Ibid.

Importantly, this is just one example of how a digital twin can be applied. Digital twins can be used in numerous growing contexts—for instance, to model real-world physical or chemical processes, to facilitate remote tours of facilities or infrastructure, or to improve physical design. While many IDM solutions are geared toward the entertainment industries, digital models and digital twins have a strong potential to be adopted into industrial sectors that rely heavily on spatial data, such as natural resources, agriculture, manufacturing and warehousing, and sectors that require a high degree of oversight, risk management, or optimization.

While estimates vary, the global market for digital twins was estimated to be approximately US $10 billion in 2023 and US $12.8 billion in 2024; it is meanwhile projected to grow to approximately US $110 billion by 2028, US $125 billion by 2032, and US $240 billion by 2035, depending on the source.[22]

In addition to these subindustries, the broader IDM ecosystem also includes cloud technologies, which enable firms to host content online, and streaming platforms, digital publishers, and distributors, which help distribute content to users. The IDM industry was estimated to contribute approximately $1.8 billion to Canada's GDP in 2020—$0.7 billion more than the television and film industry.[23] As IDM expands beyond its creative roots and into industries like manufacturing, design and engineering, natural resources, emergency response, education, and health, this opportunity is likely to grow even further.

22 See: "Digital Twin Market," Global Market Insights, March 2024, https://www.gminsights.com/industry-analysis/digital-twin-market; "Digital Twin Market," Roots Analysis, accessed May 3, 2024, https://www.rootsanalysis.com/reports/digital-twins-market.html; "Digital Twin Market," Markets and Markets, July 2023, https://www.marketsandmarkets.com/Market-Reports/digital-twin-market-225269522.html

23 Canadian Interactive Alliance, "Supporting IDM in Canada: CIAIC Position Paper – Written Submission for the Pre-Budget Consultations in Advance of the Upcoming Federal Budget," Our Commons, House of Commons, Parliament of Canada, August 2021, https://www.ourcommons.ca/Content/Committee/441/FINA/Brief/BR11513026/br-external/CanadianInteractiveAlliance-e.pdf

Image courtesy of Beamdog.

SECTION I

Mapping Alberta's IDM Industry

Section I provides an overview of the number of IDM companies operating in Alberta and discusses their distribution by industry, business model, firm size, and location.

This research builds on existing assessments of animation and VFX, video game, and immersive technology industries in Canada and Alberta by providing a comprehensive map of Alberta's entire IDM industry, including video games, XR, VFX post-production, and animation.[24]

Subindustry overviews draw from two datasets that ICTC created for this study: First, a dataset of 72 responses to ICTC's IDM employer survey, and second, a dataset of 177 IDM companies operating in Alberta, which ICTC created using a combination of public and proprietary data sources.[25]

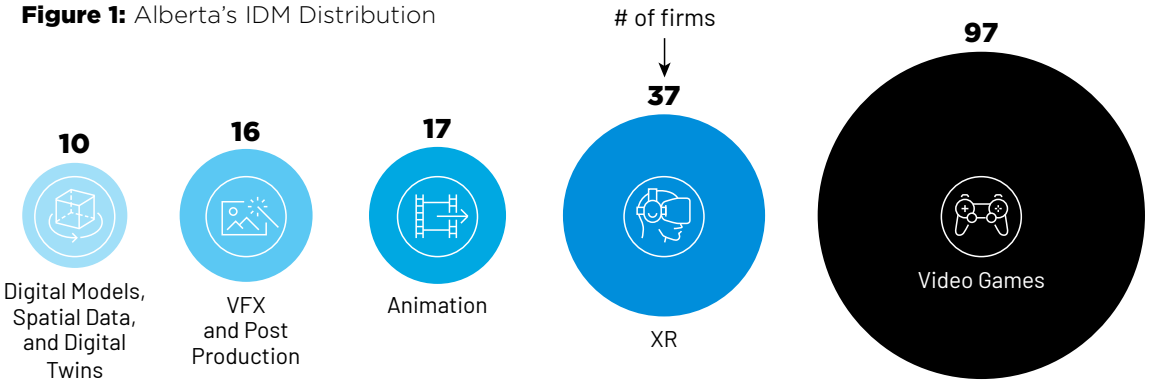
24 For example, in 2023, Calgary Economic Development and the Edmonton Screen Industries Office published, "Key Frames: A Growth Strategy for Animation and VFX in Alberta," which outlined the VFX and animation industry in Alberta and provided a strategy for growth, see: https://www.nordicity.com/de/cache/work/182/CED-2023_Animation_Visual_Effects_Strategy-Full-Report.pdf; in 2020, Nordicity published a report about Calgary's Video Games and Immersive Technology Strategy, see: https://www.nordicity.com/de/cache/work/149/Nordicity_CED_VideoGamesImmersiveTechnologyStrategy_2020.pdf; in 2021, the Entertainment Software Association of Canada published an overview of Canada's video game industry, see: https://theesa.ca/wp-content/uploads/2022/10/esac-2021-final-report.pdf

25 For more information about these two datasets, see Appendix A.

Industry

The video game subindustry is the largest in Alberta, with approximately 97 firms across the province. This is followed by XR at 37, animation at 17, VFX and post-production at 16, and digital models, spatial data, and digital twins at 10.

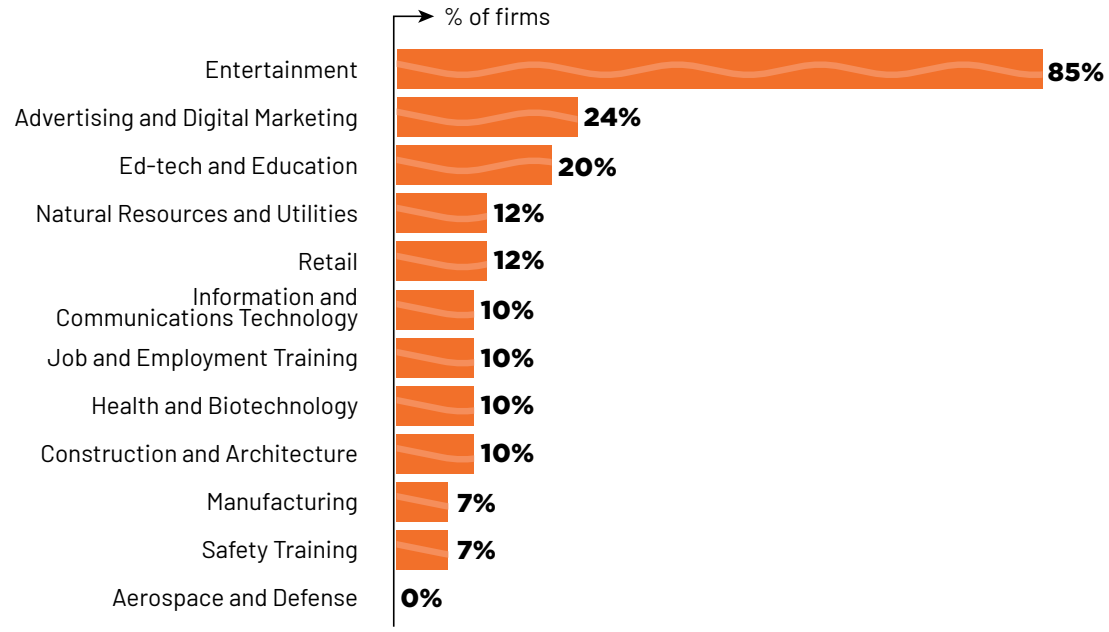
Figure 1: Alberta's IDM Distribution



Data source: ICTC Market Analysis

IDM firms often serve clients in other sectors. ICTC asked respondents to its industry survey which industries and sectors they most commonly serve. As seen in Figure 2, entertainment was the most common response, selected by approximately 85%. This was followed by advertising and digital marketing at 24% and ed-tech and education at 20%. The data highlights the importance of entertainment to IDM, yet also shows the breadth of industries where IDM work takes place.[26]

Figure 2: IDM Firms by Sector and Industry of Operation



Data source: ICTC Market Analysis Note: Survey respondents could self-classify in more than one subsector.

26 Importantly, this industry list is limited to those represented by the survey sample. For example, despite the defense and aerospace industries not being captured in the survey results, key informant interviewees identified IDM firms working in these industries.

Business Model

A previous study by ICTC find that most IDM firms can be categorized into one of three business models.[27]

- **Product-based** companies develop their own products or IP and then license or sell these as off-the-shelf products.
- **Service-based** companies provide services to clients for a fee, such as developing a tailored IDM solution and transferring the rights for what they produce to this external client.
- **Hybrid** product and service companies engage in a mix of both types of work.

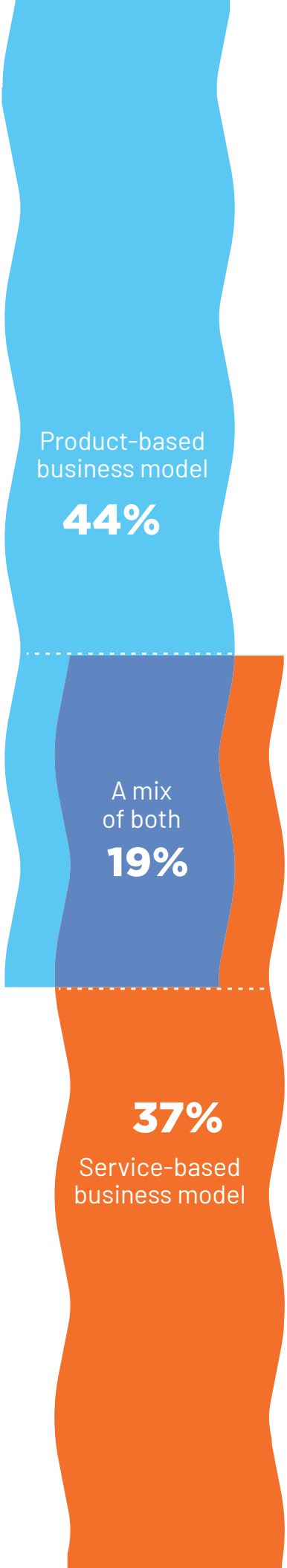
For example, a product-based company might develop its own video game or an XR-based learning platform. In contrast, a service-based company might create a custom XR training solution for an industrial client.

As shown in Figure 3, nearly half (43.9%) of the respondents to ICTC's industry survey indicated that they engage in product-based work, 36.8% indicated that they engage in a mix of product- and service-based work, and one-fifth (19.3%) indicated that they develop tailored solutions for clients.

When asked where their clients are located, approximately 85% of respondents indicated that they sell products and services to customers and clients outside of Alberta, including those in B.C., Ontario, the United States, Europe, and China. When asked how they sell their products to consumers in these distant locations, respondents noted the use of the Xbox Marketplace, Steam Marketplace, and other commonly used marketplaces and app stores.

Figure 3:
IDM firms by business model

Data source: ICTC's IDM industry survey



27 Tyler Farmer and Mairead Matthews, "Spanning the Virtual Frontier: Canada's Immersive Technology Ecosystem," August 2021, Information and Communications Technology Council (ICTC), https://ictc-ctic.ca/reports/spanning-the-virtual-frontier

Firm Size

Most IDM firms in Alberta and elsewhere in Canada are small, with a limited number of large firms accounting for most employment.[28]

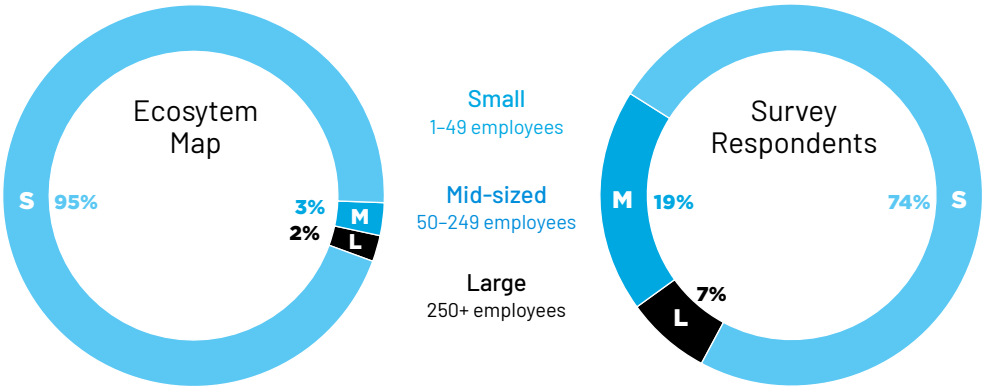
Micro firms (those with 1 to 4 employees) and small firms (those with 50 to 249 employees) may account for many entrepreneurs and sole proprietors in the IDM space.

One interviewee, a video game industry analyst, noted, "You can develop a game from anywhere in the world… and sell it to audiences anywhere in the world—in the United States, Europe, China, India."

IDM enjoys a relatively low barrier to entry: "Digital goods are very easy to [distribute]… you don't need supply chains, giant office spaces, or a huge number of people; with a small team of five or six people, you can sell a couple million copies of your game and generate $100 million in revenue."

ICTC's survey data suggests that Alberta's small IDM firms are growing. Among respondents to ICTC's industry survey, 42 provided employment estimates for the five-year period from 2019 to 2023. Over this time, 29 companies grew, 12 transitioned from micro-sized to small-sized, and three transitioned from small-sized to mid-sized.

Figure 4: IDM firms by size



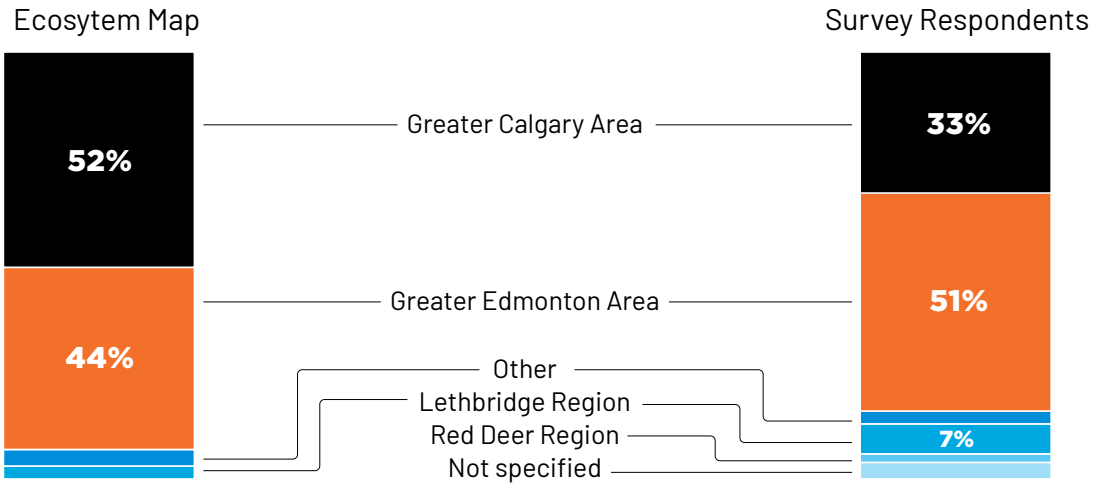
Regional Distribution

Though Alberta's rural digital economy is growing, Calgary and Edmonton account for most of Alberta's technology firms, a trend that applies to IDM and other industries like fintech, healthtech, and agri-food tech.[29] Figure 5 shows the locations of respondents to ICTC's industry survey and the firms included in ICTC's industry map. It shows that approximately 85% of respondents to ICTC's industry survey are located in either Edmonton or Calgary, with the remaining respondents being from Lethbridge (7%), Red Deer (1.5%), and elsewhere. Meanwhile, 52% of the companies included in ICTC's ecosystem map are headquartered in the Calgary area, 44% are headquartered in the Edmonton area, 3% are headquartered in Lethbridge, and 4% are headquartered elsewhere.

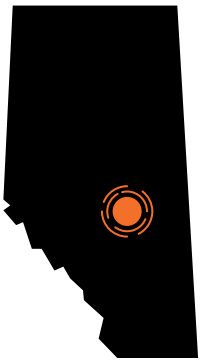
28 "The Alberta Game Development Industry," Digital Alberta, December 2015, https://digitalalberta.com/wp-content/uploads/2016/10/2015-Alberta-Video-Game-Industry-1.pdf

29 Alexandra Cutean and Mairead Matthews, "Seeding Rural Innovation: Nurturing the Tech Frontier in Alberta," Information and Communications Technology Council (ICTC), September 2023, https://ictc-ctic.ca/reports/seeding-rural-innovation

Figure 5: IDM firms by location



While Edmonton and Calgary combined account for the vast majority of Alberta's IDM firms and employment, the two markets are unique. Each specializes in different subindustries and sectors and has different types of anchor firms. These differences are explored in more detail in the sub-sections below.



Edmonton

Edmonton has served as the backbone of Alberta's IDM industry due to BioWare's early success in the late 1990s and early 2000s.[30] BioWare has since been acquired by one of the world's largest publishers, Electronic Arts; however, the brand and culture of BioWare has remained in Edmonton, achieving commercial success through franchises such as Anthem, Mass Effect, and Dragon Age.[31]

Many of the employees involved in BioWare's AAA operations launched their own studios in the Edmonton area, creating a cluster of video game developers in the region and solidifying Edmonton's role as a video game leader in Alberta. A critical mass of experienced video game and entrepreneurial talent in Edmonton has given rise to Beamdog, Inflexion, Humanoid Studios, and other innovative firms.

Edmonton's local ecosystem is further buoyed by the Edmonton Screen Industries Office, which supports local ecosystem development through its Strategic Initiatives Fund, Early Stage Project Grants, and Market Access Grants.[32]

30 "The Alberta Game Development Industry," Digital Alberta, December 2015, https://digitalalberta.com/wp-content/uploads/2016/10/2015-Alberta-Video-Game-Industry-1.pdf

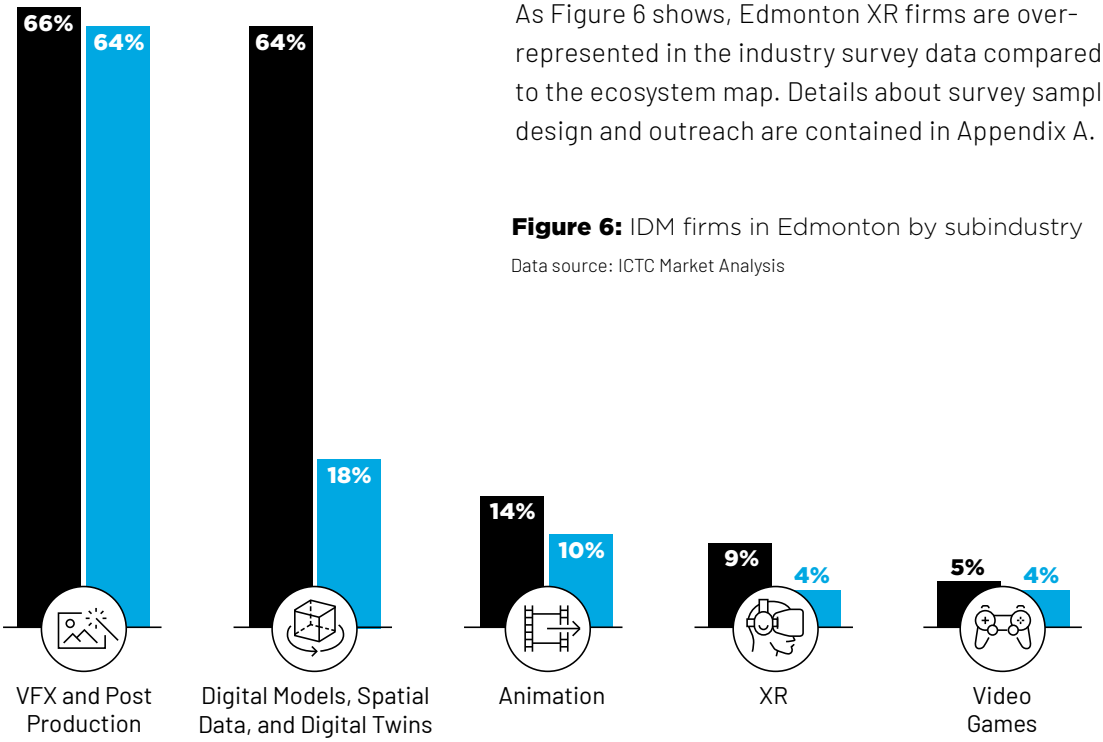
31 "Overview," BioWare, 2024, https://www.bioware.com/studios/bioware-edmonton/

32 "Funding Programs," 2024, Edmonton Screen Industries Office, https://edmontonscreen.com/funding/

One participant in this study commented that several Edmonton-based independent studios have used grants from these programs to attend international conferences like the Game Developers Conference and Gamescom conference, which allowed them to showcase their games, meet international publishers and investors, and gain new exposure.

Edmonton remains the video game hub of Alberta and is home to a combination of maturing and emerging video game firms. Edmonton is also the only city in Alberta home to medium and large video game studios, which act as anchor firms for the local industry.

According to ICTC's ecosystem map, while video game firms form the majority (64%) of Edmonton's IDM industry, other subindustries also have a presence in Edmonton. XR firms account for just under a quarter (18%) of IDM firms located in Edmonton, animation firms account for 10%, and VFX and post-production firms and firms focused on digital models, spatial data, and digital twins each account for 4%.



As Figure 6 shows, Edmonton XR firms are over-represented in the industry survey data compared to the ecosystem map. Details about survey sample design and outreach are contained in Appendix A.

Figure 6: IDM firms in Edmonton by subindustry

Data source: ICTC Market Analysis

As seen in Figure 7, approximately 95% of the IDM firms headquartered in Edmonton are small, with between 1 and 49 employees; 4% are mid-sized companies, with between 50 and 249 employees; and just 1% are large-sized firms with 250+ employees.

Figure 7: IDM firms in Edmonton by firm size

Data source: ICTC Market Analysis

Artificial Intelligence and IDM in Alberta

The Province of Alberta and the University of Alberta have invested in machine learning for over 20 years and have become a hub for top AI talent,[33] with Edmonton's Alberta Machine Intelligence Institute (Amii) being one of three national centres of AI excellence under the Pan-Canadian Artificial Intelligence Strategy.[34]

Key informant interviewees in this study were excited about the potential cross-fertilization of AI development and tools in IDM development. Many believe Edmonton can lead this charge, particularly when incorporating AI into game development. While the newness of generative AI will likely moderate the speed of its adoption,[35] game development is a costly, time-consuming practice. Generative AI can support independent developers, increase the scale of development, or reduce the likelihood of delayed releases. Although these technologies are in the preliminary stages across the globe, Edmonton's Artificial Agency is at the forefront of piloting machine learning technologies with video game studios to create intelligence-based responsive game environments.

The impact of generative AI on the IDM labour force is yet to be determined. One major international studio recently claimed that while generative AI is promising, there is still a long way to go before it replaces staff positions like dialogue writers.[36] Nevertheless, others in the industry point to the beginnings of task automation, where AI replaces tasks formerly completed by staff, meaning that fewer team members are required to accomplish the same work (an example is a new Ubisoft tool that generates the background chatter or "barks" from non-player-characters in video games).[37]

In September 2023, the SAG-AFTRA (Screen Actors Guild and American Federation of Television and Radio Artists) labour union sent a strike authorization to union members working with major video game companies, including Electronic Arts. Key issues included voice and performance capture that could be re-used by AI without requiring the re-hiring of stunt performers and voice actors.[38]

In short, IDM's reckoning with AI and its impact on the sector is beginning, and its lasting impact will depend on many factors, including labour protections. However, survey respondents in this study identified AI programming as an emerging role that will become more in demand in the future.

33 "Amazon Web Services, U of A team up to make the power of AI more accessible," University of Alberta, January 29, 2024, https://www.ualberta.ca/folio/2024/01/amazon-web-services-u-of-a-team-up.html

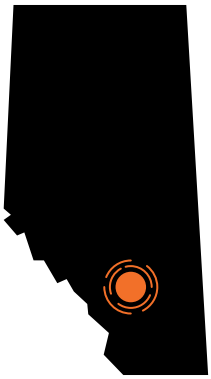
34 "Pan-Canadian Artificial Intelligence Strategy," Canadian Institute For Advanced Research, September 8, 2018, https://cifar.ca/ai/

35 Eric Bellomo and TJ Mei, "Gaming Report: VC trends and emerging opportunities," Pitchbook, May 2023, https://files.pitchbook.com/website/files/pdf/Q1_2023_Gaming_Report_13770.pdf

36 "Cyberpunk's quest director says CD Projekt Red has experimented with generative AI, but there's still a 'gigantic, really long way to go' before AI NPCs are as good as scripted characters," PC Gamer, March 29, 2024, https://www.pcgamer.com/games/rpg/cyberpunks-quest-director-says-cd-projekt-red-has-experimented-with-generative-ai-but-theres-still-a-gigantic-really-long-way-to-go-before-ai-npcs-are-as-good-as-scripted-characters/

37 Jonathan Ore, "AI could upend the video game industry. Developers worry it threatens their jobs," CBC Radio, September 23, 2023, https://www.cbc.ca/radio/video-games-artificial-intelligence-1.6974408

38 "SAG-AFTRA National Board Votes Unanimously to Send Interactive Media (Video Game) Strike Authorization Vote to Members," SAG-AFTRA, September 1, 2023, https://www.sagaftra.org/sag-aftra-national-board-votes-unanimously-send-interactive-media-video-game-strike-authorization



Calgary

While Edmonton serves as the launch point for Alberta's video game and other creative industries, Calgary is Alberta's digital economy hub.

Past research by ICTC suggests that about 80% of Alberta's financial technology firms, half of Alberta's healthcare technology firms, and half of Alberta's agri-food technology firms are headquartered in Calgary, compared to 16%, 40%, and 15% in Edmonton, respectively.[39] Calgary also accounts for about 60% of Alberta's digital economy employment versus 32% for Edmonton.[40]

While Edmonton has traditionally been the focus of Alberta's IDM industry, interviewees in this study noted that the number of independent firms located in Calgary is increasing. For example, while the only medium- and large-sized video game studios in Alberta are located in Edmonton, Calgary is home to a growing number of small independent studios.

Interviewees noted that Calgary has a sizeable film and television industry—including several animation and VFX studios—and leads the province in XR. Indeed, Calgary is home to homegrown companies like VizworX, which began as a University of Calgary research lab and is now a prominent XR employer. Calgary is also home to the international firm Unity (recently acquired by Capgemini), a large supplier of IDM development software globally.

Because Calgary leads Alberta in the number and proportion of other types of technology firms, such as financial, healthcare, and agri-food technology firms, Calgary has carved out a unique niche for itself. It supplies IDM products and services for entertainment purposes and to solve problems in industrial and commercial settings.

Unique to Calgary is the cross-fertilization between technologies and technology workers in different creative industries, as well as between creative and non-creative industries. Calgary also has a sizeable technology workforce to draw from and a variety of post-secondary institutions with technology-focused programs.

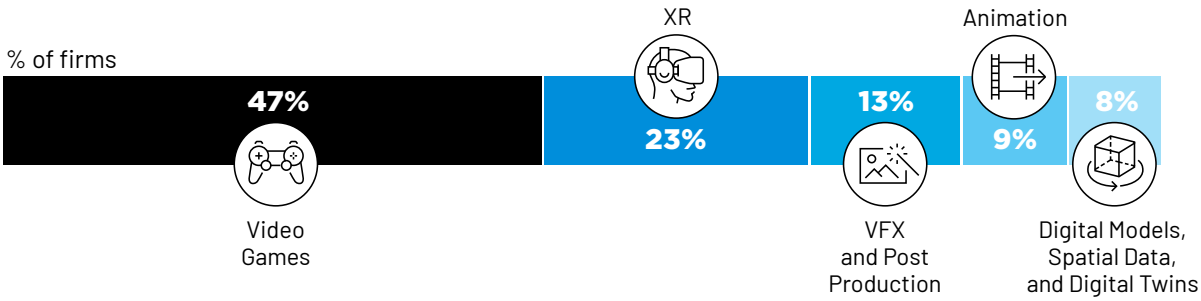
Video game firms account for approximately 47% of IDM firms headquartered in Calgary. XR firms account for 23%, VFX and post-production firms account for 13%, animation firms account for 9%, and firms focused on digital models, spatial data, and digital twins account for 8% (see Figure 8).

While video game companies comprise a high proportion of Calgary's IDM firms, many are sole proprietors or micro- or small-sized firms, meaning they have few employees. Because of this, XR accounts for the greatest proportion of Calgary's IDM employment (discussed further in Section II).

39 Alexandra Cutean, Mairead Matthews, and Mansharn Toor, "A Resilient Recovery: Alberta's Digital-Led Post-COVID Future," Information and Communications Technology Council (ICTC), June 2022, https://ictc-ctic.ca/reports/a-resilient-recovery

40 March 2024 data from the Labour Force Survey, Statistics Canada. ICTC analysis.

Figure 8: IDM firms in Calgary's by subindustry

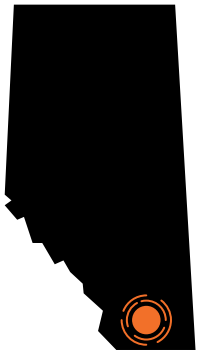


Data source: ICTC Market Analysis

As seen in Figure 9, approximately 96% of the IDM firms headquartered in Calgary are small, with between 1 and 49 employees; 3% are mid-sized companies, with between 50 and 249 employees; and just 1% are large-sized firms with 250+ employees.

Figure 9: IDM firms in Calgary's by subindustry

Data source: ICTC Market Analysis



Lethbridge

Lethbridge is Alberta's third-largest technology hub and is home to a handful of technology firms focused on IDM, healthcare technology, financial technology, and agri-food technology. It is also home to a burgeoning video game industry defined by small independent developers and micro-studios.

While, at present, Lethbridge has just a few companies focused on IDM, the region is experiencing new activity and aims to become an emerging hub for IDM technology in the coming years. One interviewee described Lethbridge as "unique" and important to watch, noting that the city fosters transference between new media companies focused on IDM and the region's traditional industries. For example, a local digital media production company recently teamed up with a Lethbridge tourism and hospitality organization to create an interactive web-based XR app that enables potential visitors to explore the city of Lethbridge and its surrounding areas.[41]

41 "Digital media company drawing attention to Lethbridge," Lethbridge Herald, June 7, 2023, https://lethbridgeherald.com/news/lethbridge-news/2023/06/07/digital-media-company-drawing-attention-to-the-lethbridge/

A collection of new, IDM-focused programs at Lethbridge College and the University of Lethbridge is fostering Lethbridge's entrance into the IDM industry.

In the fall of 2019, Lethbridge College launched two new programs focused on IDM: a two-year diploma in architectural animation technology and a one-year certificate in virtual and augmented reality.[42] The college is also home to the Spatial Technologies Applied Research and Training Centre (START), which partners with technology firms in Southern Alberta to develop XR solutions for local industries, including agriculture, energy, architecture, healthcare, cultural heritage, and emergency response.[43] In October 2023, the centre received new funding through Alberta Innovates' Ecosystem Development Partnerships Program, which will enable them to expand their programs, improve their facilities, and increase the potential for IDM innovation in the Lethbridge community.[44] The University of Lethbridge offers a Bachelor of Fine Arts (BFA) program in New Media, which seeks to equip graduates with professional skills in IDM technology alongside design and artistic acumen and includes a 300-hour internship with a new media employer.[45] The new media BFA program can be combined with other undergraduate degree programs in education, computer science, and management.

42 "Lethbridge College Launches Two New Tech-Based Programs (press release)," Lethbridge College, April 2, 2019, https://lethbridgecollege.ca/news/announcement/lethbridge-college-launches-two-new-tech-based-programs

43 "Spatial Technologies Applied Research & Training (START)," Lethbridge College, accessed May 3, 2024, https://lethbridgecollege.ca/departments/centre-for-applied-research-and-innovation/start

44 "Alberta Innovates invests $13.6 million to strengthen Alberta's technology sector," GlobeNewswire, August 22, 2023, https://www.globenewswire.com/news-release/2023/08/22/2729838/0/en/Alberta-Innovates-invests-13-6-million-to-strengthen-Alberta-s-technology-sector.html

45 "Career Bridge: New Media," University of Lethbridge, accessed May 3, 2024, https://www.ulethbridge.ca/career-bridge/new-media

SECTION II

Labour Market Trends in Alberta's Interactive Digital Media Industry

Alberta is home to one of Canada's fastest-growing digital economy labour markets. Over the past five years, employment in Alberta's digital economy has grown by more than 5% annually, and in March 2024, an estimated 253,600 Albertans were employed in the province's digital economy.[46]

This section of the report highlights labour market trends in the province's IDM industry.

First, Section II discusses **employment**: the number of people employed in the IDM sector in Alberta today and trends in employment growth. Second, it examines **hiring** and **in-demand roles and skills** using data from the employer survey and job posts.

46 The digital economy is the sum of all professionals working in ICT professions and/or in the ICT sector. For the most recent labour market on the digital economy, see: https://etalentcanada.ca/; "eTalent Canada: Alberta," Information and Communications Technology Council (ICTC), March 2024, https://etalentcanada.ca/locations/alberta

Employment Trends

The size of the IDM sector can be challenging to estimate because of data limitations. Employment in the IDM industry is not tracked at the federal or provincial levels in Canada.

ICTC used two approaches, each with its own benefits and limitations, to estimate the size of Alberta's IDM industry.

The first, which uses a market map of identifiable firms in the province, suggests that approximately 4,500 people are employed in Alberta's IDM industry as of 2024.

The second, which uses Statistics Canada's Labour Force Survey, estimates that approximately 5,200 Albertans currently work in a subset of IDM roles but does not capture administrative roles within IDM firms.

While each approach has its limitations, the two approaches combined provide a rough estimate of the size of Alberta's IDM workforce. These approaches and their respective limitations are described in more detail below.

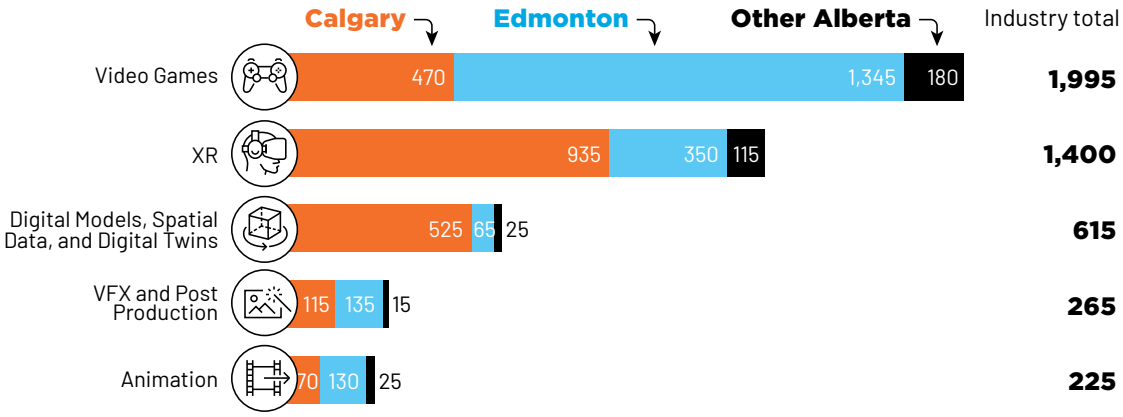
Employment by Subsector Based on ICTC's IDM Industry Survey and Ecosystem Map

The first approach is based on data from ICTC's IDM industry survey and ecosystem map. While using detailed data about the number of firms and employment in Alberta's IDM industry, this approach likely underestimates IDM employment: ICTC is unlikely to have identified all the firms that operate in Alberta's IDM industry—particularly those that employ Albertan workers remotely—and is therefore unlikely to have accounted for all relevant firms. An added challenge is that not all firms that utilize IDM technology operate in the "IDM industry" per se. Individuals who implement IDM technology in an industry other than IDM—such as oil and gas, manufacturing, or mining—are excluded from the estimate.

According to ICTC's industry survey and ecosystem map, Alberta's IDM industry employs an estimated 4,500 workers. Video games account for the greatest proportion of estimated employment, equal to 1,995 or 44%. This is followed by XR, which accounts for 1,400 or 30% of IDM roles in the province; digital models and digital twins, which account for 615 or 14%; VFX and post-production, which account for 265 or 6%; and animation, which accounts for 225 or 5%.

As seen in Figure 10, employment trends in Calgary and Edmonton differ. While video games account for the greatest proportion (66%) of IDM roles in Edmonton, this figure is just 22% for Calgary. As discussed in Section I, this is likely due to Edmonton having a greater representation of medium- to large-sized firms and Calgary having a greater representation of small, independent video game companies. In Calgary, XR is the largest employer, accounting for 44% of IDM roles. There is also a greater representation of firms focused on digital models and digital twins in Calgary than in Edmonton.

Figure 10: Estimated employment in Alberta's IDM industry



Data source: ICTC Analysis

Employment Estimate and Outlook Based on Statistics Canada Labour Force Data

The second approach is based on employment data from Statistics Canada's Labour Force Survey (LFS). This approach enables ICTC to account for nearly all individuals employed in a subset of IDM roles in Alberta's IDM industry, including individuals employed locally by Alberta-based IDM firms and remotely by firms located outside Alberta. That said, it does not account for individuals employed in non-IDM roles, such as administrative roles related to finance or HR. It also risks capturing employment in digital economy industries that are adjacent to IDM: this is because Statistics Canada's occupation classification codes (which disaggregate LFS data by occupation) and industry classification codes (which disaggregate LFS data by industry) do not align perfectly with how the industry defines IDM.

According to Statistics Canada's Labour Force Survey (LFS), as of March 2024, the IDM industry in Alberta employed approximately 5,200 IDM workers in select technical, creative, and design roles as well as a few other in-demand occupations captured through ICTC's employer survey (see Appendix for detailed methodology).[47]

Although Alberta's IDM industry is small—representing just 0.2% of Alberta's employment—it has more than doubled since 2006, with most of its gains in employment coming after 2015.[48] Moreover, between 2006 and 2024, IDM employment grew at an average annual rate of 4.8% compared to 1.5% for the province's overall economy in Alberta.[49]

ICTC forecasts that tech employment in the IDM industry, having made a strong recovery from the COVID-19 shock in 2020-2021 and surging to new highs at the end of 2022, will continue to grow faster than the general economy in Alberta in the coming years.

47 This figure differs from the ecosystem and market employment estimate explored in Section I because while this analysis only looks at technical, creative, and design talent, it does not include many administrative and support roles. Additionally, because of the design and grouping of the NOC codes and NAICS codes, it is difficult to perfectly subset the Labour Force Survey (LFS) data only to include IDM talent in IDM companies. It's possible that some individuals included in the estimate may not meet the definition of IDM outlined in this paper, potentially leading to overestimation.

48 Monthly LFS Data, Statistics Canada, ICTC calculations.

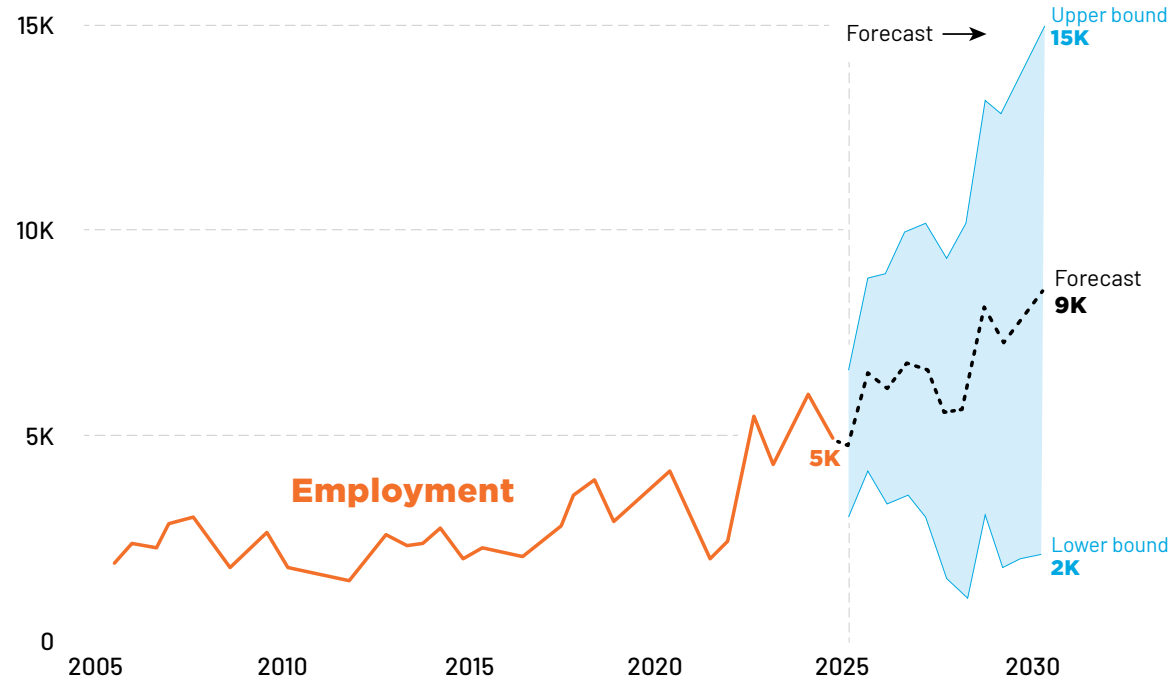
49 Ibid.

Figure 11 illustrates the historical and forecasted trends under a baseline scenario. The forecast projects that the IDM industry in Alberta could add as many as 3,500 new jobs by 2030.[50]

Confidence intervals, depicted by the shaded blue areas, account for unexpected economic fluctuations and industry changes that impact employment, such as layoffs, studio closures, changes in funding accessibility, availability of wage subsidies, and various other factors.[51] For example, this could include strong demand in other sectors, which could impact the talent supply available in the IDM industry. Alberta's growing digital economy,[52] especially in hubs like Edmonton and Calgary, could pose a risk to the IDM labour supply should the same skills (e.g., programming, software engineering) be needed in other areas of the digital economy.

Importantly, forecasts should be interpreted as estimates subject to uncertainties in the underlying data, such as the number of people presently employed in the IDM industry. The industry's talent growth trajectory is also likely to change depending on economic conditions and factors affecting Alberta and its IDM industry.

Figure 11: IDM employment in Alberta's IDM industry (forecast), 2006 – 2030

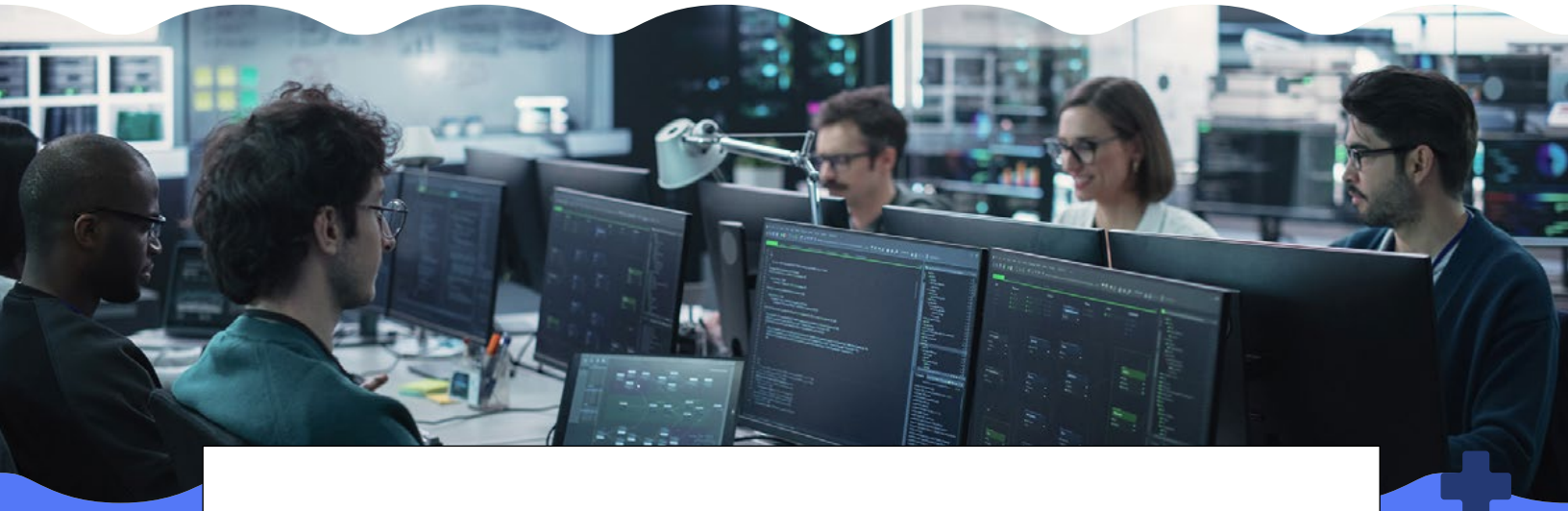


Data source: ICTC, Statistics Canada

50 These forecasts are built upon estimates of historical employment levels going back to 2006. The Figure 11 displays the 6-month averages during the period studied to account for the high volatility in monthly employment data.

51 Alexandra Cutean, Todd Legere, Trevor Quan, Justin Ratcliffe, and Faun Rice, "Ontario's Next Gen Industry: Addressing Labour Demand and Growth in the Creative Technology Sector," Information and Communications Technology Council (ICTC), February 2023, https://ictc-ctic.ca/reports/ontarios-next-gen-industry

52 "eTalent Canada," Information and Communications Technology Council (ICTC), accessed March 2024, https://etalentcanada.ca/locations/; Alexandra Cutean and Ryan McLaughlin, "A Digital Future for Alberta: An Analysis of Digital Occupations in Alberta's High-Growth Sectors," Information and Communications Technology Council (ICTC), June 2019, https://www.digitalthinktankictc.com/reports/a-digital-future-for-alberta



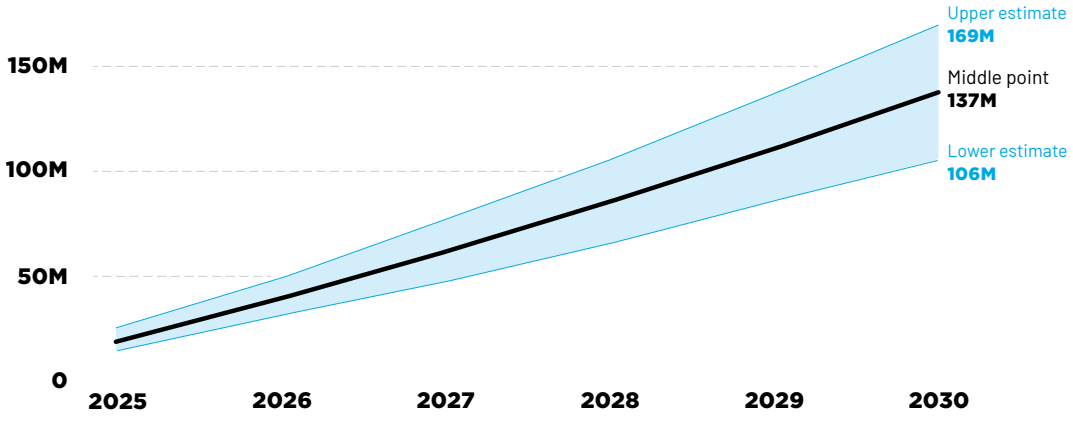
Employment Demand and the Economic Contribution of Alberta's Growing IDM Industry

Adding new jobs to a growing industry creates a ripple effect of economic benefits.

Adding new jobs can increase income levels, consumption of goods and services, and tax revenues to the federal and provincial governments. A growing workforce can attract more businesses to the area, leading to further economic expansion and investment. It can also foster innovation and the development of new technologies, products, and services, further driving economic growth.

In 2019, before the onset of the COVID-19 pandemic and subsequent digital economy boom, Alberta's IDM industry was estimated to generate between $50 and $80 million in annual GDP.[53] Since then, digital economy employment in Alberta has grown by a compound annual growth rate of 6.5%, outpacing employment growth in technology hubs like Ontario, B.C., and Québec and increasing how much digital economy industries like IDM contribute to provincial GDP.[54] As seen in Figure 12, new employment in IDM roles could contribute an additional $106M to $169M to Alberta's GDP over the next five years, should potential employment gains be realized (see Appendix A for methodology).[55]

Figure 12: GDP Projections 2025-2030



Data source: ICTC, Statistics Canada, Province of Alberta

While the estimate is useful for illustrating the potential economic value of employment growth in Alberta's IDM industry, it is also subject to several limitations.

First, the GDP estimate is conditional on expected growth in IDM employment materializing. Should employment change, GDP contribution would change as well. Second, while the upper and lower bounds provide additional insight, the actual GDP contribution from employment growth will likely fall between the two values. Third, GDP estimates are subject to external forces, which can be difficult to predict. For example, an economic recession or a boom in the tech sector that spurs innovation, increases business investment, and yields productivity gains could reduce or increase the amount of GDP each worker generates, impacting the industry's total GDP.

Finally, the estimate does not capture the clustering and spillover effects that come from additional growth in the IDM sector. Growth in one industry tends to have multiplier effects in other industries that benefit the entire economy. Indeed, Innovation, Science and Economic Development (ISED) Canada estimates that for every job created in the information and communications technology (ICT) sector, 1.3 jobs are generated in the economy overall.[56] Similarly, an extra $0.862 is generated elsewhere in the economy for every dollar added to the ICT sector's GDP.

Assuming the same multipliers can be applied to IDM, 3,500 new jobs in Alberta's IDM industry could generate 5,250 jobs for the economy overall. Likewise, an additional $137 million in IDM industry GDP would generate an additional $118 million for the economy overall.

53 Alberta Department of Economic Development and Trade, "Annual Report 2018-2019," Province of Alberta, June 7, 2019, https://open.alberta.ca/dataset/ce036ce2-cea1-4e15-86c3-8c2a959f14ac/resource/8a111a82-0b39-4667-b56b-11eb7a2508e1/download/economic-development-and-trade-nnual-report-2018-2019-web.pdf; Timothy Lane, "The digital transformation and Canada's economic resilience," Bank of Canada, June 2021, https://www.bankofcanada.ca/2021/06/digital-transformation-canada-economic-resilience/; J. Clement, "COVID-19 impact on the gaming industry worldwide - Statistics & Facts," Statista, February 2024, https://www.statista.com/topics/8016/covid-19-impact-on-the-gaming-industry-worldwide/#topicOverview

54 Growth from March 2019 to March 2024 using a Compound Annual Growth Rate (CAGR); "eTalent Canada," Information and Communications Technology Council (ICTC), accessed March 30, 2024, https://etalentcanada.ca/locations/

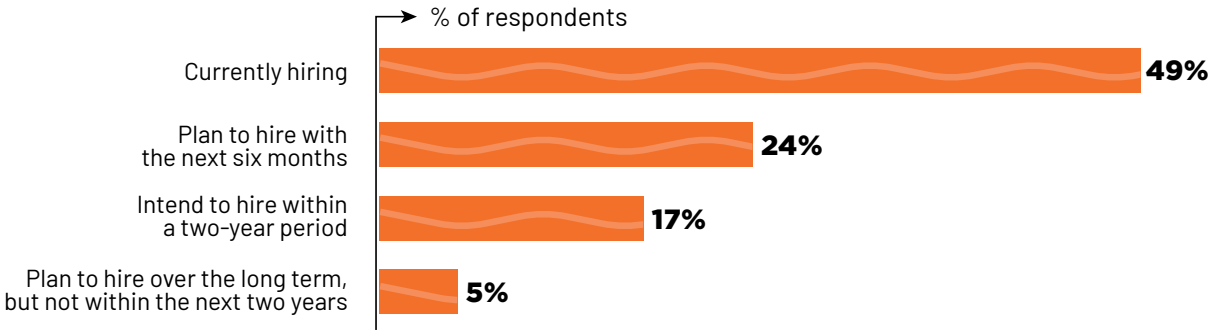
55 According to Statistics Canada's Labour Force Survey data and ICTC estimates, in 2019, there were approximately 6,000 employees working in the IDM sector. Based on these numbers, the GDP per worker ranges from $8,300 to $13,300. These estimates were used to understand additional economic activity associated with each additional worker employed in the IDM sector.

56 "2021 Canadian ICT Sector Profile," Innovation, Science and Economic Development Canada, 2022, https://ised-isde.canada.ca/site/digital-technologies-ict/sites/default/files/attachments/2022/ICT_Sector_Profile2021_eng_0.pdf

Hiring Trends

ICTC's survey data suggests that Alberta's IDM labour market is active. ICTC asked respondents of the industry survey about their future hiring plans. Of the 41 respondents that answered this question, 49% were currently hiring, 24% planned to hire within the next six months, 17% had intentions to hire within two years, and 5% aspired to hire over the long term.[57]

Figure 13: Hiring plans among survey respondents

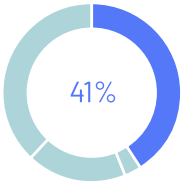


Data source: ICTC industry survey

In-Demand Roles and Skills

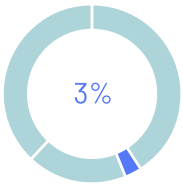
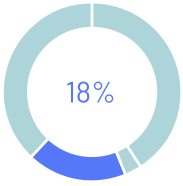
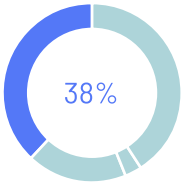
To identify the most in-demand roles in Alberta's IDM industry, ICTC used a combination of job postings and survey data. While many IDM employers report hiring using word-of-mouth referral networks, many jobs are still posted in Alberta's IDM sector. Between the last week of June 2023 and the first week of February 2024, ICTC gathered weekly snapshots of job postings and compiled a dataset of jobs posted in the province, grouped by function. ICTC also asked survey respondents to identify their top 5 most in-demand roles. As Table 1 shows, the IDM industry hires across a range of expertise, including technical, artistic and creative, design, and operational talent.[58]

Table 1: Job Scraped Data by Job Categories

Job Category	Sample of job titles from job postings and survey data	Share of job postings	Number of roles identified in survey
Technical Roles	Software developer Effects technical director Rigging technical director Creature technical director Engine operator Systems director VR/AR programmer Gameplay programmer Artificial intelligence programmer Network programmer QA engineer Graphics programmer		39

57 These 41 respondents represent 57% of those surveyed.

58 Sample job titles were taken from the web scraping and verified and supplemented with in-demand job titles from the survey and key informant interviews. Other research also corroborates this finding. See: Alexandra Cutean et al., "Ontario's Next Gen Industry: Addressing Labour Demand and Growth in the Creative Technology Sector." ICTC. February 2023.

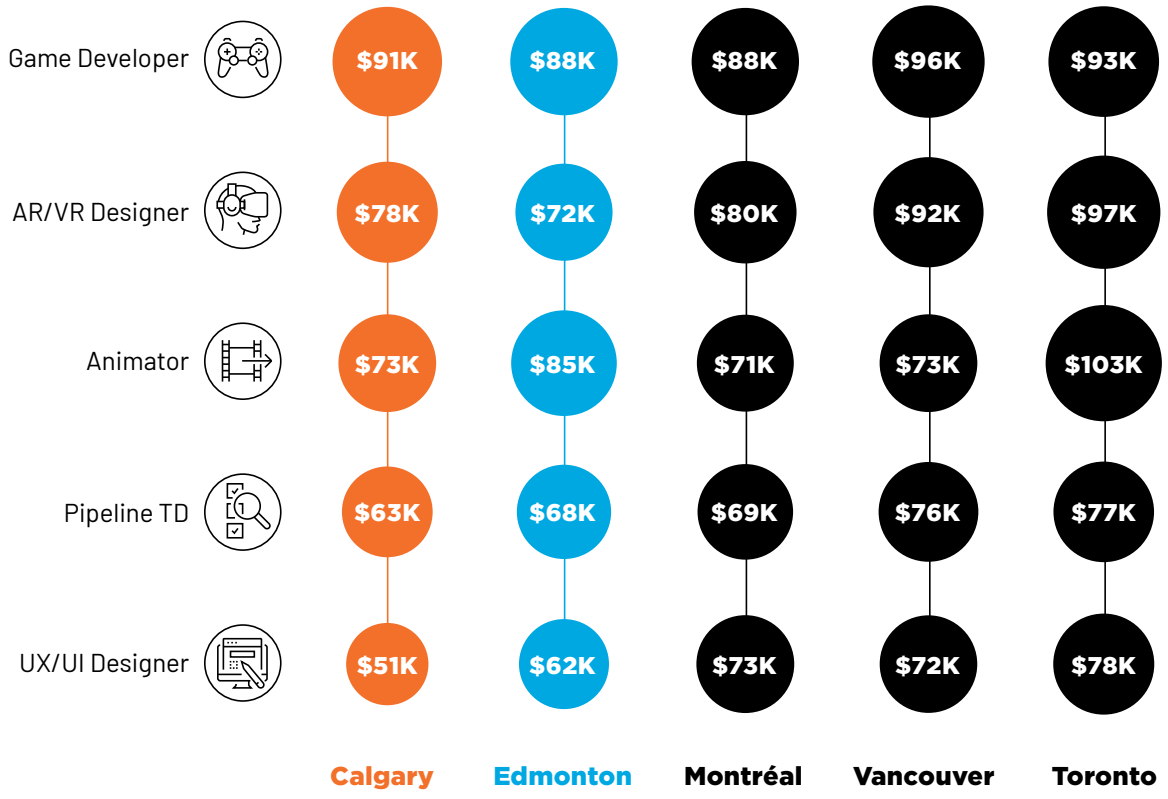
Job Category	Sample of job titles from job postings and survey data	Share of job postings	Number of roles identified in survey
Artistic and Creative Roles	Technical artist Animator Concept artist Modelling artist Environment artist Lighting artist Computer graphics supervisor Layout artist Rigger 3D modeler 3D artist 2D artist Creative writer Digital artist		24
Design Roles	Narrative designer Compositor VFX producer Production manager Gameplay designer Combat designer Environment designer Narrative designer Level designer UX/UI designer Games writer Sound designer		18
Operational Roles	Production manager Community manager Runner Business development specialist Business development manager Client partnership manager Coordinator Logistics manager Digital support agent HR roles Finances and sales roles Marketing assistant Marketing and communications specialist		25

Salary Trends

Using data from ICTC's eTalent Canada website, ICTC compiled mid-level salary information for five common IDM roles: game developer, VR/AR designer, animator, pipeline technical director, and UX/UI designer. As seen in Figure 14, the mid-career position that earns the highest average salary in both Calgary and Edmonton is game developer. This is followed by VR/AR designers in Calgary and animators in Edmonton.

While larger ecosystems like Toronto and Vancouver have a higher average salary for most IDM roles, Edmonton notably ranks second when it comes to the average salary provided to mid-level animators. Calgary's average salary for mid-level video game developers is also competitive compared to other Canadian ecosystems.

Figure 14: Average salary for mid-level IDM roles in Calgary, Edmonton, Montréal, Toronto, and Vancouver



Data source: eTalent Canada

Technical Roles and Skills

In terms of technical expertise, the IDM industry relies on roles like programmers, software developers/engineers, and rendering experts. Below is a list of the most in-demand technical roles in the IDM industry and the top ten most in-demand skills for each role.

Software Developer

C++
JavaScript
Unity
C#
JavaScript
Python
Angular
React
SQL

Rigging Technical Director

Maya
Python
3D Studio Max
Blender
MEL
MotionBuilder
Houdini
ZBrush
Unity
Unreal Engine

Engine Operator

Unity
C#
C++
Unreal Engine
Photoshop
Java
JavaScript
Python
Maya
SQL

Effects Technical Director

Maya
Unreal Engine
Unity
Houdini
Blender
Nuke
Substance Painter
Shake
Renderman
PFTrack

Creature Technical Director

Maya
ZBrush
Substance Painter
Houdini
Unreal Engine
Unity
Blender
Marvelous Designer
3D Studio Max
Mudbox

Systems Director

C++
Java
C#
Unity
Unreal Engine
Git
Jira
Perforce
JavaScript
Linux

VR/AR Programmer

Unity
C#
Python
C++
JavaScript
Java
Blender
Unreal Engine
Maya
3D Studio Max

AI Programmer

C++
C#
Unity
Python
Java
JavaScript
Unreal Engine
Perforce
C
SQL

QA Engineer

Jira
Photoshop
Unity
C#
Python
Unreal Engine
SQL
Java
JavaScript
C++

Gameplay Programmer
Unity
Perforce
Photoshop
Unreal Engine
C#
Maya
C++
Visio
Java
Jira

Network Programmer
C++
Java
C#
Python
SQL
Linux
Unity
JavaScript
Perforce
Git

XR and IDM in Alberta

Alberta's XR firms have carved out a niche for themselves, building on the province's original strength in video games.

In this study, interviewees noted how, when the province's XR industry was first emerging, many firms benefitted from being able to adopt talent from the video game industry and upskill them internally to develop new knowledge and skills related to XR. For example, while traditional video game developers create products for consumption on a 2D screen, XR developers build content for an immersive, 3D environment. This may mean learning how to develop content with greater degrees of freedom (a measure of how an object moves through space), discovering how to use spatial audio, or becoming familiar with best practices for reducing headset fatigue. It also requires developers to learn how to work with new types of hardware, such as XR headsets and controllers. As one Alberta technologist working in XR observes:

> *There's a 90 to 95% overlap between XR development and gaming. So, it's a very, very quick transition and because [we already had a strong video game industry,] some of our early VR/AR founders in Alberta had an early advantage in that field.*

Still, XR firms' ability to hire video game talent can depend on how the technology is applied. For example, one interviewee who builds industrial XR solutions using game development software shared that just because someone is familiar with video game software does not mean they can jump into production as soon as they're hired.

Entertainment-focused XR solutions can have a lot in common with video game development, but for industrial applications, additional technical skills and domain knowledge are needed beyond being able to program the final product:

> *We are building software solutions… we may use a gaming platform as a core tool for building our solutions, but the solutions are being developed for an operational or training need … which changes the type of talent we need. In the gaming environment, a lot of the focus is on content generation-oriented skillsets, whereas in our case, a lot of the skillsets are related to the commercial uses of [IDM] technologies… How do you bring a fully operational control room into an immersive environment, enable people to interact with complex visualizations and be able to draw, and enable them to operate their facility more effectively as a result of that?*

While the existence of transferable skills between the XR and video game industries opens a broader range of job opportunities to talent with these skills, some upskilling may be needed before becoming "production-ready."

Artistic and Creative Roles and Skills

On the creative side, the IDM industry requires artists and animators to design and animate the different kinds of visuals included in IDM products, including environments, characters, objects, textures, and anything that contributes to the overall visual appeal. While artistic and creative roles account for approximately 25% of the roles that survey respondents identified as in-demand, they comprise just 3% of the job postings that ICTC captured during the web-scraping period. Interviewees suggested a strong tendency to hire artistic and creative workers through informal hiring networks instead of job postings—driving a "hidden job market" for artistic and creative roles. While ICTC's survey did not ask survey respondents how difficult they find it to fill artistic and creative roles, past research about Alberta's animation and VFX industry suggests creative roles are hard to fill.[59]

3D Modelling Artist	Character Rigger	Environment Artist
Maya	Maya	Maya
ZBrush	Photoshop	ZBrush
Substance Painter	Python	3ds Max
After Effects	MEL	Photoshop
Illustrator	ZBrush	Substance 3D Designer
3ds Max	After Effects	Substance 3D Painter
Unreal Engine	Premiere Pro	Unreal Engine
Blender	Unity	Mudbox
Unity	3ds Max	Unity
Premiere Pro	Unreal Engine	Nuke

59 Nordicity, "Key Frames: A Growth Strategy for Animation and VFX in Alberta," Edmonton Screen Industries Office and Calgary Economic Development, 2023, https://www.calgaryeconomicdevelopment.com/assets/Reports/Sectors/Digital-Media-Entertainment/CED-2023_Animation_Visual_Effects_Strategy-Full-Report.pdf

Technical Artist

Maya
Photoshop
3ds Max
Preforce
Unity 3D
ZBrush
JavaScript
MotionBuilder
ActionScript
Unreal Engine

Concept Artist

Maya
Illustrator
After Effects
ZBrush
InDesign
Premiere Pro
KeyShot
Nuke
Blender
TVPaint

Computer Graphics Supervisor

Maya
Nuke
Photoshop
After Effects
Mental Ray
3ds Max
ZBrush
Houdini
RenderMan
Mudbox

Modelling Artist

Maya
Unreal Engine
Unity
Houdini
Blender
Nuke
Substance Painter
Shake
Renderman
PFTrack

Lighting Artist

Maya
ZBrush
Substance Painter
Houdini
Unreal Engine
Unity
Blender
Marvelous Designer
3D Studio Max
Mudbox

Animator

C++
Java
C#
Unity
Unreal Engine
Git
Jira
Perforce
JavaScript
Linux

Layout Artist

Maya
Photoshop
After Effects
Illustrator
Premiere Pro
Nuke
ZBrush
Toon Boom
3ds Max
Unreal Engine

Design Roles and Skills

The IDM industry relies on design roles like compositor, production manager, level designer, and narrative designer. Design professionals are essential for storytelling, building the user experience, and curating playthrough.

Compositor

Technical Skills
Nuke
Maya
Photoshop
After Effects
Premiere Pro
Mocha
PFTrack
Shake
ZBrush
Houdini

Production Manager

Technical Skills
Photoshop
Final Cut Pro
Premiere Pro
Graphic Design
Adobe Creative Suite
After Effects
Illustrator
Avid Media Composer
Customer Relationship Management (CRM)
InDesign

Level Designer

Technical Skills
Maya
Unreal Engine
Unity 3D
Jira
C#
Blender
ZBrush
Premiere Pro
GameMaker
Mudbox

Game Writer

Technical Skills
Unity
Unreal Engine
Twine
inklewriter
ChatMapper
articy:draft
Perforce
Scrivener
Git
Lua

Narrative Designer

Technical Skills
Unity
Unreal Editor
Unreal Engine
Photoshop
Twine
inklewriter
Yarn Spinner
articy:draft
C++
C#

VFX Producer

Technical Skills
Photoshop
Final Cut Pro
After Effects
Nuke
Maya
Premiere Pro
Illustrator
Avid Media Composer
Shotgun
Shake

Gameplay Designer

Technical Skills
Unity
Unity 3D
Perforce
Photoshop
Unreal Engine
C#
Maya
3ds Max
C++
Godot

UX/UI Designer

Technical Skills
Photoshop
Unity
Sketch
Unreal Engine
Adobe XD
Axure RP
InDesign
JavaScript
Blender
Premiere Pro

Sound Designer

Technical Skills
Pro Tools
Wwise
Logic Pro X
Unity
SFX Libraries
FMOD
Ableton
REAPER
Unreal Engine
Perforce

Operational Roles and Skills

Finally, the IDM industry relies on a broad range of operational roles to guide operations, business development, marketing and communications, market analysis, sales forecasting, demand planning, logistics, and player and community support. These include human resources managers, marketing and communications specialists, business development managers, logistics coordinators, support specialists, and community managers.

During this study, research participants often commented on how difficult it is to find talent that is skilled in their respective operational domain and has a good understanding of IDM or its subindustries, such as video games or XR.

For example, a technically sophisticated, creative, and fun-to-play game will not necessarily be successful in a saturated and fast-moving market without appropriate marketing and communications support. Video game marketing professionals need robust marketing and communications skills and a deep understanding of video game culture, markets, creators, and players.

This includes being able to promote games leading up to and following their release; attend launch events, trade shows, and conventions; localize promotional materials to different regional contexts; engage in traditional and social media monitoring; and build and manage relationships with journalists, social media influencers, reviewers, streamers, and high-profile fans. The ability to develop and manage these types of relationships in an authentic way was seen as crucial for success. As one interviewee noted, "[professionals in the industry] can tell when they get an email from someone who's into gaming" compared to "someone who's not interested."

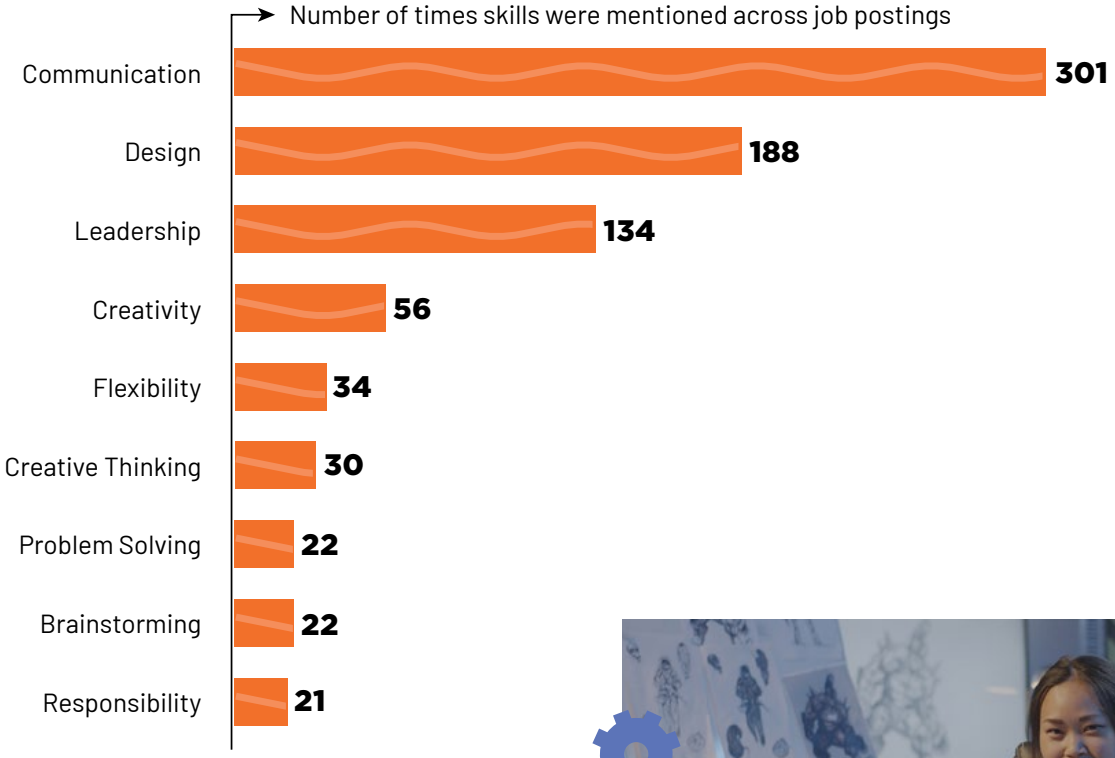
With respect to the gaming industry, others emphasized the importance of having "gamer knowledge." Video game marketers and communicators should understand different genres, major franchises, and the social and online contexts in which video games are consumed. This includes an innate understanding of different social media and streaming platforms such as YouTube, Facebook, X, Instagram, Twitch, and Discord, how content is monetized, how to partner with content creators, how to engage with users in comment sections, threads, communities, and other online spaces, and how to craft compelling content that will find organic engagement and success. With many major game titles becoming evergreen products, with regular expansions, downloadable content (DLC), season passes, and in-game events, marketing and communications professionals and community managers need to be able to provide support across a game's entire lifecycle.

Some interviewees indicated that they hire operational roles in-house, while others indicated that they outsource these functions to external service providers, such as consulting firms specialized in public relations, marketing, or communications. Marketers and communicators working directly for smaller studios and promoting smaller titles may be part of a small team—or even a team of one—and be required to use limited resources to achieve the above outcomes.

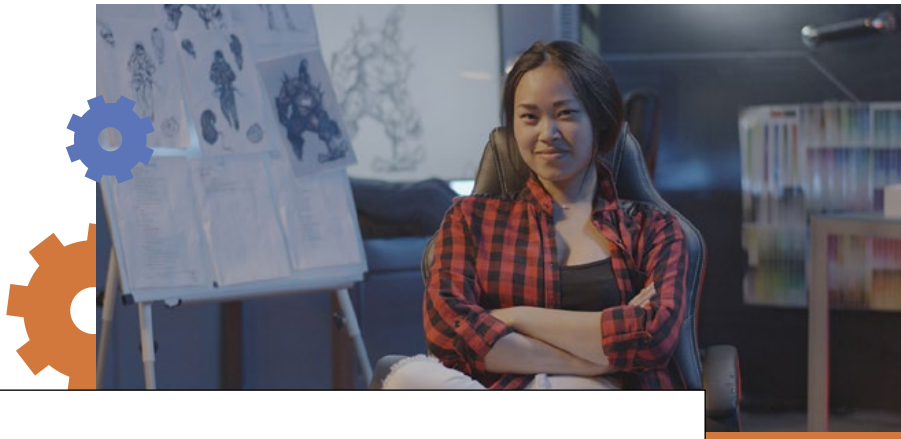
Human Skills

Building on the above technical skills, ICTC used job postings data to identify the top ten most in-demand human skills in Alberta's IDM industry. As seen in Figure 15, the most in-demand skill was communication, mentioned in 301 job postings. This was followed by design (mentioned in 188 job postings), leadership (mentioned in 134 job postings), and creativity (mentioned in 56 job postings).

Figure 15: Top ten most in-demand human skills across IDM job postings



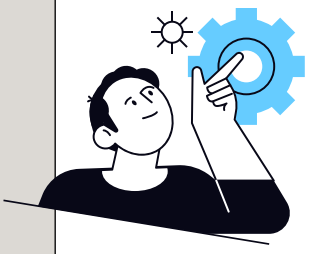
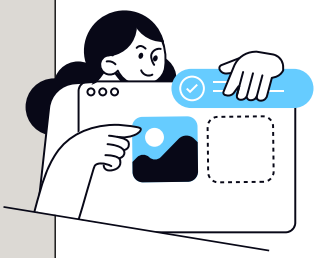
Data source: Job postings data, ICTC analysis



The Mechanics of an IDM Team

Video Games

In Alberta's IDM ecosystem, team composition can vary depending on studio type, size, business models, and clients. At video game studios, a common team structure can be characterized by a blend of technical, artistic/creative, and design roles. The following is a snapshot of common roles at video game studios, their responsibilities, and their interactions with one another.

Category	Role	Core responsibilities
Technical	Gameplay Programmer	**Coding:** building the core mechanics and infrastructure of a game **Scripting:** developing code for specific higher-level tasks/scenarios in a game, including story triggers, character interactions **Debugging:** finding and fixing bugs development bugs
	Engine Operator	**Engine operation:** building and/or maintaining game engine (e.g., Unity) **Engine optimization:** optimizing performance, including managing elements critical for smooth gameplay like speed, response time, etc. **Debugging:** finding and fixing bugs in engine code
Artistic/Creative	Technical Artist	**Pipeline development:** designing workflows to take a game from concept to implementation **Visual asset optimization:** balancing visual quality and speed, including graphic refinement, shader optimization, and mesh optimization **Rendering:** optimizing shading, lighting, and texture
	Character Rigger	**Rigging:** creating the characters' skeleton, including character anatomy and movements **Skinning:** attaching 3D "mesh" to the rig; the mesh serves as the "skin" of the character **Testing:** ensuring realistic visual display of the character in different scenarios and movements
Design	Level Designer	**Level conceptualization:** creating layout/ flow based on narrative, game mechanics; balancing level difficulty, cadence, etc. **Mapping:** developing player paths, obstacles, interactive elements for each level **Prototyping:** developing testable level prototypes, and using player feedback to iterate level design
	Narrative Designer	**Story development:** developing plots and character arcs **Writing:** writing dialogue for characters, and other narratives, including backstories **World building:** developing the game setting, e.g., history, backstories, environment **Game integration:** working with level designers and gameplay programmers to weave narrative that matches levels and game experience

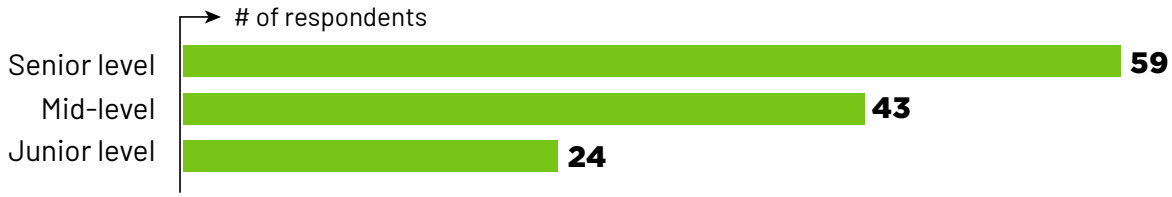
Seniority Level

IDM employer survey respondents were asked to indicate the seniority level of the jobs they were most urgently hiring for.

Mid- to senior-level talent was identified as the highest-priority hiring need, but firms also indicated that they planned to hire workers of all levels. Interviewees in this study highlighted that a lack of access to mid- and senior-level talent is a barrier to growth for Alberta's video game industry. This comment has also been made about Canada's video game industry more broadly.[60] Mid- to senior-level talent is required to successfully onboard and develop junior talent, helping to ensure a future talent pipeline for both individual companies and the industry as a whole. Past research suggests that Canada's post-secondary institutions produce enough graduates to fill junior-level positions in Canada's video game industry. Still, there is not enough experienced talent to meet the demand for mid- and senior-level talent roles.[61]

Respondents were asked to list up to five of their most in-demand occupations and the level of seniority (e.g., junior-, mid-, or senior-level role). Across 107 roles from 31 respondents, 24 needed junior-level talent, 59 needed mid-level talent, and 43 needed senior-level talent. Respondents were allowed to list multiple seniority levels for each demanded role, and many indicated demand for multiple seniority levels across in-demand positions.

Figure 16: Hiring plans among survey respondents



Data source: ICTC industry survey

While employers were looking for mid-career and senior talent, many of them relied on work-integrated learning (WIL) as a core part of their hiring process.

Indeed, 76.4% of respondents indicated that they hire co-op students and interns, with larger firms being more likely to engage in this type of hiring activity. Across all respondents, the median number of interns or co-op students that firms hire per year is between one and two. Sometimes, co-ops and internships provide a pathway into full-time roles. Across all respondents, approximately one in three co-op students/interns were hired into full-time roles following their placement; among respondents that hire fewer than two co-op students or interns per year, this figure rises to approximately two in five.

60 Entertainment Software Association of Canada, "ESAC Speaking notes for testimony to Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities," Meeting Number 12 - Review of the Temporary Foreign Worker Program, Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities, Parliament of Canada, May 16, 2016, https://theesa.ca/wp-content/uploads/2022/10/Speaking-notes-for-committee-testimony-Final.pdf

61 Entertainment Software Association of Canada & Information Technology Association of Canada, "The Importance of Global Workers in Canada's ICT and Digital Media Industries," January 2014, https://theesa.ca/wp-content/uploads/2022/10/ITAC-white-paper.pdf; Alexandra Cutean et al., "Ontario's Next Gen Industry: Addressing Labour Demand and Growth in the Creative Technology Sector," ICTC, February 2023.

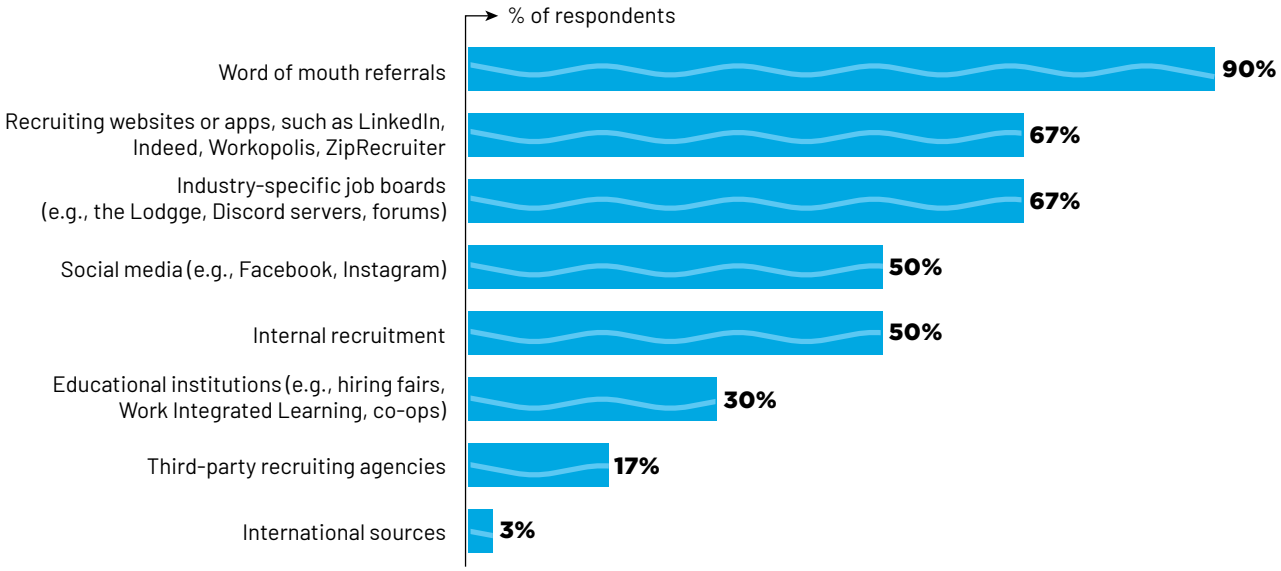
Hiring Strategy

Use of Formal and Informal Hiring Practices

Interviewees in this study indicated that IDM companies in Alberta often rely on personal networks and word of mouth to recruit new employees—a trend observed in other parts of Canada, such as in Ontario's IDM industry.[62] Indeed, two interviewees reported hiring their entire team through personal networks.

To determine how common these informal hiring approaches are in Alberta's IDM industry, ICTC asked respondents to its industry survey what their most common recruitment pathways are. Results from ICTC's industry survey suggest many firms use multiple recruitment pathways when hiring talent, but the clear favourite among respondents was "word of mouth" referrals (see Figure 17).

Figure 17: Hiring practices among survey respondents



Data source: ICTC industry survey

Informal hiring practices, such as hiring through personal networks or word of mouth, risk negatively affecting the long-term health of the IDM industry in Alberta by making hiring activity invisible to the broader public and potential job candidates. Consider, for example:

- The impact that informal hiring practices might have on a recently graduated high-school student who is considering whether to enroll in a program related to IDM but looking for relevant job postings online and seeing only a handful.
- The experience of an IDM professional in Vancouver who is considering moving to Edmonton but cannot find job postings relevant to their field of practice.

62 Alexandra Cutean et al., "Ontario's Next Gen Industry: Addressing Labour Demand and Growth in the Creative Technology Sector," Information and Communications Technology Council (ICTC), February 2023.

- The experience of an international firm that is considering opening an office in Alberta but hears from investment agencies that the regional job market is weak due to limited job activity related to IDM.
- The experience of a local firm that is requesting funding from the provincial or federal government but has no visible hiring activity to point to when trying to prove the labour market impact of IDM.

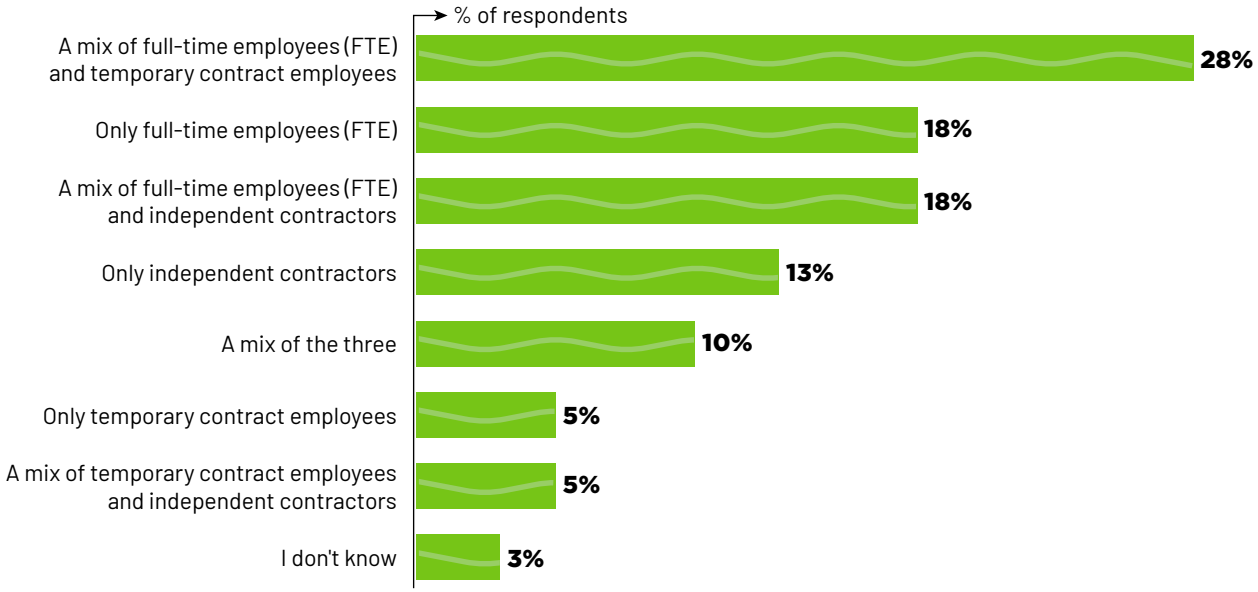
These potential challenges point to the benefit of more formalized hiring practices, such as posting on industry-specific job boards or using sites like LinkedIn or Indeed, for a growing industry.

Use of Independent Contractors, Part-time, and Temporary Roles

In total, survey respondents planned to hire more than 160 individuals over the next 12 months. However, it is worth noting that not all of these roles will be full-time positions due to the prevalence of part-time and contract-based work in the IDM industry.

Figure 18 shows the types of roles respondents plan to hire: notably, more than 60% of respondents plan to hire a combination of full-time, temporary contract, and independent contractor roles.

Figure 18: Hiring plans among survey respondents



Data source: ICTC industry survey

For IDM employers, it is common to hire independent contractors (such as freelancers) and short-term contract workers. The project-based nature of the industry means that firms go through hiring cycles where more talent is demanded for shorter periods, and firms often leverage contract employees and independent contractors to meet their talent needs.[63]

63 Kenzie Gordon et al., "The video game industry is booming. Why are there so many layoffs?," The Conversation, February 11, 2024, https://theconversation.com/the-video-game-industry-is-booming-why-are-there-so-many-layoffs-222685

Remote and International Talent

Interviewees shared that it is common for IDM firms in Alberta to try to attract talent to Alberta from outside the province or hire workers remotely.

To assess how common this approach is, ICTC asked respondents to its industry survey whether they hire remote workers from other parts of Canada and internationally. Among respondents who answered this question, approximately 78% indicated that they hire remote workers from other parts of Canada, while 68% indicated that they hire remote workers from other locations internationally.[64] Other publications about Canada's video game industry similarly highlight the importance of international talent to the IDM industry and even go as far as requesting a tailored foreign worker program to help the industry secure international talent.[65]

International immigration now accounts for the majority of Alberta's population and labour force growth, making newcomer talent an important part of most industries' talent strategies.[66] A 2023 study by ICTC also finds that newcomers to Alberta are more likely to settle in urban than rural areas: for smaller municipalities and rural areas that plan to grow their IDM industries, it will be important to develop holistic approaches to newcomer talent attraction and retention, going beyond things like pay, job satisfaction, and career opportunities to include things like broadband availability, robust and up-to-date kindergarten to Grade 12 education (with a particular emphasis on strong ICT education), recreational activities, community culture, amenities, meetups, and events, newcomer supports, and networking and mentorship opportunities.[67]

Diverse Talent Pools

> *You have to make diversity a priority when you put together a senior game team... [and not just] diversity for diversity's sake. To have a diversity of perspectives and diversity more generally within your development staff—it's all to make a great product. For our firm, it's woven into what we do, how we hire, and who we look for... because that's the only way the industry changes over time.*

Diversity, equity, and inclusion is another important part of hiring strategy. Past research by ICTC finds that certain demographic groups are underrepresented in the digital economy, and the IDM industry is no exception to this rule.[68]

64 Note: n = 32 and n = 25 respectively.

65 Entertainment Software Association of Canada, "ESAC Speaking notes for testimony to Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities," Meeting Number 12 - Review of the Temporary Foreign Worker Program, Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities, Parliament of Canada, May 16, 2016, https://theesa.ca/wp-content/uploads/2022/10/Speaking-notes-for-committee-testimony-Final.pdf

66 "Immigration as a source of labour supply," Statistics Canada, June 22, 2022, https://www150.statcan.gc.ca/n1/daily-quotidien/220622/dq220622c-eng.htm, as cited in Alexandra Cutean and Mairead Matthews, "Seeding Rural Innovation: Nurturing the Tech Frontier in Alberta," Information and Communications Technology Council (ICTC), September 2023, https://ictc-ctic.ca/reports/seeding-rural-innovation

67 Alexandra Cutean and Mairead Matthews, "Seeding Rural Innovation: Nurturing the Tech Frontier in Alberta."

68 Maryna Ivus, Maya Watson, "Gender Equity in Canada's Tech Ecosystem: Attracting, Retaining, and Supporting Entry- and Mid-Level Talent," ICTC, 2022, https://ictc-ctic.ca/reports/gender-equity-in-canadas-tech-ecosystem; Alexandra Cutean et al., "Benchmarking the Creative Technology Ecosystem in British Columbia," ICTC, 2021, https://ictc-ctic.ca/reports/benchmarking-the-creative-technology-ecosystem-in-british-columbia ; "Developer Satisfaction Survey, 2021 Summary Report," 2021, International Game Developers Association, https://igda-website.s3.us-east-2.amazonaws.com/wp-content/uploads/2021/10/18113901/IGDA-DSS-2021_SummaryReport_2021.pdf

For example, among respondents to a 2021 survey by the International Game Developers Association, which surveyed video game developers around the world, including in Canada, approximately 61% identified as men, 30% identified as women, 8% identified as either non-binary, genderfluid, genderqueer, two-spirited, or transgender, and 7% identified as transgender.[69] This compares to an estimated 22% of Alberta's video game workforce being women.[70] In terms of ethnic diversity, approximately 81% identified as white, Caucasian, or European; 10% identified as Hispanic, Latino, Latina, or Latinx; 7% identified as East Asian; 4% identified as Black, African American, African, or Afro-Caribbean; and 4% identified as Aboriginal or Indigenous.[71]

A 2023 survey of Alberta's animation and VFX industries found that women are considerably underrepresented. Among survey respondents, approximately 50% of firms reported having no women employees whatsoever, while 14% reported women accounting for at least 50% of roles in their workforce.[72] In terms of ethnic diversity, just 28% of firms reported having any employees who identified as being part of a visible minority community.[73] Further, no companies reported having Indigenous staff.[74]

Equity also extends to workforce policy beyond hiring. In a survey of video game personnel in Alberta, approximately 74% of respondents disagreed that the video game industry provides equal treatment and opportunity for all.[75] The most witnessed forms of inequity among survey respondents were microaggressions, social inequity, inequity in hiring processes, and inequity related to roles, salary, compensation, and promotion.[76]

Interviewees in this study reiterated that EDI strategies are hugely important to the IDM industry and are not simply a nice-to-have for the sake of optics. Notably, in response to a 2021 survey by the Entertainment Software Association of Canada, approximately 56% of firms indicated that they have no equity, diversity, and inclusion policy.[77] Engaging women, visible minorities, and Indigenous Peoples in IDM roles has ample benefits. It increases employment diversity, giving different demographic groups access to interesting and valuable employment opportunities. It offers employers access to larger talent pools and ensures diverse perspectives are included in product strategy, creative decisions, and storytelling, improving how diverse audiences receive products. In the case of video games, for example, interviewees highlighted the importance of giving users the ability to outfit their characters with culturally relevant hairstyles or clothing options.

69 "Distribution of game developers worldwide from 2014 to 2021, by gender," Statista, December 2023, https://www.statista.com/statistics/453634/game-developer-gender-distribution-worldwide/

70 Entertainment Software Association of Canada (ESAC), "The Canadian Video Game Industry 2021."

71 Johanna Weststar et al., "Developer Satisfaction Survey 2021: Summary Report," International Game Developers Association, September 2021, https://igda-website.s3.us-east-2.amazonaws.com/wp-content/uploads/2021/10/18113901/IGDA-DSS-2021_SummaryReport_2021.pdf

72 Nordicity, "Key Frames: A Growth Strategy for Animation and VFX in Alberta," Edmonton Screen Industries Office and Calgary Economic Development, 2023, https://www.calgaryeconomicdevelopment.com/assets/Reports/Sectors/Digital-Media-Entertainment/CED-2023_Animation_Visual_Effects_Strategy-Full-Report.pdf

73 Ibid.

74 Ibid.

75 Ibid.

76 Johanna Weststar et al., "Developer Satisfaction Survey 2021: Summary Report," International Games Developers Association, September 2021, https://igda-website.s3.us-east-2.amazonaws.com/wp-content/uploads/2021/10/18113901/IGDA-DSS-2021_SummaryReport_2021.pdf

77 Entertainment Software Association of Canada (ESAC), "The Canadian Video Game Industry 2021," October 2021, https://theesa.ca/wp-content/uploads/2022/10/esac-2021-final-report.pdf

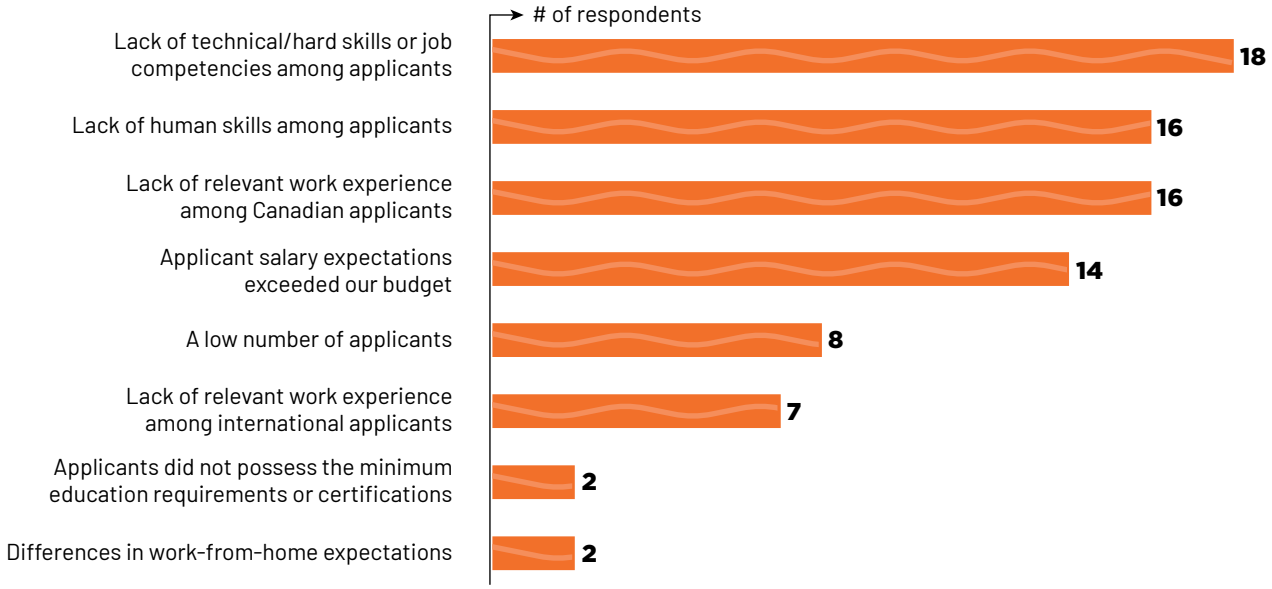
Barriers to Recruitment

While there is growing demand for IDM talent in Alberta, many firms report challenges hiring talent with the right mix of experience, knowledge, and skills for their business.

To better understand the types of barriers firms face when hiring IDM talent, ICTC asked respondents to its industry survey what barriers they face. Selected by 18 respondents, the most common barrier identified was a lack of technical skills, hard skills, or competencies among job applicants.

This was followed by a lack of relevant work experience among Canadian applicants, a lack of human skills among applicants, and a mismatch between applicant salary expectations and firm budgets.

Figure 19: Barriers to recruitment among survey respondents



Data source: ICTC industry survey

When prompted to choose between talent supply issues being primarily volume or quality-related, most respondents picked either quality-related or a mix of both. This data suggests there are enough workers in Alberta's IDM industry to meet labour market needs, but skills mismatches prevent existing candidates from filling open roles. This shortage of sufficiently skilled talent drives up competition for good quality candidates and increases the impact that wage expectations have on the hiring ability of small-sized firms.

Indeed, several interviewees shared that because they are still building out revenue streams, their studios cannot offer salaries as competitive as some of the large international firms in the region. Because of this, international firms hiring talent in Alberta can crowd out local firms.

Another interviewee from a smaller studio indicated that it is not just wages but the level of prestige that impacts the ability to hire quality talent: "Because we are a new studio and not as established, when looking for talent I've had to rely predominantly on less experienced people." In this type of environment, smaller studios or independent firms may become willing to compromise on candidate quality for the ability to attract junior talent to a lesser-known firm or for the ability to pay a lower salary.

Due to recent increases in the prevalence of remote work, particularly since the onset of the COVID-19 pandemic, Alberta-based IDM firms may not only lose talent to other firms located in Alberta but also to other parts of Canada or internationally. Like other technology industries, the IDM industry is well-suited to remote work, meaning firms must compete locally and internationally for talent.

Figure 20: Barriers to recruitment among survey respondents

Data source: ICTC industry survey

IDM and Talent Retention

Retaining mid- and senior-level staff is crucial for onboarding, guiding, and developing new junior team members. Firms face several established, industry-wide challenges with respect to retaining mid- and senior-level talent.

One is that experienced talent hired on a contract basis might not stick around for a new project cycle between jobs. An executive from a large IDM studio notes senior IDM technical talent with in-demand skills can act as "mercenaries" when moving between different projects and studios: "They showed up, worked, did the project, got it on their resume, and left to go to another location. They could move through the industry flawlessly." This executive shared that it is a consistent challenge for Alberta IDM companies to retain senior technical talent, yet these senior workers are essential to studios.

Another is burnout resulting from the project-based nature of the work, which has historically created a "crunch" culture as deadlines approach.[78] That said, companies have worked hard to move away from this model in recent years, reducing the impact of project-based work on burnout and satisfaction.

78 Amanda C. Cote and Brandon C. Harris, "The cruel optimism of 'good crunch': How game industry discourses perpetuate unsustainable labor practices," New Media & Society, vol. 25, no. 3 (March 2023), https://journals.sagepub.com/doi/10.1177/14614448211014213

A further barrier to retention is brain drain. For IDM talent in Alberta, there is a pull to relocate out of the province—whether physically or virtually through remote work—either to larger Canadian IDM hubs or internationally in pursuit of career growth. With significant in-demand skills, the IDM workforce can also be highly mobile. As one video game micro-studio founder stated when asked about relocating from Alberta in pursuit of career opportunities, "I put my computer in a car, and I drive away–it's very easy."

Yet, conversations with IDM workers in Alberta also note how attractive the province can be from a quality-of-life perspective. These quality of life considerations include the relatively low cost of living when compared to other Canadian IDM industry hubs, such as Toronto and Vancouver; relatively low provincial taxation on personal income and no provincial sales tax; vibrant urban communities; and visually stunning rural and natural areas such as the Rocky Mountains were all cited as important factors attracting IDM talent to Alberta, in addition to being an important contributor to retention. As one Calgary-based IDM studio executive shared:

> *You're offering the job, but there's a quality-of-life attractor that's bringing people and getting them to accept and stick around. Some of the folks who have moved here from Toronto have really laid their roots here, have bought houses and cars and things like that, and so they tell me that they really enjoy being in Calgary.*

Another interviewee—an Alberta-based video game industry veteran with international AAA experience—noted that considerations for quality of life are essential for IDM companies establishing themselves in the province: "If we are asking talent to relocate from around the world, we want those people to have a great quality of life. We want them to be able to live in a city that is affordable and livable for them."

In addition to traditional approaches like providing competitive compensation and fostering good working conditions, broader incentives, such as quality of life, are essential for Alberta to retain IDM talent.

Cities and regions that remain dynamic, vibrant, and livable have distinct advantages compared to cities and regions that stagnate or decline. As members of the "creative class," IDM workers add to the economic and cultural dynamism of an urban area.[79] This economic and cultural dynamism helps attract and retain more creative workers, including skilled and in-demand IDM talent.

Fortunately, Alberta's two largest urban centers, Calgary and Edmonton, both offer significant urban amenities, as well as the requisite cultural and economic dynamism to benefit from this cycle. Indeed, Calgary has recently enjoyed international attention and is regularly featured in global city rankings and livability indices.[80] Edmonton has been featured on similar global city rankings in the recent past and is poised to do so in the future as it continues to grow its international reputation.

79 See: Richard Florida, The Rise of the Creative Class (Basic Books: 2002).

80 For example: Resonance, "World's Best Cities Report 2024: The 100 Global Cities Shaping Tomorrow," https://www.worldsbestcities.com/best-cities-report/?r=dXJlYVITb29ZKzBhQ0x6SXZCNFN2QT09, 52; Economist Intelligence Unit, "The Global Liveability Index 2023: Optimism amid instability," 2023, https://www.eiu.com/n/campaigns/global-liveability-index-2023/, 2; Mercer, "Quality of Living City Ranking 2023," https://www.mercer.com/insights/total-rewards/talent-mobility-insights/quality-of-living-city-ranking/ ; Oxford Economics, "Global Cities Index," 2024, https://www.oxfordeconomics.com/global-cities-index/

Table 2 outlines key Canadian IDM hubs' respective rankings on Resonance's 2024 World's Best Cities Report, Economist Intelligence Unit's 2023 Global Liveability Index, Mercer's Quality of Living City Ranking 2023.

Table 2: Canadian IDM Hubs in Selected Global City Livability Rankings (2023/24)

	ALBERTA		COMPETITOR CANADIAN IDM HUBS		
Global Rankings	**Calgary**	**Edmonton**	**Montréal**	**Toronto**	**Vancouver**
Oxford Economics Global Cities Index 2024 (Top 1000)	**50**/1000	**89**/1000	**31**/1000	**17**/1000	**20**/50
Resonance World's Best Cities Report 2024 (Top 100)	**93**/100	Not Ranked	**60**/100	**23**/100	**50**/100
Economist Intelligence Unit 2023 Global Liveability Index (Top 10)	**7**/10	Not Ranked	Not Ranked	**9**/10	**5**/10
Mercer Quality of Living City Ranking 2023 (Top 250)	**23**/250	Not Ranked	**20**/250	**17**/250	**8**/250

Data source: Oxford Economics, "Global Cities Index 2024"; Resonance, "World's Best Cities Report 2024"; Economist Intelligence Unit, "The Global Liveability Index 2023; and Mercer, "Quality of Living City Ranking 2023."

Yet, it is not just Albertan cities that feature well in these rankings. Other IDM hubs, namely Toronto, Montréal, and Vancouver, outperform Calgary in many cases. The tension of pursuing an IDM career in Alberta versus moving to a larger Canadian or international IDM hub for career opportunities is ultimately a personal consideration for each IDM worker employed in Alberta today. As numerous industry representatives and IDM workers noted during ICTC's consultations, the high cost of living and quality of life factors incentivize IDM talent to stay in the province. This includes economic factors such as tax treatment, as well as other factors such as natural beauty and vibrant urban communities.

Alberta IDM employers must be aware of these attractive factors as they hire and retain talent. Alberta policy makers at the provincial and municipal levels should also be mindful of these factors as they strive to make Alberta and its urban centres as attractive as possible to a highly skilled and geographically mobile IDM workforce.

SECTION III

Workforce Development and Pathways into the IDM Industry

IDM and Post-Secondary Training in Alberta

Alberta's IDM industry is supported by a variety of post-secondary education and training pathways at the university, polytechnic, and college levels. Many roles in IDM involve transferable education: for example, a computer science graduate could pursue a role in the gaming industry or as a software developer.

Educational pathways into the IDM sector are as diverse as the sector itself. Many interviewees mentioned supplementing their education with self-teaching before venturing into their fields. Alberta offers many educational programs with varying program lengths, subject matter, and costs, so students searching for programs must do ample research to ensure that the program they select uses industry-relevant software and teaches the necessary skills and competencies. Self-directed learning can also be a valuable and effective way to supplement one's education.

The following examples highlight programs in Alberta with IDM-specific components (each list is illustrative, not exhaustive).

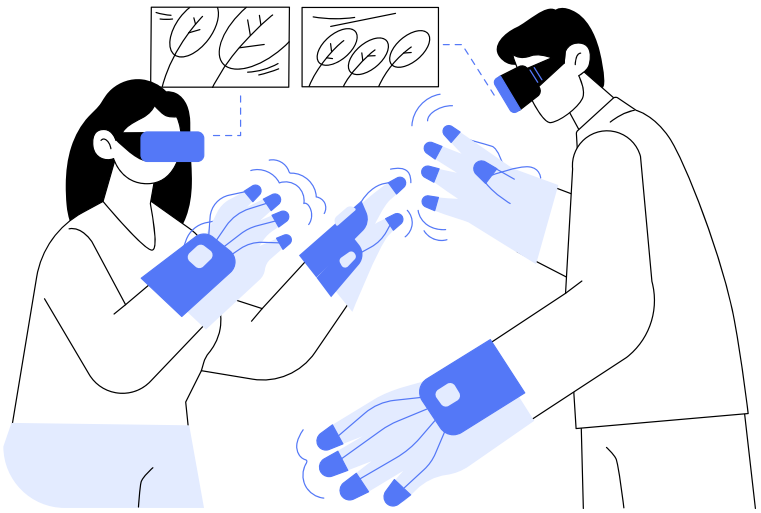
VFX and Animation

Robust training programs and educational pathways support Alberta's 24 active VFX and Animation companies.[81] Programs include:

Table 3: Examples of Post-Secondary Programs Relevant to VFX and Animation in Alberta

Institution and City	Program Name	Duration	Tuition (domestic)	Target Audience
Red Deer Polytechnic, Red Deer	Bachelor of Applied Arts in Animation and Visual Effects	4 years	Year 1 $11,787.00 Year 2 $11,877.00 Year 3 $12,587.00 Year 4 $10,072.00	Undergraduate students/Junior talent
Northern Alberta Institute of Technology (NAIT), Edmonton	Digital Media and IT program (Diploma)	2 years	$185.00 per credit (3 credits per course)	College students/ Junior talent
Visual College of Art and Design, Calgary	3D Modeling Animation Art and Design (Diploma)	2 years	Information not available	College students/ Junior talent
Alberta University of the Arts, Calgary	Animation (Minor), Media Arts (Minor), Drawing (Bachelor of Fine Arts)	4 years	$7,619.97/year	–
Bow Valley College, Calgary	Advanced 3D Animation & 3D Modelling (Diploma)	2 years	$40,622.00	College students/ Junior talent
Pixel Blue College, Edmonton	3D Animation & Visual Effects (Diploma)	1 year (850 hrs)	$19,995.00	College students/ Junior talent

81 "Key Frames: A Growth Strategy for Animation and VFX in Alberta", Nordicity, 2022, https://calgaryeconomicdevelopment.com/assets/Reports/Sectors/Digital-Media-Entertainment/CED-2023_Animation_Visual_Effects_Strategy-Full-Report.pdf



XR

XR companies in Alberta complete projects in the gaming industry, healthcare services, art direction, training and education, and much more. As a result, it is important that students hoping to work in XR in Alberta are prepared to work outside of the gaming industry and are familiar with industrial applications of XR technology. Notable XR programs include:

Table 4: Examples of Post-Secondary Programs Relevant to XR in Alberta

Institution and City	Program Name	Duration	Tuition (domestic)	Target Audience
Lethbridge College, Lethbridge	Virtual and Augmented Reality (certificate)	1 year	$7,695.00	College students
University of Alberta, Edmonton	XR courses (micro-credentials)	Duration varies by program*	Prices vary by program*	Beginners, students, professionals
Northern Alberta Institute of Technology, Edmonton	Digital and Virtual Environments (Research Centre)	N/A	N/A	Undergraduate students, researchers, businesses
NorQuest College, Edmonton	Augmented and Virtual Reality in Healthcare	6 hours	$135.00	Healthcare professionals
Southern Alberta Institute of Technology, Calgary	Virtual Reality and Augmented Reality (Workshop)	4 hours (Workshop) 90–120 minutes (at school)	N/A	Youth between grades 6 – 10

* see Further Reading for more information

Video Games

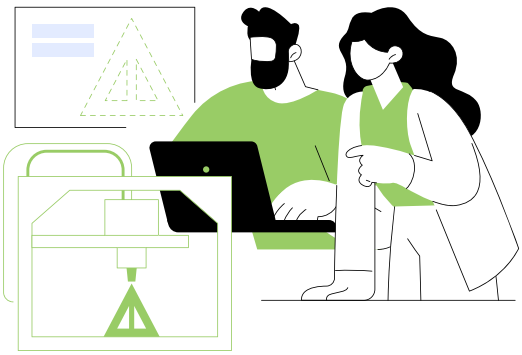
Video game development programs and training pathways are paramount to supporting the IDM sector's continued growth. Notable game development programs include:

Table 5: Examples of Post-Secondary Programs Relevant to Video Games in Alberta

Institution and City	Program Name	Duration	Tuition (domestic)	Target Audience
University of Calgary, Calgary	Bachelor of Science in Computer Science (Concentration in Computer Game Development)	4 years	Approx. $7,100 (two terms with a full-time course load)	Undergraduate students/Junior talent
University of Alberta, Edmonton	Computer Game Development (Certificate)	Varies	N/A	Undergraduate students at the University of Alberta
Lethbridge College, Lethbridge	Game Design micro-credential programs	10 hours per program	Cost varies by program	College students/ Junior talent
Bow Valley College, Calgary	Advanced Game Development	2 years	$38,467.00	College students/ Junior talent
Northern Alberta Institute of Technology, Edmonton	Digital Media and IT – Game Design Concentration program	2 years	$185.00 per credit (3 credits per course)	College students/ Junior talent

Digital Models and Digital Twins

ICTC did not identify any programs specifically focused on digital models or digital twins. However, digital models are the foundation of many interactive digital media solutions, meaning the skills needed to create and operationalize them are already built into many programs focused on IDM, immersive technology, VFX, and video games.



For example, the Visual College of Art and Design's 3D Modeling Animation Art and Design diploma program includes three courses on environmental modelling and a course on lighting and textures, which teach transferrable skills that can be applied outside of animation art and design. Similarly, Lethbridge College's Virtual and Augmented Reality program teaches students the foundations of 3D asset creation and how to use game engines like Unity.

While existing IDM programs teach students how to create and operationalize digital models, turning digital models into "digital twins" can require additional skills related to embedded software engineering, networking, application protocol interfaces (APIs), back-end software development, hosting, cloud provisioning, geographic information systems (GIS), and spatial data. For example, a firm might associate their digital model with a real-world counterpart using IoT equipment. If they used out-of-the-box IoT equipment with built-in APIs, they would likely require a back-end software developer or full-stack developer who could integrate the IoT equipment with their digital model. If they were to build their own IoT hardware in-house instead of buying out-of-the-box equipment, they might also need to hire a hardware engineer or an embedded software engineer.

Industry Perspectives on Post-Secondary Education in IDM in Alberta

Industry interviewees commented on their experiences with students emerging from Alberta's post-secondary training institutions. Their experiences offer important context that could help with future workforce development and curriculum alignment with industry needs.

Challenges

Tuition Costs: Many of Alberta's IDM-related educational pathways have significant costs. As Tables 3-5 above illustrate, tuition fees can cost domestic students upwards of $40,000 for a 2-year diploma program and nearly $70,000 for international students.[82] High tuition costs can create high barriers to entry, and students may take on debt that is difficult to pay back rapidly after graduation.

High Expectations from New Graduates: Some research participants cautioned that more students wanted to work in the IDM sector than they could hire. For example, they saw large numbers of computer science graduates interested in video games without the workforce experience to compete for entry-level roles appropriately. Small companies expressed that they might not be able to designate senior personnel time to develop new talent and wanted more involvement from post-secondaries in helping students develop hands-on skills and managing their expectations.

Mis-Aligned Curriculum and Generalist Skills: IDM employers commented that post-secondary programs in Alberta teach a generalist skillset in IDM fields, providing graduates with a strong menu of skills valued by smaller companies that need workers who will be flexible and able to fill multiple roles. These skills are also useful for graduates who are interested in working for themselves as contractors or founding their own companies. Alberta's IDM ecosystem has proven to be especially adept at starting small companies and micro-enterprises.

82 "Advanced 3D Animation & 3D Modelling," Bow Valley College, accessed April 12, 2024, https://bowvalleycollege.ca/programs-courses/centre-for-entertainment-arts/advanced-3d-animation-and-3d-modelling

Yet, for larger IDM companies, there are not enough specialists with certain skills or deep knowledge of key technologies available in the province. This makes it challenging for large, established IDM companies to locate new studios in Alberta. One studio executive with AAA video game experience observed, "If an EA were to come to Alberta, let's say, they would struggle to find specialized people here in town."

It can also be challenging for Alberta-based IDM employers that begin scaling to specialize their workforces. This forces these rapidly growing employers to either hire from outside of the province, contract with an outside specialist within Canada or internationally or undergo the lengthy and expensive process of training a specialist internally. One IDM executive said, "We have about 130 developers on our team. This is large enough to invest in specialists for some disciplines, but we certainly wouldn't expect somebody coming out of a post-secondary program in Alberta right now to slot into those specialist roles immediately."

Creative technology industries in larger markets such as Montréal or Vancouver have access to post-secondary programs to train these specialists. As one Alberta-based post-secondary game development instructor noted, "You'll see in Vancouver a lot of schools where it's like game characters, and you do that for like 16 months, they're targeting those larger studios. But that's not necessarily helpful for a smaller studio."

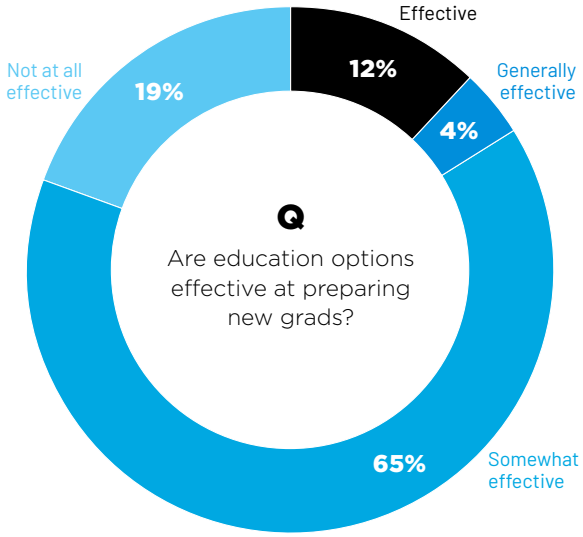
In contrast, Alberta's post-secondary IDM programs cover a larger variety of skills and technologies. The graduates from these programs have broader skills than their peers in similar programs in B.C. and Eastern Canada, but they will not have the depth. As the same recruiter remarks, "It all comes down to that generalist structure of the programs. If you have to learn ten things over 12 months, you're not going to get particularly good at any one of those things, generally speaking."

Due to this lack of specialization in their education, it can be difficult for Alberta's IDM graduates to find work at larger studios in Alberta or elsewhere in Canada. If graduates are unaware of this challenge and potential educational limitations, they may be disappointed with their post-graduation career outcomes. As a video game studio recruiter commented: "You want to work for BioWare? You want to work for Microsoft? You have to specialize. You have to be the best person in the province at making rocks or the best person in the province for making gory sound effects—very, very specialized." Or, as another digital animation studio hiring manager shared, "We have found greater success trying to spot candidates who are already at the company that we can migrate toward technical art. If we're specifically trying to bring new talent in, it's typically from schools in British Columbia or from Sheridan College."

Industry interviewees also offered specific guidelines for what they'd like to see in post-secondary programs. Survey results highlight questions about whether the talent pool of new graduates has the requisite skills and competencies for entering the industry (Figures 21 and 22). Employers have found that junior talent have good conceptual understanding of programming skills. Still, they may lack hard skills in C++ or C# that would enable new hires to work with Unreal, Unity, or the studio's internal game engines.

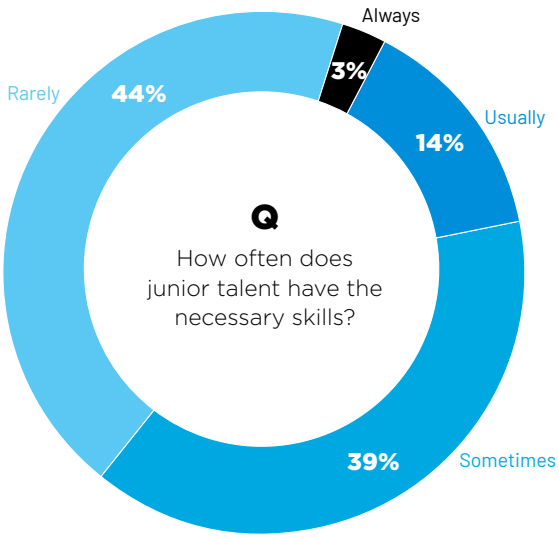
Employers also encounter challenges with project estimation skills, particularly among 3D modelling contract workers. One employer interviewed for this project emphasized the importance of contractors being able to ask the right questions and define clear boundaries for the work, such as relating to "weather, camera, character design, how many hours," for example. This employer discussed the present imbalance between technical skills and project management abilities: "How are we estimating when we don't even know what we need to do in the first place? That's really been the challenge, you know, they knew how to model a thing, but they didn't know what questions to ask."

Figure 21: New Grads Prepared for Job Market



Data source: ICTC survey

Figure 22: Junior Talent and Skills



Data source: ICTC survey

Opportunities

Post-secondary institutions and industry interviewees raised several opportunities to improve outcomes for students and recent graduates who want to work in IDM in Alberta. Despite the challenges mentioned above, much can be done to improve outcomes for IDM students and recently graduated job seekers in Alberta.

Industry-Post-Secondary Interconnection: Firstly, interconnectedness and cooperation must be fostered between IDM industry employers and post-secondary institutions (PSIs), especially considering that relative to B.C. and Ontario, the IDM industry in Alberta is small and still growing and could leverage its size to create a more cohesive and unified ecosystem. Further cooperation between PSIs and sector employers can take the form of co-op programs, job fairs at colleges, polytechnics, and universities, or bringing industry expertise into the classroom. Work-integrated learning (WIL) helps students develop specialized and job-ready skills that can help them overcome misaligned expectations and/or being hampered by a skill set that is too broad.

As Section II discussed, many small- and medium-sized IDM employers noted the significant contributions interns, co-op, and summer students can make. They praised WIL programs offered by Alberta post-secondary institutions. However, one hiring manager at an IDM studio noted that while WIL placements were of significant value to the studio, it was challenging to meet the demand for placements for all the students partner PSIs were producing from their respective IDM programs: "We as studios, we can't keep up with them–the sheer number of people coming." Small studios may also struggle to dedicate senior staff hours to mentoring a WIL student.

A potential solution to this problem is being trialled by Alberta's neighbouring IDM industry. B.C.'s creative technology industry association, DigiBC, offers a "concierge"-style service that takes some of the work of hosting a WIL student off employers' plates. With matchmaking services, group onboarding, and professional development opportunities for WIL students, DigiBC aims to make it easier for subject-matter experts to develop junior talent. An ICTC evaluation of this program will be forthcoming in 2025.

Alberta IDM companies are also trying ways to involve their senior staff in PSIs. One interviewee offered an example of sending mid-level and senior employees to teach in universities during seasonal quiet periods, both as a way to foster new students and to mitigate staff burnout:

> *We had proposed a sabbatical program, where burnt out folk from AAA can teach some courses, then go back to work, which also provided a junior the opportunity to backfill at the studio while the senior is on sabbatical.*

Similarly, some PSIs are developing hubs to encourage collaboration with industry. The new Calgary Entertainment Arts Production Hub at Bow Valley College will support business development for industry and students, offering access to mentorship, training, reskilling, and upskilling.[83]

Educating Students About Industry Realities: Interviewees recommended that post-secondary institutions manage students' expectations by preparing them for the sometimes-challenging reality of working in IDM:

> *The IDM sector is famous for making you pay your dues. Go to game jams, build prototypes, pay your dues. I'm not saying it's right, but we need to educate people on the realities of this industry.* – Advisory Committee Member

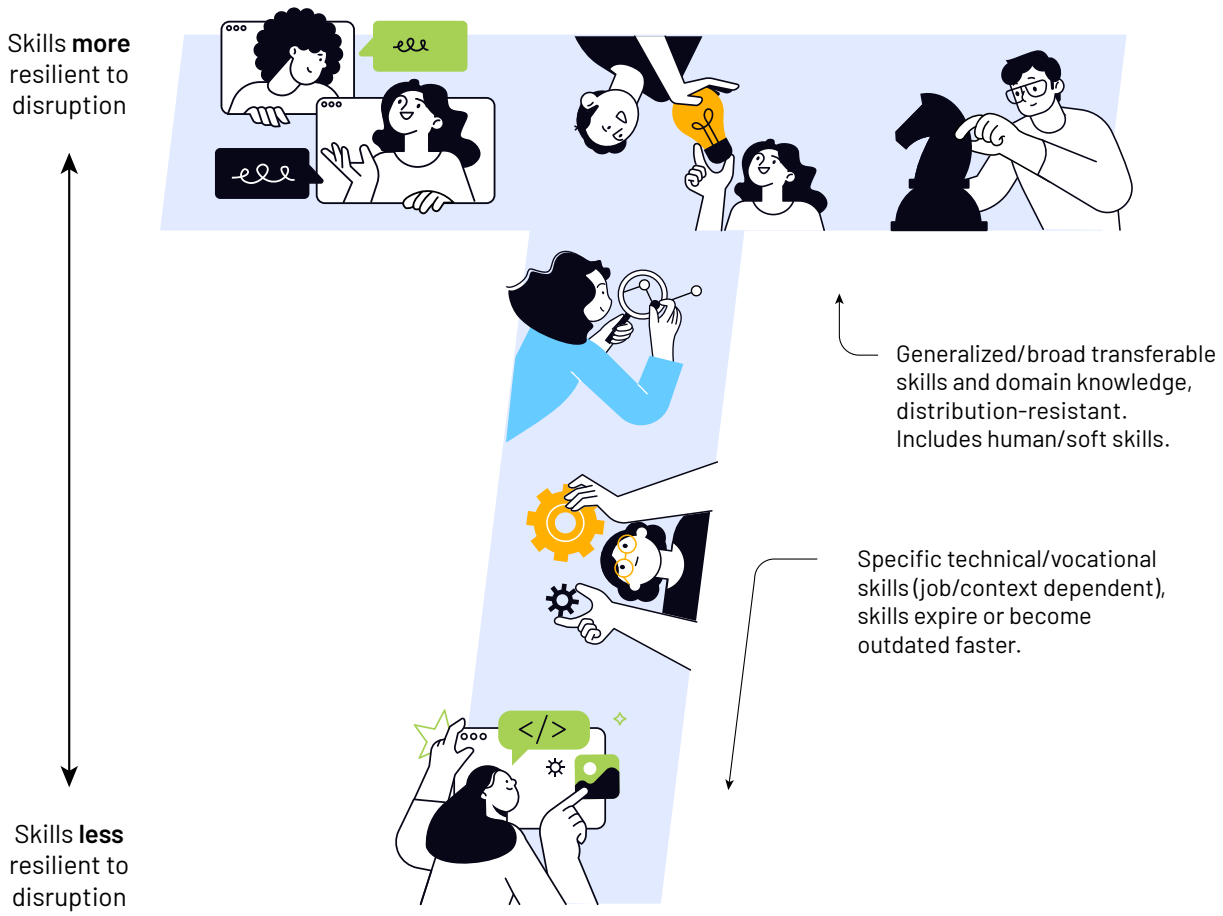
Interviewees suggested techniques like offering job talks where industry members described realities like salary expectations, job competition, and short-term freelance or contract lifestyles. They also recommended offering workshops in budgeting, accounting, taxes, cost estimates, defining a scope of work, and other skills essential to a career as a freelancer.

For example, one interviewee shared that "the challenges that arose with [new contractors] was that they had hard skills in 3D modelling, animation, or creative writing – whatever their discipline was, they could do the job. But they didn't always understand project management, budgeting, estimating – what it was to work as a contractor."

83 Bow Valley College, "OCIF invests in the Calgary Entertainment Arts Production Hub at Bow Valley College," Nov. 16, 2023, https://bowvalleycollege.ca/about/media-relations-centre/news-media-releases/2023/ocif-invests-in-the-calgary-entertainment-arts-production-hub-at-bow-valley-college

Creating "T-Shaped" Professionals: A "T-Shaped" professional has a broad base of expertise and knowledge, as well as an in-depth, deep specialization in some areas (see Figure 23 below).[84] Providing Alberta's IDM graduates with a generalized skillset has advantages: it has helped the province support its ecosystem of small- and medium-sized IDM companies, as well as fuel its dynamic startup and micro-studio scene. Generalist IDM talent is often what these types of employers need.

Figure 23: T-Shaped IDM Professionals



Alberta's post-secondary IDM programs have been successful in this regard. Yet, to attract larger IDM employers to set up shop in the province and to help Alberta-based IDM companies scale, the Alberta IDM industry needs access to a pipeline of specialists, which the province's post-secondary training system is not designed to produce.

Few of the specialists larger IDM employers are interested in hiring in the near future will be recent graduates from Alberta post-secondary institutions. Resolving this tension of producing specialized versus generalized IDM graduates in Alberta will involve post-secondary institutions deciding if, and to what degree, they should transform their generalist-focused IDM curriculum to produce needed specialists. It will also require Alberta's IDM students to be aware of the tradeoff between specialized and generalized IDM education when choosing what program is right for them.

84 See: Morten T. Hansen, "IDEO CEO Tim Brown: T-Shaped Stars: The Backbone of IDEO's Collaborative Culture (interview)," Chief Executive, accessed May 3, 2024, https://chiefexecutive.net/ideo-ceo-tim-brown-t-shaped-stars-the-backbone-of-ideoaes-collaborative-culture

Workforce Development & Ecosystem Development: Critical Mass and IDM in Alberta

Alberta's IDM industry notably produces dynamic startups, micro-sized studios, and thriving small- and medium-sized businesses. Among members of Alberta's IDM industry that ICTC consulted with for this report, the ability to establish new companies was viewed as one of the industry's core strengths. Founders of IDM studios noted how a competitive tax environment, entrepreneurial culture, and low cost of living were significant enablers for the number of IDM companies being founded in Alberta.

The ability to generate new IDM businesses with innovative technologies, fresh ideas and creative direction, and novel applications of IDM technology enhances Alberta's entire IDM ecosystem. Small companies, who have everything to gain by taking risks and pursuing new ideas, help advance the technological and ideational progress of the IDM ecosystem. While most startups, micro-studios, and small firms will suffer failure and close shop, those who succeed have the potential to grow rapidly, with their creative products potentially becoming household names.

As one video game industry analyst ICTC interviewed for this report noted,"You know the next big company - the next multi-million- or billion-dollar company - in the gaming space is probably going to come from the startup scene," observing that larger, established companies must "take calculated risks to keep shareholders happy, which generally means a lot of sequels, a lot of continuation of the same thing."

Nevertheless, business size in Alberta's IDM sector is closely tied to workforce development. For example, less circulating talent might mean a higher burden on small firms to retrain personnel to suit their business needs—one interviewee described finding it too hard to retrain game development professionals to work in industrial applications, for example:

> *We don't look at senior technical people and we don't look at senior game development people in Alberta. We assume that they'll come in with too much relearning to be able to get them effective.*

Similarly, less circulating talent can mean that skilled personnel are in extremely high demand:

> *You can go to Vancouver and find three artists everywhere because their schools are popping them out, there's EA training them up and letting them go, and there's this constant flow of talent, whereas you do not see that in Edmonton. The few studios that are here, we fight for the key talent pretty hard, and we try not to be [rude] about it.*

When IDM companies in Alberta, most famously video game studios, achieve business success and begin to scale, they often encounter significant roadblocks—the startups and micro-studios can become small established companies, and these small companies can then grow to become medium-sized companies, but further growth can be challenging to achieve in Alberta. As one long-term observer of Alberta's video game industry notes, "We're kind of like almost locking ourselves into having a cottage video game industry—like a highly successful cottage video game industry that can't scale."

Several challenges contribute to scaling problems in Alberta's IDM industry. One, already mentioned, is a **lack of access to specialized talent**. A veteran of Alberta's video game industry observed:

> *The sheer reality is that once a company scales to a point in Alberta, it simply doesn't make any more sense to hire in Alberta with access to talent in hubs like Vancouver or Montréal. It's just easy to hire somebody there. Get in place the minimum infrastructure required to benefit from their tax credit programs, and then start to grow your teams.*

A second challenge Alberta IDM companies face is gaining **access to capital, funding, and support for scaling**.

While there are a variety of programs that help Canadian businesses access capital and funding for things like research and development, many are not designed in a way that suits the IDM industry or IDM firms. For example, grants and tax credits provided by organizations like Alberta Innovates, IRAP, and the federal Department of Finance only apply to very novel research and development activities. Apart from unique or novel applications of IDM technologies, most IDM products, services, and projects generally do not qualify. The bulk of funding programs that apply to the IDM industry provide comparably small pots of money to firms to assist with things like hiring students or exploring export opportunities instead of scaling.

For smaller IDM companies, such as startups and micro-studios, a common issue identified was developing a viable product with revenue streams needed to be eligible for further government funding. One studio founder intending to eventually access Canadian Media Fund (CMF) monies noted that by the time his company would be eligible for CMF funding, he would not require it to scale. Another Alberta-based veteran of the Alberta video game industry remarked:

> *There are pros and cons to Canadian Media Fund money and sometimes by accepting CMF money it makes it harder for you to scale in the future because you already owe that money back, depending on which stream you go through.*

One IDM executive posited that micro-grants geared toward small IDM companies, such as micro-studios and startups, could fill a significant gap in Alberta's IDM support landscape. Such a funding program could help these smaller entities that cannot yet match funding from programs like CMF and Alberta Innovates to develop to the point where they are in a more viable position to access more extensive funding programs.

Access to equipment and shared facilities, such as those provided by the Centre for Data Management and Visualization at NAIT, can be essential for startups and small studios working on innovative IDM products but who may not have ready access to certain facilities or technology, such as motion capture equipment.[85] Furthermore, business and technology incubator programs housed within Alberta colleges and universities, such as the Creative Destruction Lab at the University of Calgary,[86] have the potential to provide support for IDM startups to commercialize innovative products and bring them to market. IDM business owners interviewed for this report noted success in accessing export development funding from numerous government sources, with some IDM company owners praising their recent involvement in international trade missions.

85 Edmonton Global, "Digital Media and Entertainment: Our digital media and entertainment ecosystem," accessed April 19, 2024, https://edmontonglobal.ca/sectors/digital-media-and-entertainment/#ecosystem

86 Creative Destruction Lab, "CDL-Rockies," accessed April 19, 2024, https://creativedestructionlab.com/locations/calgary/

While larger IDM companies can benefit at the margin from some of the supports discussed above, they require programs that can scale with company size and help produce stable and predictable financial outcomes. A commonly cited example of such support would include refundable tax credit programs, discussed in the following case study.

A Case Study on Provincial IDM Tax Credits

Tax credit programs are common instruments directed by governments toward the IDM industry. These programs typically consist of refundable tax credits on expenses such as labour and development costs that companies engaged in producing IDM products, such as video games, may utilize to reduce their overall tax burden. IDM tax credits are common throughout Canada and other countries.[87] They are usually instituted by governments to attract IDM companies and encourage studios to keep IDM jobs in their respective jurisdictions. In Canada, provincial IDM tax credits have proven to be instrumental in attracting companies, perhaps the most well-known example being Québec's tax credit that formed the nucleus of Montréal's video game industry.[88]

Alberta's Short-Lived Interactive Digital Media Tax Credit (2018-2019)

Alberta's now discontinued Interactive Digital Media Tax Credit (IDMTC) provided a 25% refundable tax credit on qualifying labour costs associated with the production of IDM products, such as video games.[89] IDMTC offered a further 5% diversity and inclusion tax credit for companies employing "under-represented employees in technical positions."[90] The IDMTC was available to corporations permanently established in Alberta that were "substantially engaged" in the production of IDM products.[91] IDMTC was offered during the 2018 tax year but was subsequently cancelled by the Alberta government in 2019.[92] Since IDMTC's cancellation, there have been regular calls by members of Alberta's IDM industry for Alberta to reinstate this tax credit.[93] There is a widespread belief amongst many in Alberta's IDM industry that a lack of tax credits makes the province less competitive with other jurisdictions in Canada. IDM employers consulted for this report regularly noted the absence of a tax credit in Alberta; as one interviewee put it, "Without tax credits, which were cancelled in 2019, there is literally no world in which the IDM industry grows in Alberta."

The Government of Alberta has recently expressed openness to bringing back an IDM tax credit program. For instance, a November 2022 mandate letter from the Office of the Premier to the Minister of Technology and Innovation asked for a new "tax credit proposal for the video game/digital media industry" to allow Alberta's IDM industry to be "competitive with Ontario, Québec, and British Columbia."[94]

87 See: Maria De Rosa and Marilyn Burgess, "An International Review of Financing For Video Game Companies," Interactive Ontario, September 15, 2021, https://www.ontariocreates.ca/assets/images/research/research-funded/files/io_mdrreport_internationalfinancing2.pdf

88 "How subsidies helped Montréal become 'the Hollywood of video games,'" NPR Planet Money, January 24, 2022, https://www.npr.org/sections/money/2022/01/04/1068916102/how-subsidies-helped-montreal-become-the-hollywood-of-video-games

89 See: Government of Alberta, "Interactive Digital Media Tax Credit (IDMTC) Program Guidelines," January 2019, https://open.alberta.ca/dataset/b121da68-6ae8-4db7-9020-987003a8c2d1/resource/84d8061a-c6ca-425d-b289-0fe4cfd577a3/download/idmtc-guidelines-2019-final.pdf

90 Ibid., 11.

91 Ibid., 5.

92 "Five business tax credits scrapped; UCP abandons targeted programs in favour of lower corporate taxes," Calgary Herald, October 24, 2019, https://calgaryherald.com/news/five-business-tax-credits-scrapped-ucp-abandons-targeted-programs-in-favour-of-lower-corporate-taxes

93 See: "Alberta's video game industry assesses future after tax credit axed," Yahoo! News, October 31, 2019, https://ca.news.yahoo.com/albertas-video-game-industry-assesses-030812416.html?guccounter=1; "'It's a priority': Alberta government looks to bring back tax credit for gaming, digital media sector," CBC News, November 18, 2022, https://www.cbc.ca/news/canada/calgary/video-game-digital-media-tax-credit-1.6656845; "Alberta may lose digital media jobs after budget snub, say developers," Calgary Herald, March 1, 2023, https://calgaryherald.com/business/alberta-may-lose-digital-media-jobs-after-budget-snub-say-developers; Coutney Nickerson, "Opinion: No advantage for Alberta's video game industry," Edmonton Journal, December 21, 2023, https://edmontonjournal.com/opinion/columnists/opinion-no-advantage-for-albertas-video-game-industry

94 Office of the Premier (Government of Alberta), Mandate Letter to Minister of Technology and Innovation, November 10, 2022, https://open.alberta.ca/dataset/71ebe02e-bda3-46f3-8ddd-6bf3a0d3d7ca/resource/7e1272b6-68e0-4d50-8f07-9df538ebc4d1/download/ti-mandate-letter-technology-and-innovation.pdf

Indeed, as a 2015 report by GameCamp Edmonton notes, "What makes Alberta a smaller player in the video game industry in Canada, however, is not its level of talent or expertise, but a difference in the playing field in Alberta in comparison to what is offered in numerous other provinces in Canada, notably Québec, British Columbia and Ontario."[95] As of Alberta's 2024 provincial budget, there have been no new developments regarding a renewed provincial IDM tax credits.[96]

Interactive Digital Media Tax Credits Across Canada

Most tax credits offered to IDM industries across Canada cover labour related to media production. However, a few, such as Ontario's Interactive Digital Media Tax Credit, also cover marketing and commercialization expenses. In addition to provincial tax credits, the federal government provides tax credits to IDM companies through its Scientific Research and Experimental Development (SR&ED) Tax Credit.[97] In addition to tax credits, various federal and provincial subsidies are available to the IDM industry, such as the Canada Media Fund.[98] Table 6 outlines current provincial interactive IDM tax credits offered throughout Canada.

Table 6: Provincial Interactive Digital Media Tax Credits Across Canada (2024)[99]

			Eligible expenses	
Province	**Program name**	**Benefits**	**Marketing**	**Production**
British Columbia	Interactive Digital Media Tax Credit	17.5% "eligible salary and wages."		✓
Manitoba	Manitoba Interactive Digital Media Tax Credit	35-40% "qualified labour expenditures, and some marketing and distribution expenses."	✓	✓
Ontario	Ontario Interactive Digital Media Tax Credit	35-40% "eligible Ontario labour expenditures and eligible marketing and distribution expenses."	✓	✓
Québec	Québec Production of Multimedia Titles Tax Credit	37.5% "eligible labour expenditures."		✓
Prince Edward Island	PEI Labour Rebate	25% "eligible salaries and wages."		✓
Nova Scotia	Nova Scotia Digital Media Tax Credit	Lesser of 50% "qualifying expenditures" or 25% "total expenditures," and possible 5-10% "geographic area bonus."		✓
Newfoundland and Labrador	Newfoundland and Labrador Interactive Digital Media Tax Credit	40% "qualifying expenditures, which consist of eligible salaries plus 65% of eligible remuneration paid."		✓

95 GameCamp Edmonton, "The Alberta Game Development Industry," December 2015, https://digitalalberta.com/wp-content/uploads/2016/10/2015-Alberta-Video-Game-Industry-1.pdf, 6.

96 See: Government of Alberta, "Budget 2024," https://www.alberta.ca/budget

97 Hugo Labrande and Elliot Cudmorem, "SR&ED in the video game industry," Copoint, April 7, 2022, https://www.copoint.ca/insights/sr-ed-video-games

98 Government of Canada, "Canada Media Fund," last update: April 18, 2023, https://www.canada.ca/en/canadian-heritage/services/funding/media-fund.html

99 BDC, "Funding programs for creative and cultural industries," accessed April 17, 2024, https://www.bdc.ca/en/articles-tools/entrepreneur-toolkit/templates-business-guides/list-creative-cultural-industries-funding-programs; PwC Canada, "The Big Tables: Canada's tax incentives for film, video, digital media and animation projects, part 2 – The Big Table of digital media incentives in Canada 2024," https://www.pwc.com/ca/en/industries/entertainment-media/publications/film-video-tax-incentives-canada.html; Government of British Columbia, "Interactive digital media tax credit," last update: February 22, 2024, https://www2.gov.bc.ca/gov/content/taxes/income-taxes/corporate/credits/interactive-digital-media; Government of Manitoba, "Manitoba Interactive Digital Media Tax Credit," accessed April 17, 2024, https://www.gov.mb.ca/jec/busdev/financial/midmtc/index.html; Ontario Creates (Government of Ontario), "Ontario Interactive Digital Media Tax Credit (OIDMTC)," accessed April 17, 2024, https://www.ontariocreates.ca/tax-incentives/oidmtc; Investissement Québec, "Production of Multimedia Titles," accessed April 17, 2024, https://www.investquebec.com/quebec/en/financial-products/smbs-and-large-corporations/tax-credits/production-of-multimedia-titles.html; Government of Nova Scotia, "Digital Media Tax Credit," last update July 26, 2019, https://www.novascotia.ca/finance/en/home/taxation/tax101/businesstax/corporateincometax/digitalmediataxcredit.aspx.html; Government of Prince Edward Island, "PEI Labour Rebate," accessed April 17, 2024, https://www.princeedwardisland.ca/en/service/pei-labour-rebate; Government of Newfoundland and Labrador, "Newfoundland and Labrador Interactive Digital Media (IDM) Tax Credit – Guidelines," accessed April 17, 2024, https://www.gov.nl.ca/fin/tax-programs-incentives/business/idmtc-guidelines/

Québec's Production of Multimedia Titles Tax Credit

Introduced by the Québec provincial government in 1996, the Production of Multimedia Titles tax credit (CTMM) provides a refundable tax credit to IDM companies, such as video studios, operating in Québec. The CTMM tax credit will cover 37.5% of eligible salaries of IDM workers, significantly reducing the cost of producing IDM products in the province. A recent analysis of CTMM published by the Université de Sherbrooke notes that, since the implementation of tax credits in the province, the "video gaming industry in Québec has grown significantly, particularly in terms of employment."[100] Total employment in the Québec video game industry was 13,500 positions in 2021, with the majority of these jobs concentrated in larger companies, such video game studios producing AAA game titles, employing over 100 people—with Ubisoft alone employing close to one-third of the industry's total workforce in Québec.[101]

Companies benefiting from the CTMM tax credit generated $3.5 billion in gross income in Québec in 2019.[102] Total tax expenditure for the CTMM program is estimated at $293 million in 2019, with the cost in forgone tax revenues per video game job estimated at $23,000.[103] These metrics demonstrate how a tax credit program such as CTMM can act as a catalyst to attract IDM employers to a province and, over time, create a dynamic, world-renown industry supporting thousands of high-paying IDM jobs. However, it demonstrates the significant cost for governments to forgo tax revenue to offer tax credit programs like CTMM.

100 Michaël Robert-Angers and Luc Godbout, "Toward a Tailored Review of the Refundable Tax Credit for the Production of Multimedia Titles," Chair in Taxation and Public Finance, Université de Sherbrooke, February 2023, https://www.dropbox.com/s/fevtnw63tm4i3h1/Tax%20Credit%20Study%20%28Godbout%29.pdf?_hsenc=p2ANqtz-_j2xia_qtdzxRCsxz1uqvXAwNdVvNUlirF0r-ASIwwUeaaxP7pzrPznEWCgKPbwynxXskmgr24aCfTdmCkic0zvB6x8p62n34ujX-cWIwXs7c0JI8&_hsmi=254098789&dl=0&utm_content=254098789&utm_medium=email&utm_source=hs_email, 4.

101 Ibid., 43.

102 Ibid., 13.

103 Ibid., 15 & 43.

Conclusion

Alberta's IDM industry is marked by innovative solutions and applications. With 177 studios, video games are the dominant subindustry, followed by XR. While the Alberta-made video games ecosystem originates from homegrown success stories like BioWare, XR is a novel blend of technologies whose use cases extend to education, healthcare, energy, and natural resources.

Employing approximately 4,500 to 5,200 people in technical, artistic, design, and operational roles, Alberta IDM's employment rate has outpaced that of the general economy for years. Despite a challenging economic climate, this growth is expected to continue, with Alberta adding up to 3,500 new IDM jobs by 2030.

Mid- to senior-level talent is key to this equation as employers look to optimize their production processes and maximize labour value; workers with technical skills and experience are crucial to propelling the industry and helping it scale. Junior talent also plays a role in the long term, but building this future pipeline requires greater collaboration between post-secondary education and industry. Where junior talent may be interested in the exciting opportunities in the IDM industry, ensuring that they have the right blend of technical and workplace skills to succeed is essential.

This alignment, alongside strategic support for scaling homegrown studios and attracting high-quality investment, is key to expanding Alberta's IDM ecosystem.

Appendix: Research Methodology and Limitations

Methodology

Primary Research

Employer Survey

An employer survey was circulated to IDM firms in Alberta and firms that employ individuals in IDM roles in Alberta. The survey consisted of 55 questions about the firm's characteristics, employment trends, in-demand jobs, hiring pathways, and education. A total of 72 respondents took the survey.

Key Informant Interviews

ICTC conducted 28 KIIs with stakeholders from Alberta IDM companies. While the insights gathered in these interviews were used to provide qualitative insight and to elaborate on trends studied from broader data, it should be noted that the sample pool of interviews is very small and should not be considered representative of the entire IDM industry.

Advisory Committee

ICTC held three virtual discussion meetings with the advisory committee for this project. The advisory committee comprised 11 members from industry, academia, and the public sector. Insight gathered from these discussions was used to validate findings, direct research, and provide nuance about the industry and employment in the province of Alberta.

Secondary Research

The secondary research was comprised of two parts. The first included a literature review of relevant materials that informed the analysis in this paper. Past work included information on IDM industries, the digital economy in Alberta, labour challenges in the province and those that affect the industry, and other topics explored in this paper. The second part of the secondary research consisted of an ecosystem or market map. Using several secondary (and primary) sources, ICTC identified companies working in the IDM industry in Alberta. ICTC identified their primary location, estimated the number of people working there, and categorized them into their primary IDM function.

Web Scrape

Throughout the project, ICTC analyzed job postings from various sources to identify Alberta's in-demand IDM jobs and skills. The analysis included distilling other important information contained in these job postings.

Employment Estimate

ICTC used survey responses from its industry survey in combination with a custom data set of Alberta-based IDM companies to estimate total industry employment. First, ICTC calculated the total employment of the survey sample. Second, ICTC used its custom data set of Alberta-based IDM companies to estimate the total number of IDM firms operating in Alberta. ICTC combined these data points to estimate total employment for the entire IDM industry. The custom dataset was also used to estimate the geographic distribution of IDM firms in Alberta and the percentage of total employment that each subindustry accounts for in Alberta, Calgary, Edmonton, Lethbridge, and the remainder of Alberta, respectively.

Employment Estimate and Forecast

ICTC mapped the jobs from the survey, KIIs, and web scrape to a list of 11 National Occupational Classification (NOC) codes deemed relevant to the IDM industry.[104] ICTC then used data from the Labour Force Survey (LFS) to estimate the number of individuals working in these occupations from 2006 to 2024 (Table 7).

A similar approach was used to link Alberta's IDM companies to the North American Industry Classification System (NAICS) codes. ICTC identified 5 NAICS codes that together represent most of the IDM industry.[105] By intersecting the IDM NOC codes and the IDM NAICS codes, ICTC was able to isolate and estimate the number of IDM workers employed in the IDM industry.[106]

NAICS codes were used to create a subset of individuals working in NOC codes specifically related to the IDM industry. The NOC codes capture all individuals working in these professions regardless of the industry; the NAICS codes are used to better capture the number of individuals working in the IDM industry.

Table 7: NOC Mapping and Sample IDM Job Titles

2021 National Occupation Code		Sample Job Titles
21232	Software developers and programmers	► Interactive media developer ► Interactive media programmer ► Animation programmer ► Graphical user interface (GUI) designer ► Graphical user interface (GUI) developer ► Mobile applications developer ► Artificial intelligence programmer ► Software development project manager
21233	Web designers	► Interactive media consultant

104 The selected NOC codes comprise the core technical, creative, and design talent present in the IDM industry (referred to hereafter as specialized IDM occupations), and exclude non-specialized, economy-wide roles related to finance, human resources, or administration.

105 These NAICS codes are at the 4-digit level. Data with further granularity such as using 6-digit NAICS from the 2022 schedule was not available at the time of this study.

106 Please see the methodology section in Appendix A for details

2021 National Occupation Code		Sample Job Titles
22222	Information systems testing technicians	► Video game tester
41402	Business development officers and market researchers and analysts	► Business development officer ► Marketing data analyst
50011	Managers - publishing, motion pictures, broadcasting and performing arts[107]	► Executive producer - video games
51111	Authors and writers (except technical)	► Interactive media writer ► Dialogue writer
51120	Producers, directors, choreographers and related occupations	► Video game art director ► Video game producer ► Video games project manager
52111	Graphic arts technicians	► Video game artist ► Visual effects (VFX) artist ► Rendering specialist
52113	Audio and video recording technicians	► Digital effects specialist ► Sound engineer
52119	Other technical and coordinating occupations in motion pictures, broadcasting and the performing arts	► Production coordinator - video games
52120	Graphic designers and illustrators	► Interactive media designer ► Digital animator - artist ► 2D animation artist ► 3D animation artist ► 3D artist ► Technical artist ► Graphic design and illustration animator ► 3D modeler ► User experience designer ► Concept artist

Employment was averaged over a six-month period to account for the high variance in the number of people employed in a given month. Once the historical data was estimated, the time series and an autoregressive integrated moving average (ARIMA) model were used to estimate growth in the Albertan IDM industry over the next six years to 2030.

107 50011 – Managers - publishing, motion pictures, broadcasting and performing arts were not included in the forecast estimates due to high-levels of suppression at both the national and provincial level.

The model assumes that current and future employment values depend on previous employment levels in the province. GDP per worker was estimated using documented growth trends in the sector alongside initial estimates provided by the province. These GDP estimates were used to create a band, both low and high, of the added GDP resulting from the employment growth. Below is the mapping from industry to the North American Industry Classification System used in the IDM employment estimation and forecast. Table 5 shows the industry classification using the 2022 schedule; due to the unavailability of the 2022 NAICS codes for LFS data, the 2022 NAICS codes were mapped back to the 2017 schedule.

Table 7: NAICS Codes Mapping and Selected Industry Titles

2022 NAICS 4-Digit Aggregations	6-Digit Codes	Included Industries
5132 Software publishers	**513212** Video Game Publishers	▸ Designing and publishing or publishing video games only ▸ Video game designing and developing (with publishing) ▸ Video game software publishing ▸ Video game software publishing (including designing and developing) ▸ Video game software publishing exclusively on Internet
5121 Motion picture and video industries	**512190** Post-Production and Other Motion Picture and Video Industries	▸ Special effects for motion picture, post-production ▸ Specializing in motion picture or video post-production services, such as creating credits, producing computer graphics and animation
5162 Media streaming distribution services	**516212** Media streaming distribution services	▸ Media (e.g., audio, video) streaming distribution services ▸ Web broadcasting
	516219 Other media content providers	▸ Operating gaming sites (exclusively on Internet) ▸ Social networking websites ▸ Operating web communities
5182 Computing infrastructure providers, data processing, web hosting, and related services	**518210** Computing infrastructure providers, data processing, web hosting, and related services	▸ Game server hosting providers ▸ Computing platform infrastructure provision ▸ Media streaming data storage services
5415 Computer systems design and related services	**541515** Video game design and development services	▸ Custom design of video games to meet the needs of specific users ▸ Custom designing video games ▸ Video game designing and developing (without publishing)

Research Limitations

While every effort was made to ensure that the research underlying this report was as exhaustive as possible, a few limitations exist.

Measuring the Size of the IDM Labour Force

The IDM industry is not well-defined and lacks proper documentation in historical data. ICTC utilized a combination of secondary and primary research to estimate the size of the IDM industry and its labour force in Alberta. However, the approach outlined in this report has a few limitations. First, the roles identified as "IDM NOC codes" are limited to the tech talent required for building and developing IDM products.

These IDM NOC codes encompass in-demand roles such as technical artists, video game programmers, and VFX artists but do not include administrative roles essential to many firms' operations, such as finance, human resources, and accounting. Second, NAICS aggregation by Statistics Canada primarily captures the labour force in the IDM industry but may also include additional labour not classified as IDM industry workers. These limitations suggest that the IDM industry labour force estimates could be either higher or lower than what is presented. While ICTC will continue to track this data over time, the overall size of the IDM industry may be smaller or larger than the initial estimates.

Key Informant Interviews

Information from KIIs should be interpreted cautiously. ICTC has done its best to validate the information provided by interviewees. However, because the KII data is inherently tied to the individual's beliefs and interests, some insights may reflect the individual's perception of the industry rather than the industry itself.

Survey

One limitation of the survey is the quality of the respondents' sample and whether it constitutes a random sample. If the firms in the sample that completed the survey are not entirely reflective of all IDM firms in the province, then the survey can lead to biased estimates. As such, survey data should be interpreted cautiously as the opinions and beliefs of the respondents rather than those of the entire IDM industry.