REALITY CHECK:
The State of Vancouver and BC's VR/AR Ecosystem

A comprehensive study that maps out the industry and provides policy recommendations

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VANCOUVER ECONOMIC COMMISSION

VANCOUVER VR/AR ASSOCIATION

VIFF Vancouver International Film Festival

Finger Food Advanced Technology Group

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Preface

Vancouver is fortunate to have a highly diverse, modern economy, with its traditional strengths in resources augmented by industries such as finance, ICT, film & TV, tourism. In more recent years, we have seen the rapid emergence of a number of new "21st century" sectors such as biotech, AI, blockchain and most notably for this report: virtual and augmented reality (VR/AR).

The challenge of these new sectors is to understand how they have emerged, what they are comprised of, and most importantly, what can be done to support their growth – a challenge made even more difficult by a lack of available data from sources such as Statistics Canada, which can be relied upon for data on more traditional sectors – hence the reason for this report.

The Vancouver Economic Commission (VEC) and the Vancouver International Film Festival (VIFF) have partnered with the Vancouver VR/AR Association to deepen our understanding of this exciting and rapidly emerging sector, with a view to informing key audiences – including the VR/AR community itself – and our federal and provincial partners.

We hope you find the information in this report useful, and encourage you to consider how you can play a role in securing and enhancing the future for VR/AR in Vancouver and BC.

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As the technological landscape progressively evolves away from interactions limited by simple flat screen interfaces — a paradigm dominant for decades — an expanded landscape of richer and more intuitive experiences and tools is destined to take its place.

In order to realize the economic benefits of these technological changes, it is essential to provide the right support and infrastructure for the VR/AR industry. This study was undertaken to gain a detailed understanding of the state of the VR/AR ecosystem in Vancouver and BC — in terms of jobs, revenue, talent, and investment — and to identify any gaps hindering the performance of companies.

A survey of companies, a series of in-depth interviews with stakeholders, and secondary research was carried out to explore the state of the VR/AR ecosystem in this province, and to provide relevant information as a basis for formulating recommendations and providing appropriate support for this exciting industry with dramatic potential for growth and societal good.

Aerial View of False Creek, Tourism Vancouver

Key Findings of the Study

» **VR/AR is an emerging sector**
The VR/AR sector in BC is relatively young – 71 percent of survey respondents were founded during the past 10 years, and 29 percent were founded more than 10 years ago. Some of the companies with a longer history have recently expanded or pivoted into VR/AR from other high-tech or media-creation activities.

» **VR/AR has a wide range of applications**
The BC companies surveyed and interviewed for this study show a diversity of involvement in VR/AR technologies and applications. This bodes well for the local and regional ecosystem as companies are either fully immersed in the different dimensions of VR/AR, or are researching and developing relevant applications to the full extent of this technology's potential.

» **BC's VR/AR sector creates high skilled jobs**
The job creation potential of the VR/AR industry in BC is significant. On average, surveyed VR/AR companies employ 25 full-time persons, 18 of whom are highly qualified STEM hires. Companies surveyed were also very optimistic about their expected growth in employment. During the next 12 months, companies expect to reach an average 44 percent growth rate of full-time jobs. In addition, 92 percent of companies surveyed said they expect to "expand" over the next two years.

» **BC's VR/AR sector is growing**
The most important ultimate indicator of success for a company is revenue, and as companies grow in revenue so too do their positive impact on the economy. Of the companies in a startup or developing stage, 64 percent of those surveyed have revenues of less than $500,000 each. Of companies in a growth stage, 20 percent surveyed report revenues of $500,000 to $3 million. More mature, larger companies earning $3 million or more in revenues make up the remaining 16 percent of the sample.

» **VR/AR is a global opportunity**
The diversity of the geographic sources (markets) represents the high potential for continued revenue growth for the companies surveyed. The more diverse the markets for revenues, the more likely the potential for continued growth. Revenue earned from the BC market accounts for 35 percent of total revenue. International exports account for 51 percent of all revenues, with US exports making up the biggest share at 39 percent. Exports to other Canadian provinces account for 14 percent of total revenues.

Vancouver VR/AR Association

» **BC's VR/AR companies are investing in R&D**
Surveyed companies have spent significantly on R&D to realize their growth potential from commercialization of research. Seventeen percent have spent over $1 million each and 24 percent have spent between $150,000 and $1 million. Fifty-nine percent have spent $150,000 or less on R&D. This latter amount is still significant given that 64 percent of companies surveyed can be considered startups or in early stages of development with low revenues.

» **BC's VR/AR industry lacks homegrown investors**
Although investments into BC VR/AR companies come from both within and outside of the province, BC-based sources of capital make up only 23 percent of the total. Foreign investment from outside Canada generally accounts for 53 percent of the total – with the US contributing 17 percent and other countries contributing 36 percent. Investments from other Canadian provinces make up the remaining balance of 24 percent. This demonstrates that geographically there is a broad base of investor interest in BC VR/AR companies.

» **Access to capital & investment is a major challenge**
Notwithstanding this broad interest in VR/AR, this study shows that access to capital and investment financing is still a major challenge for VR/AR companies, particularly for those companies in the startup and growth stages of their business. Approximately half of the surveyed companies have raised less than $50,000 in capital each, highlighting the need to address the challenge of securing financing for further growth in this industry area of the BC economy. Of companies surveyed, only 29 percent have raised between $50,000 and $1 million; only 22 percent of companies have raised over $1 million in capital. Comparisons can be made to sectors like cleantech and life sciences which receive considerably more early-stage funding, and particularly from government grants and funds.

» **BC's VR/AR companies need more access to customers and talent**
In addition to access to capital, other major challenges cited by companies surveyed include: finding new customers in domestic and foreign markets; finding and keeping qualified talent; insufficient government support; increased operational costs (including taxes and costs of materials and equipment); and finding and retaining affordable spaces.

» **Satisfaction of current support infrastructure is low**
Generally, there is low satisfaction among VR/AR companies across all ecosystem support categories. These include investment, corporate matchmaking, government support, ecosystem, support infrastructure, export opportunities, skills and training institutions, and community initiatives. The major gaps in the ecosystem are investment, corporate matchmaking and government support.

Recommendations

There is global competition for leadership in VR/AR technology. Other jurisdictions in Canada and around the world are providing significant support to help their local and regional VR/AR infrastructures and communities advance and contribute to economic growth. The gap analysis provided in this study, and the views expressed by BC- and Vancouver-based companies on their challenges and opportunities, suggests that this is a time for action in this province. The following recommendations emerge from the findings of this study. The full rationale for each recommendation is provided at the end of the report.

Recommendation 1 | Community
Fund basic operation costs for key community organizations to facilitate regular workshops, networking events and talks.

Objectives: Strengthen the relationships between key community organizations and unify the organizations to achieve strategic goals that benefit the entire ecosystem; and enable people in the community to learn from one another and explore new business opportunities with each other.

Recommendation 2 | Talent
Incentivize post-secondary institutions, accelerators/incubators, and bootcamps to develop skills training programs.

Objectives: Address shortage of qualified talent for VR/AR companies to grow and scale; and address gaps in practical business knowledge to help founders to be investment ready.

Recommendation 3 | Support Infrastructure
Build a shared facility to incubate early-stage VR/AR startups and provide mentorship, coaching, and device rental services.

Objectives: Reduce startup costs for early-stage founders and increase quality of investment-ready startups. To implement this recommendation, it would be necessary to identify who would be responsible for managing this shared facility.

Recommendation 4 | Investment
Foster the creation of angel networks and investor education programs; and fund inbound delegations of foreign investors to meet local companies.

Objectives: Educate investors on how to invest in a VR/AR startup; and help local early-stage startups connect with foreign investors without the need to travel.

Recommendation 5 | Corporate Matchmaking
Connect VR/AR startups with traditional domestic sectors to explore new innovative use cases of VR/AR technology in these sectors.

Objectives: Help enterprises innovate at the speed of startups; and help startups commercialize their technology.

Recommendation 6 | Tax Incentives
Increase the BC Interactive Digital Media Tax Credit from 17.5 percent to 25 percent and advocate for fair distribution of Telefilm and CMF funding in the interactive and experimental programs.

Objectives: Provide higher tax incentive for companies to adopt VR/AR technology to create more content. VR/AR founders can reinvest money from tax credit to grow their businesses. Support the fair distribution of federal funds that are currently skewed towards Ontario and Quebec, and increase the chances of BC companies being funded by CMF and Telefilm.

Recommendation 7 | Export Development
Fund operational costs for organizing trade missions to foreign markets.

Objectives: Empower industry associations to represent local VR/AR companies, and help them to facilitate international business deals. There are existing programs that help companies participate in trade vs, but there are no funding programs that reimburse operators who organize and plan trade events and delegations. The CanExport program, for example, does not typically reimburse operating costs.

Precision OS

Introduction

Virtual reality (VR), augmented reality (AR), and other immersive technologies are an important next step in the evolution of computing. As the technological landscape progressively evolves away from interactions limited by simple flat screen interfaces — a paradigm dominant for decades — an expanded landscape of richer and more intuitive experiences and tools is destined to take its place. Enabled by these new immersive platforms, enhanced volumetric and interactive experiences are likely to change the way people encounter the world, with new styles of computing never before experienced. Freeing the imaginations of content creators from the limitations of location, scale, and from many of the practical constraints of the physical world. This has the potential to usher in an era of awe-inspiring entertainment, remarkable health solutions, and extraordinary training tools – to name just a few of the exciting new applications.

Positive economic, social, and health impacts are likely to flow from such a technological sea change; this trend has been well documented by researchers and analysts forecasting the effects of these disruptive technologies.[1] Indeed, government agencies, investors, entrepreneurs, and content creators around the world have been making significant investments into immersive technologies and solutions over the past decade.

As a province with important technology, media, and gaming sectors, British Columbia can play a leading role in bringing these solutions to the global market – and to do so in a way that engenders immediate local economic benefits that multiply into broader societal improvements.

In order to realize the benefits of these promising technologies, however, it is essential to provide the right support and infrastructure for the industry. Gaining a good understanding of the state of the ecosystem in BC in terms of jobs, revenue, talent, investment, and identifying any gaps hindering the performance of companies is vital. This report, which explores the state of the VR/AR ecosystem in BC, aims to provide the basis for this understanding, enabling stakeholders such as companies, government, educational institutions, and investors to formulate recommendations and provide the appropriate support for this important industry.

Vancouver VR/AR Association

1 https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/augmented-and-virtual-reality-the-promise-and-peril-of-immersive-technologies

Vancouver VR/AR Association

What is VR/AR?

Virtual reality and augmented reality describe families of technologies and platforms that use diverse interconnected methods to simulate a user's presence in an alternative or enhanced world. These technologies stimulate some of the senses — typically sight, hearing, touch and increasingly motion — to provide the illusion of interacting with an entirely fictional world, while having only limited reference to the user's immediate physical surroundings (as is the case in VR), or of interacting with an enhanced version of the physical world (as is the case in AR or mixed reality).

Gaming provides an excellent example of applying virtual reality to the creation of entirely novel worlds. Most commonly effected using head-mounted devices coupled with hand-held controllers, these technologies whisk users away into fantastical environments where they can fly, become soldiers, or create structures without limitations. Corporate training, navigation, or first response safety all provide excellent examples of applying augmented reality technologies to enhance the user's interaction with real-world events, structures, or objects. Today, for example, large aerospace companies are using AR technologies to provide interactive models for training or creating step-by-step diagnostic routines that virtually overlay onto multi-million-dollar parts, guiding workers in resolving complex problems quickly, with the information they need visible right at their fingertips.

Seeing is Believing

In a recent report published by PwC titled, "Seeing is believing: How virtual reality and augmented reality are transforming business and the economy," PwC economists estimated that VR and AR have the potential to deliver a $1.5 trillion boost to the global economy by 2030 up from the current GDP contribution of $46.4 billion. PwC analysis suggests that AR will provide the bigger boost to GDP through to 2030, generating $1,092.4 billion, whereas VR will generate $450.5 billion in global GDP. The report also predicts that the global VR/AR workforce will grow to 23,360,639 by 2030, from 824,634 in 2030.

$1.5 Trillion

GDP Boost to the Global Economy by 2030

(PwC, 2019)

VR/AR as the Next Computing Platform

The key to understanding the promise of these technologies and of their potential applications is placing them in the context of similar groundbreaking technological changes. The history of computing is written in stories of incremental improvement that occur over long periods coupled with stories of dramatic upheaval driven by revolutions in underlying technologies.

The earliest days of the modern electronic era of computing began with machines built from simple vacuum tubes manually wired together. These behemoths consumed outrageous amounts of power by today's standards, were notoriously prone to failure, and occupied entire rooms — but they were nevertheless a substantial revolutionary improvement in performance over earlier electromechanical counting devices based on magnetic relays. Similarly, those electromechanical counting devices were a dramatic improvement over the mechanical counting devices that preceded them.

The subsequent development of the solid-state transistor, invented in the 1940s, introduced the benefits of a system that had no moving parts to wear out and a much higher potential for increased density at scale. Manual connections remained a problem, but it was eventually solved by integrating transistors into microelectronic circuits. With all connections now planned in advance and created in a single process during manufacturing, a new era of computing was born.

For decades, the industry marched along a pathway of incremental improvement, with performance and capacity increasing year over year, while size and power consumption progressively dropped, and resolution of displays grew to be closer and closer mirrors of reality. Finally, decreases in power consumption crossed a critical intersection with improving capacity for energy storage in the form of new lightweight battery technologies, and the next revolutionary era of mobile computing was born in the 1990s. This mobility revolution continued through the early 2000s, first by progressively extending the function of traditional computing platforms — mostly by creating portable incarnations of the desktop computing paradigm — but ultimately peaking with the introduction of transformative mobile phone technologies, now a universal computing platform.

Technology has begun to catch up to the human imagination, opening up the potential for creating immersive true-to-life virtual experiences

Cloudhead Games

Much like the desktop computing platforms of the 1990s, and the laptop computing platforms that succeeded them, the technologies that underpin mobile phones (i.e. enabling portability) and gaming platforms (i.e. world building and simulation) have been undergoing impressive incremental improvements for most of the past two decades. Concomitant to these improvements, a new possibility for the next revolutionary technology emerged in the form of virtual reality. Where previously had existed multiple barriers to verisimilitude in the forms of capacity constraints, measurement device insufficiency, lack of portability, or inadequate software tools, now technology has begun to catch up to the human imagination, opening up the potential for creating immersive true-to-life virtual experiences. And with the advent of mass applications of artificial intelligence enabling the mapping of objects to the real world, these virtual experiences can increasingly be made to manifest not solely in isolated fictional spaces, but indeed as augmentations appearing to overlay and interact with the physical world around us.

VR/AR Ecosystem in Vancouver and BC

Vancouver is recognized as a leading VR/AR ecosystem in the world with more than 230 immersive technology companies at work in 2019. Second only to the Bay Area/Silicon Valley, the region has established itself as an international leader in VR/AR in a relatively short period of time — 71 percent of the companies who responded to the survey were founded in the past 10 years (see Exhibit 1).

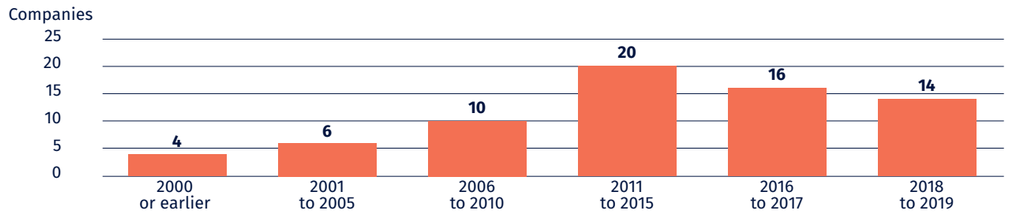
Albeit a young industry, VR/AR technology in Vancouver is backed by a decades-long legacy of excellence in film and television, video gaming, and VFX and animation.

Aptly known as "Hollywood North," Vancouver is the third-largest film and production centre in North America with more than 40 years of industry experience. Supported by state-of-the-art studios and post-production facilities, it is home to more than 64 movies and 55 television series annually, as well as hundreds of smaller productions. Closely tied to this success in film and television is the advancement of the Vancouver VFX and animation industry. There are more than 60 studios based in Vancouver, making it the largest cluster of domestic and foreign-owned VFX and animation studios in the world. As such, the region has established itself as a leading centre for technology and talent in all areas of film and television production, from live-action to animation and post-production VFX.

Similarly, the video game and interactive media industry in Vancouver has played a substantial role in laying the groundwork for the rise of VR/AR. Since Distinctive Software, now EA, was founded in 1980, Vancouver has maintained international prominence as one of the top 10 video game clusters in the world. There are more than 200 game development studios at work in Vancouver that together create more than 7,500 jobs in BC and attract a talent pool of world-class creative and technological thinkers. The Vancouver VR/AR industry has benefited greatly from the innate connection between video game and VR/AR development.

Although VR/AR has applications that extend far beyond entertainment and gaming, it was these sectors that first demonstrated its technological and economic impact. The Vancouver VR/AR industry was assisted in its formation and growth by the talent, technological proficiency, and business expertise established first by these industries. This is evidenced by the survey data, which shows 29 percent of the companies that participated were founded more than 10 years ago (see Exhibit 1). The longevity of these companies suggests resilience and endurance in the face of challenges, some of which will be described later in this report, and further highlights the role legacy industries like film and gaming have played in developing the VR/AR sector in BC.

Exhibit 1
Companies by Year Founded



#1

Largest VFX and Animation Cluster in the World

Variety Magazine

#2

Largest VR/AR Ecosystem in the World

VR Scout

#3

Largest Film & TV Production Centre in North American

Vancouver Economic Commission

Tourism Vancouver

What BC Companies Do

The BC companies surveyed and interviewed for this study have shown a diversity of involvement in VR/AR technologies and applications. This bodes well for the local and regional ecosystem, as companies are either fully immersed in the different dimensions of VR/AR, or are researching and developing relevant applications to the full extent of this technology's potential. The multifaceted aspects of BC's VR/AR ecosystem is evident in the way companies describe what they do, particularly in terms of developing and commercializing technology and specific applications for which VR/AR is particularly suited. Vancouver-based and BC companies in general provide virtual and augmented reality platforms to advance training and education methods and systems, and to enable interactive experiences for a variety of other applications in many sectors such, as health and medical devices, tourism, real estate, games and entertainment, aerospace and defense, natural resources, transportation, and arts and culture — to name a few.

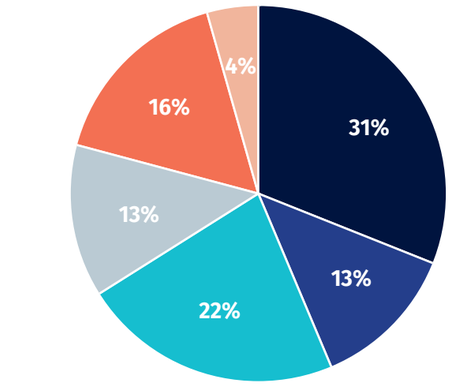
Companies surveyed are providing or developing numerous applications for VR/AR technology: 3D visualization tools for industries; immersive reality and game development studios; interactive arts exhibitions; animated storytelling platforms; software for developing mobile apps, complex websites, and enterprise applications; interior design services; medical preoperative planning tools; and complex clinical and health VR/AR experiences, such as surgical simulations for residents and surgeons. They provide training simulations with dynamic speaking virtual humans in virtual reality that make learning a truly engaging and empowering experience. As one company put it: "We create remarkable moments."

> **"Virtual and augmented reality will become a part of people's daily lives"**
>
> **Mark Zuckerberg**
> CEO, Facebook

It is very difficult to categorise VR/AR products and services because of the extensiveness and potential of their ubiquitous applications. Nonetheless, the following chart provides a high-level grouping showing specific responses of 71 BC-based companies indicating what their products and services are. The largest category at 31 percent is "content development and games." "Services" — which includes training and design — is second at 22 percent. "Visualization and analytics" is the third most frequently cited category by BC-based companies at 16 percent. "Tools and technology" and "interactive experiences" together make up 26 percent of responses (13 percent each).

Exhibit 2 generally shows that there is a great diversity of VR/AR products and services being provided or developed by the BC-based companies surveyed and interviewed for this study.

Exhibit 2
Company Products and Services by Category



- **Content & Games** comprises Content, Digital Avatars/Characters, Games, Reality Capture
- **Interactive & Experience** comprises Live Events, Location-Based, Social
- **Services** comprises Advertising, Agency Design/Development, Distribution, Training
- **Tools & Technology** comprises 3D Tools, Components, Head-Mounted Displays, Input, SDK
- **Visualization & Analytics** comprises Product Visualization, Analytics, Data Visualization
- **Other** includes Broadcasting, Curation, Publishing, Robotics

Job Creation

The job-creation potential of the VR/AR industry in BC is significant. Sixty-six companies in the survey responded that on average in 2019 they employed 25 full-time persons (of whom 18 are STEM jobs), 5 part-time persons (of whom 3 are STEM), and 7 contract persons (of whom 4 are STEM). The total number of full-time persons employed in the sixty-eight VR/AR companies were 1,665 in 2019, of whom 1,053 (or 63 percent) are highly qualified STEM jobs. Extrapolating the findings from the survey sample to all known VR/AR entities in Vancouver and BC, the total jobs for the industry in the province would be over 2,500 — and as many as 3,000 if all VR/AR professionals working at big companies are included.

Exhibit 3
Current VR/AR Employment of Companies Surveyed

	Total Employees	Number of Companies	Average Employees
Full-Time Employees	1,665	66	25.2
Part-Time Employees	211	39	5.4
Contract Employees	369	52	7.1

Exhibit 4
Science, Technology, Engineering, Mathematics (STEM) Employment of Companies Surveyed

	Total Employees	Number of Companies	Average Employees
Full-Time Employees	1,053	58	18.1
Part-Time Employees	74	24	3.1
Contract Employees	159	40	4.0

Companies were asked what their expected growth in employment during 2020 is likely to be. The response was very optimistic. For 66 companies the expected average growth of full-time jobs is 43.6 percent.

Exhibit 5
Growth of Full-Time Jobs Expected in 2020 of Companies Surveyed

Total current full-time jobs	1,665
Total full-time jobs anticipated to hire in 2020	726
Percentage increase from current full-time employment (without attrition)	43.6%
Number of companies	66
Average expected new full-time jobs per company	11

Vancouver VR/AR Association

This sense of optimism about their near-term prospects was further confirmed when companies were asked what their general growth expectations were for the next two years. Ninety-two percent of companies said they expect to “expand.” Only two percent said they would “downsize," and six percent said they would “stay the same.”

There are many cited reasons by companies for this optimism. These include the following:

- they are launching new products and/or services;
- the market is ready for their offerings;
- the game industry continues to rise;
- they have a firm grip on a niche in the market;
- they have a sustainable business model;
- they have many promising leads;
- their partnerships are growing; and
- they are seeing interest in their technology from a variety of sources and potential customers.

Exhibit 6
Growth Expectations (Next Two Years)

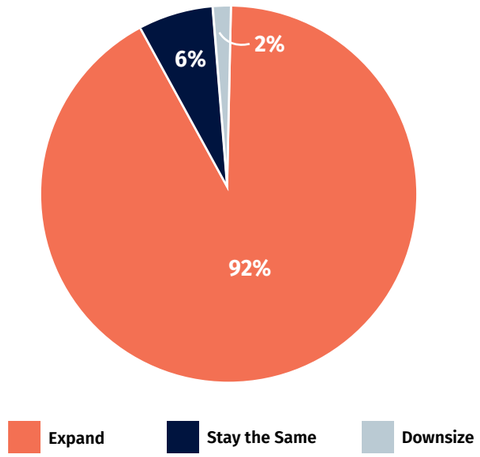
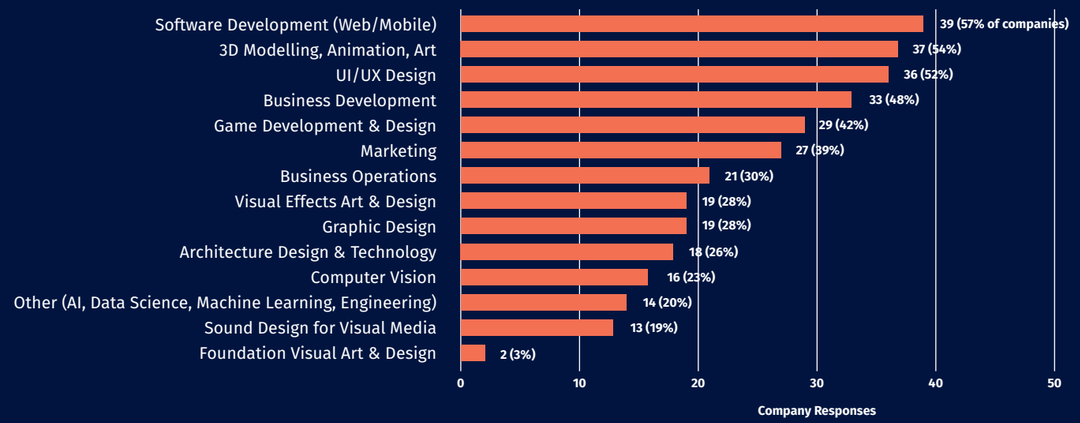


Exhibit 7
Skillsets Needed for VR/AR Companies

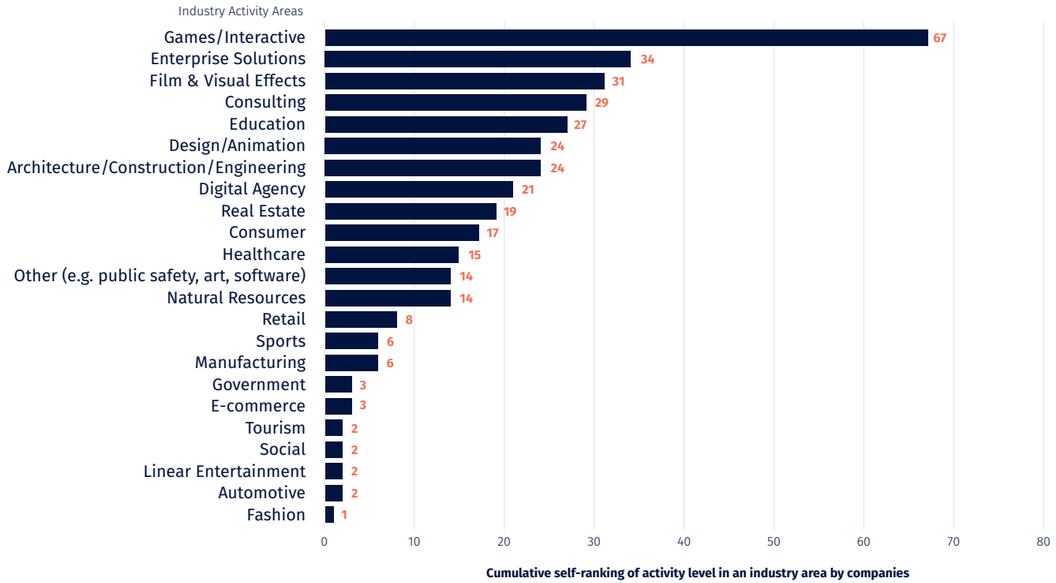


The jobs-creation potential of the VR/AR industry in BC is mostly in highly skilled personnel, in both professional and technical jobs. The most desirable qualifications indicated by 69 companies in the survey are shown in the above chart, ranked in order of importance. In descending order, the list cites the most desirable skills as indicated by companies: software development (57 percent of companies); 3D modeling, animation, and art (54 percent); UI/UX design (52 percent); business development (48 percent); game development and design (42 percent); and, marketing (39 percent). Note that responses to skillsets categories are not mutually exclusive, since each company was asked to indicate all the desirable skills that applied to them.

Note: Sixty-nine companies responded to this question. Company responses to skillset categories are not mutually exclusive.

VR/AR Specializations in BC

Exhibit 8
Industry Areas in Which Companies are Most Active



As mentioned earlier, BC companies responding to the survey are involved with many VR/AR areas, and provide their offerings to many different industry sectors. The chart above shows that the greatest involvement is in games and interactive applications, enterprise solutions, film and visual effects, consulting, education, design and animation, architecture, construction, and/or engineering, and digital agencies. Here again, however, is shown the difficulty of classifying VR/AR activity specializations due to the overlapping and multifaceted aspects of this technology. For example, one VR/AR platform developed could impact several industry sectors and different application areas.

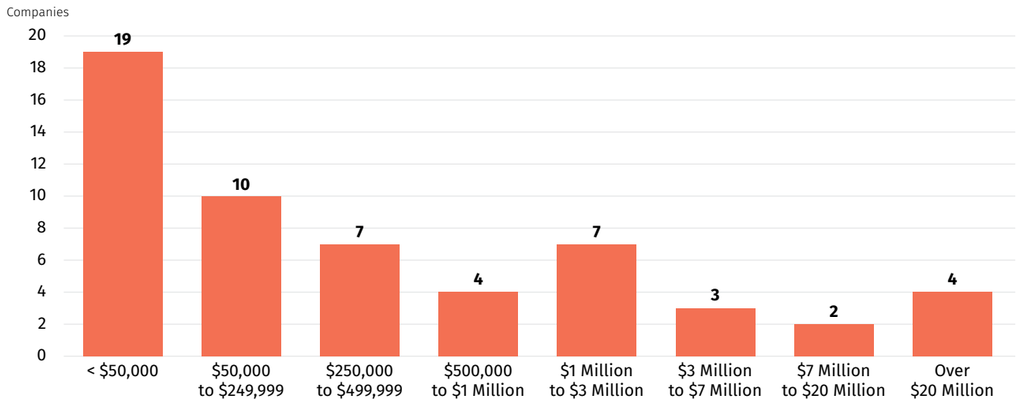
Cloudhead Games

Revenue Growth

The most important ultimate indicator of success for a company is revenue, and as companies grow in revenue so too do their positive impact on the economy. The next chart shows that the revenues of the 56 VR/AR companies who answered the revenue question in the survey are well distributed across low, medium, and high ranges. As might be expected, the largest number of companies (36) are in a startup or developing stage, with revenues of less than $500,000.

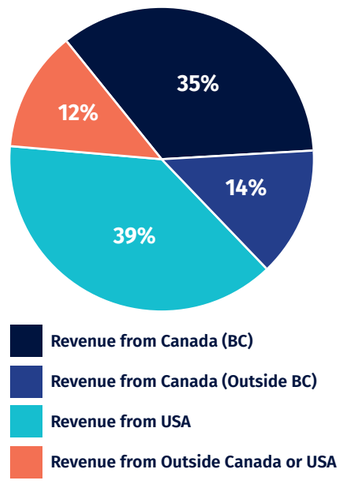
This is 64 percent of all companies responding to the revenue question. In the medium range (i.e. companies earning $500,000 to $3 million) there are 11 companies, or 20 percent of the sample. More mature, larger companies earning $3 million or more in revenues make up the balance of 16 percent (i.e. 9 companies of the sample).

Exhibit 9
Gross Revenues of Responding Companies (2019)



The diversity of the geographic sources (markets) represents the high potential for continued revenue growth for the companies surveyed. The more diverse the geographic sources of revenue, the more likely there is a potential for growth, due to wider reach and broader customer base. Exhibit 10 shows the diversity of revenue sources and customer base of the 59 companies who responded to the sources of revenue question in the survey. Revenue earned from the BC market makes up 35 percent of total revenue. This indicates that VR/AR companies in BC are successfully exporting outside Canada and are also reaching customers in other provinces of Canada. In total, 51 percent of revenues are from exports and 14 percent are from other provinces. Revenues from the USA make up the biggest share at 39 percent.

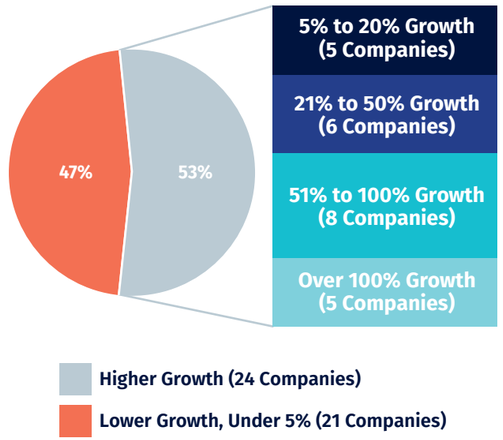
Exhibit 10
Geographic Sources of Revenue



BGC Engineering Inc.

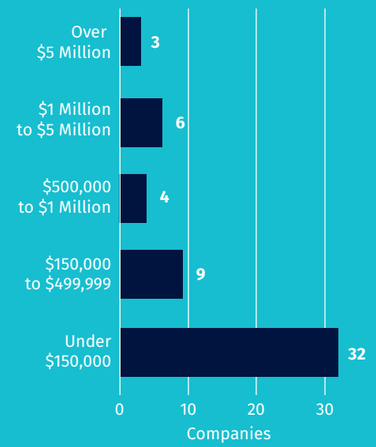
Many of the companies surveyed attributed their optimism for sales growth to the diversity of customers and the market potential as they currently see it. They also said, however, that successful sales are a result of effective commercialization of their R&D efforts and spending. Exhibit 11 shows that during 2019, 24 out of 45 companies (or 53 percent) attributed a significant amount of their sales growth to commercialization of R&D. Out of these 24 companies, 16 had a high rate of attribution of their growth to commercialization of R&D — over 21 percent — and 13 companies had very high attribution of their growth to commercialization of R&D — over 50 percent. Unsurprisingly for an industry on the edge of technological innovation, the VR/AR companies surveyed were in general very likely to rely on their R&D efforts as the driver for a significant amount of their commercial success.

Exhibit 11
Sales Growth Attributed to Commercialization of R&D



The BC VR/AR companies surveyed have spent significantly on R&D, to realize their growth potential from commercialization of research. Nine of 54 companies (or 17 percent) spent over $1 million each and 13 (or 24 percent) spent between $150,000 and $1 million. Thirty-two (or 59 percent) spent $150,000 or less on R&D. This latter amount is still significant given that 64 percent of companies surveyed can be considered startups or in early stages of development with low revenues (refer back to Exhibit 9).

Exhibit 12
R&D Spending Per Company



Vancouver AR/VR Association

Who is Investing in VR/AR?

The BC VR/AR companies surveyed are in various development stages. As the need to commercialize and increase their customer base grows, so too does their need for financing and capital expenditure. The next chart shows how much financing companies have raised. Twelve companies out of 55 in the survey each successfully raised over $1 million, with two companies raising over $10 million each. Sixteen companies raised between $50,000 and $1 million. Approximately half of the sample — the remaining 27 companies — raised less than $50,000 each. This highlights the challenge of securing financing for further growth in this industry area of the BC economy – and the need to address it.

Exhibit 13
Financing/Capital Raised

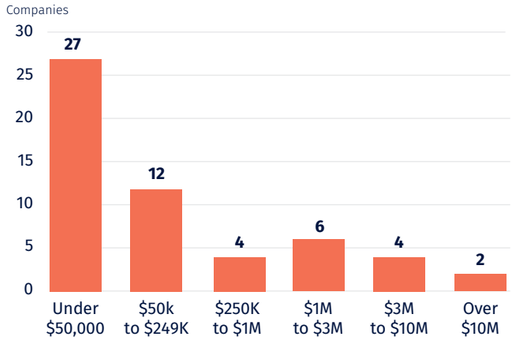
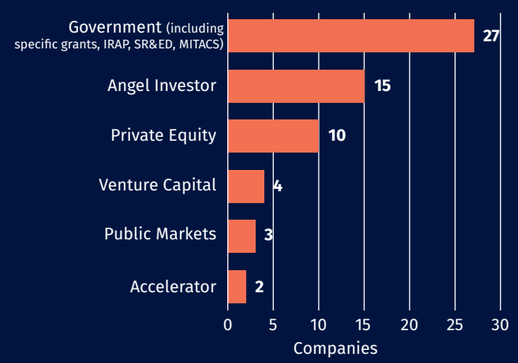


Exhibit 14
Most Prevalent Types of Financing



The chart on the right shows the most prevalent sources from which VR/AR companies in BC are getting their financing. Note that this chart shows the incidence of financing by source, but not the amount of financing received from each source, since the survey did not ask for that information. Twenty-seven of 42 companies said government is a source of financing for them. Angel investors are the next most frequent source of financing, with 15 companies saying this is a prevalent type of financing for them. Ten companies said private equity also plays a role in financing their initiatives. Fewer companies have venture capital, public markets, or accelerators as sources of financing.

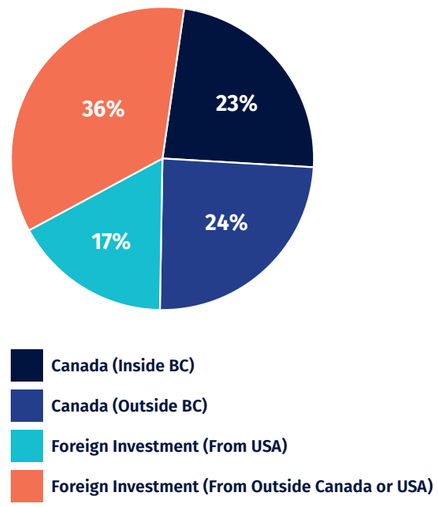
Exhibit 15
Government Funding Sources

Category	Total Dollars	Number of Companies	Average Per Company
SR&ED	$ 2,217,000	12	$ 184,750
IRAP	$ 1,076,000	9	$ 119,556
Mitacs	$ 145,000	4	$ 36,250
CanExport	$ 62,000	2	$ 31,000
Creative BC	$ 281,200	7	$ 40,171
Canada Media Fund	$ 300,000	1	$ 300,000
Telefilm	$ 146,000	1	$ 146,000
Other	$ 1,124,000	6	$ 187,333

Although the survey did not ask for the amount of financing received per source overall, the survey did ask companies to break down their sources of government funding specifically. Exhibit 15 shows that the main government funding source for companies in the survey is SR&ED, which is the Scientific Research and Experimental Development Tax Incentive Program.

The Industrial Research Assistance Program (IRAP) is the second largest government source of financing for these companies. For at least one company the Canada Media Fund is a major source of financing, and for at least one company the Telefilm program is.

Exhibit 16
Geographic Sources of Capital



As the chart on the left shows, investments in BC VR/AR companies come from inside and outside BC. BC-based sources of capital make up only 23 percent of the total. Foreign investment from outside Canada generally makes up 53 percent of the total — with the USA contributing 17 percent and other countries contributing 36 percent.[2] Canada outside BC contributes 24 percent. This demonstrates that geographically there is a broad base of interest in BC VR/AR companies.

Notwithstanding this broad interest, however, the survey and interviews also showed that access to capital and investment financing is still a major challenge for VR/AR companies, particularly for those companies in startup and growth stages of their business. Based on the interviews and comments made by respondents in the open-ended questions of the survey, VR/AR companies feel there is a considerable need for more funding from government — as well as from other sources — to realize the full potential of the industry.

2 One outlier company received significant funding from a European country, which has the effect of skewing the US vs. other foreign investment split in sources of funding.

Precision OS

BC's VR/AR Sector Lacks Homegrown Investors

The leading VR/AR companies in BC have raised their seed and Series A round outside of BC. For example, surgical training company, Precision OS, has raised UA$2.3 million in its Series A led by Switzerland-based AO Invest. Another noteworthy example is Archiact Interactive, which raised US$3.1 million from 37Games, one of the largest publicly listed game companies in China.

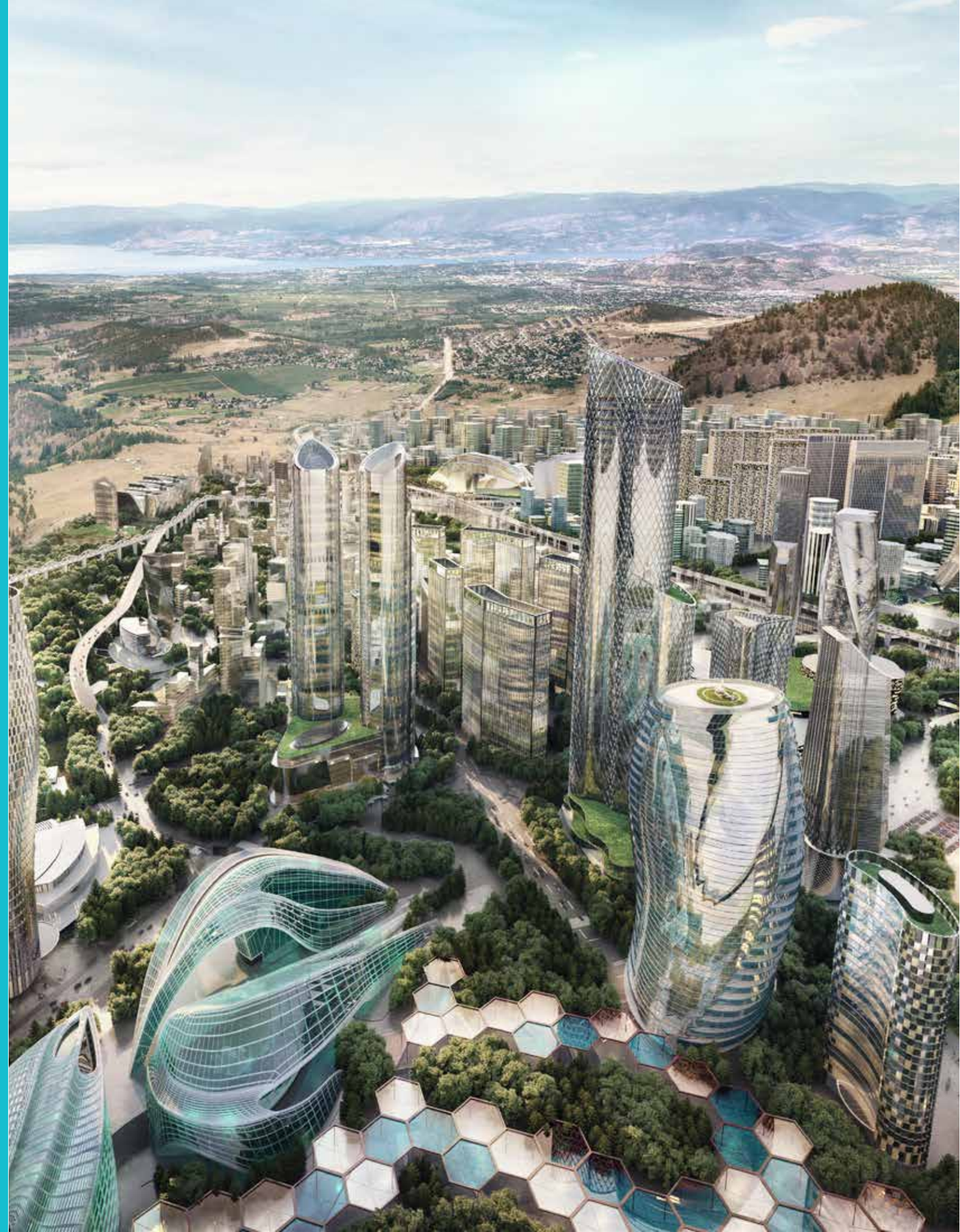
Investors from outside of BC are on betting on BC-based companies, but local investors have not made any major investments. VR/AR entrepreneurs in BC tend to struggle to secure early-stage funding from local investors.

"Metro Vancouver is one of the top markets worldwide for creating VR and AR content," says Tony Bevilacqua, founder and CEO of Cognitive 3D, a company that provides analytics on how individuals in virtual and augmented reality interact with their surroundings. "But we're being challenged by the lack of local investment in what we would call at-risk technologies — businesses that are very research- and development-oriented, and don't necessarily have a healthy financial outlook in the short term. If you have the metrics for a Series A round, you can raise money here. It's in that seed stage, where a company doesn't necessarily have the traction or numbers to show investors, that we see the biggest gaps in local funding."

For an industry that is predicted to be worth up to US$215 billion by 2021, according to market intelligence provider International Data Corporation, local venture capitalists are missing out on the opportunities.

List of active VR/AR Funds Around the World

Rothenberg Ventures
Andreessen Horowitz
Boost VC
ViveX
The Venture Reality Fund
Presence Capital
Techstars
Colopl Next
GFR Fund
Intel Capital
Y Combinator
500 Startups
Lux Capital
Qualcomm Ventures
Samsung NEXT
Super Ventures
The WXR Venture Fund



LNG Studios

VR/AR Use Cases

Just like its predecessors, VR/AR technology is considered a computing platform that will permeate into a broad spectrum of industries. VR/AR technology is widely regarded as the next step in the evolution of computing and a new medium for society to interact with digital information. Both VR and AR have begun to make a significant impact in business contexts, as enterprises and brands adopt VR/AR capabilities and conduct a wide range of pilot projects.

BC companies are at the forefront of developing innovative VR/AR solutions to solve various problems in industries such as healthcare, real estate, natural resources and brand activations. This section outlines the broad range of VR/AR use cases as well as BC's homegrown success stories.

Digital Twinning

A digital twin is a virtual replica of a real thing, living or nonliving, such as a person, product or system. Digital twins appear and behave identically to the original object. They are used to monitor and analyze the thing they are imitating in order to identify errors before they occur, simulate circumstances and make improvements.

Companies
e.g. Llama Zoo, BCG Engineering

Healthcare

VR has been readily adopted in healthcare for surgery simulation, phobia treatment, robotic surgery and skills training. Immersive technology enables healthcare professionals to learn new skills and improve existing ones in a safe and controlled environment.

Companies
e.g. Conquer Experience, Precision OS

Training

VR is a powerful tool for training, as it removes the need to imagine a situation and instead replaces it with a realistic simulation. VR training creates a low risk high efficacy learning environment as it enables people to train in the most realistic way possible with the situation actually happening in real life. On the contrary, AR provides contextual information in real-time to enable people to operate complex machinery efficiently.

Companies
e.g. Motive.io, SecondSight AR

Reality Capture

Reality capture is the process of collecting available data to create digital representations of real-world conditions. The method is highly accurate, quick and cost effective. The most common types of reality capture use laser scanners and photographs.

Companies
e.g. Volumetric Camera System, Blueprint Reality

Software

VR/AR software combines digital content with real-world environments to super power the way we design, develop and analyze 3D data.

Companies
e.g. Ziva Dynamics, Cognitive3D

Real Estate, Architecture & Construction

VR/AR has a multitude of applications in visualizing real estate developments. From property marketing to interior design and architecture, immersive technology has enabled this industry to bring their vision to life before the final product has been completed.

Companies
e.g. LNG Studios, Stambol

Entertainment

VR/AR is the perfect technology to enhance entertainment experiences. From location-based entertainment to video games and amusement park attractions, applications for immersive technology in this area are limitless.

Companies
e.g. Archiact, Cloudhead Games, YDreams, Dreamcraft Attraction

Smart Glasses

The next-generation computing interface, smart glasses empower the wearer with contextual information contained within the lens of eye glasses.

Companies
e.g. Form, Atheer

Retail & Brand

Retail and brands are adopting VR/AR to bring consumers closer to their products and enhance the buying experience by enabling them to try on and test out merchandise more easily.

Companies
e.g. Finger Food Advanced Technology Group, Shape Immersive, XR Media Group

Success Stories

After four years of development and US$8 million raised, FORM shipped the world's first augmented reality swim goggles in August 2019. The $199 **FORM Swim Goggles** have been widely acclaimed as a game-changer for serious swimmers, which number over 30 million in the US alone.

In 2019, **DreamCraft Attractions** opened VR attraction "Twilight Saga: Midnight Ride" for Lionsgate Entertainment World in Zhuhai China, and designed an all-new VR DreamSet product for Dave and Busters, which will be rolling out to locations throughout the US in 2020.

Ziva Dynamics launched CG asset technology in 2019, including the scalable simulations tools used by Sony Pictures Imageworks to generate over 150 photorealistic creatures in less than a month, the world's fastest animation puppet – which performs 2.4x faster than the industry's standard – and the highest-quality pre-made animal anatomy on the market.

Cloudhead Games

Cloudhead Games recently released Pistol Whip, an action rhythm shooter that has become a top seller and garnered numerous awards and nominations, including the prestigious DICE Awards for VR Game of The Year and Game Developer Award for Best VR Game.

In 2019, Time magazine named **Biba**'s smart playground system one of the top inventions of 2019.

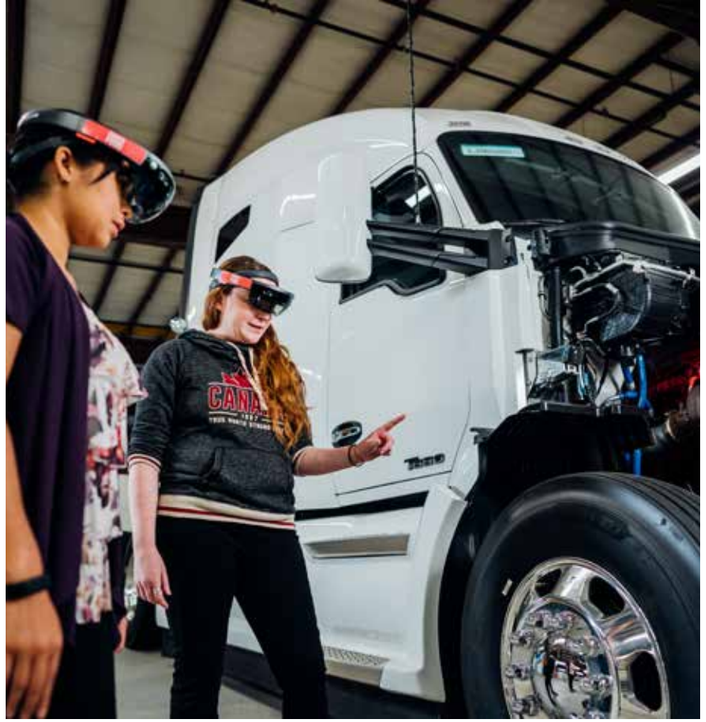
In 2019 **LlamaZOO** saw continued success bringing clarity to complex data for some of the world's largest companies, kicking off a Digital Technology Supercluster project with Microsoft, Boeing and Avcorp, and growing their client list with names like Chevron and DeBeers.

In 2019, **Cognitive3D** grew its team by 60%, and revenues 78% year over year. In partnership with Accenture, Kelloggs and Qualcomm, Cognitive's analytics technology powered Accenture's VR merchandising use case and won the prestigious Lumiere Award for Best Use of VR for Merchandising/Retail.

In 2019, **Archiact** celebrated the launch of two major VR games – underwater PC VR adventure game FREEDIVER: Triton Down, and MARVEL Dimension of Heroes, the smartphone-powered Super Hero AR experience.

Archiact

After raising $2.3 million dollars in its Series A funding, **Precision OS** has grown its team from 10 to 18 to develop a best-in-class VR surgical training platform.



Finger Food Advanced Technology Group

In the past five years **Finger Food Advanced Technology Group** has grown to more than 200 people in Canada, and AR/VR continues to be a substantial part of their business.

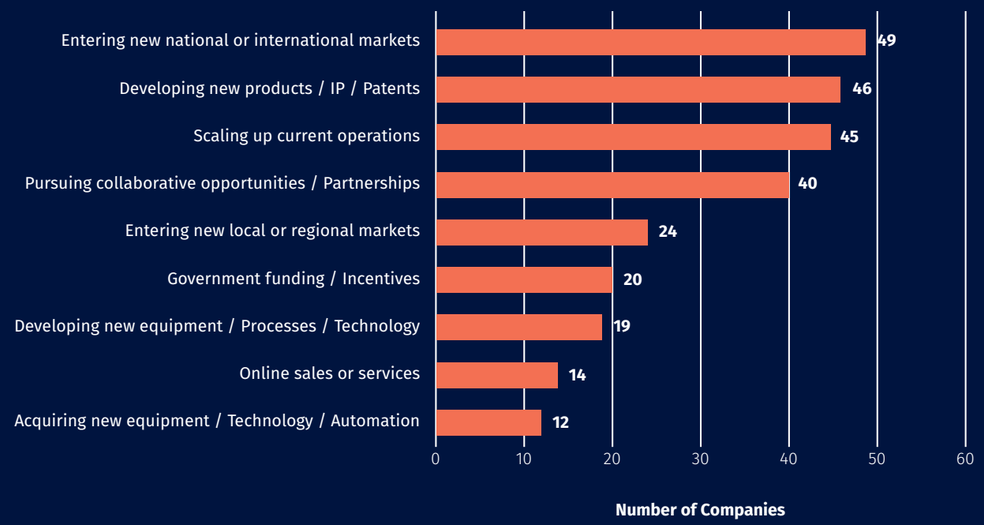
Opportunities

VR/AR companies in the survey were asked what they see as their biggest opportunities in the next five years. The following chart shows that there are many areas of opportunity to capitalize on, as indicated by the 65 companies who responded to this question in the survey.

The greatest area of opportunity, as seen by these companies, is to enter new national or international markets not previously penetrated (e.g. Asia), to broaden the customer base and diversify geographical reach. There are also big opportunities for developing new pertinent products and services that fulfill customer needs. Scaling up operations and pursuing collaborative initiatives and partnerships are also top areas of opportunity.

Specific comments made by VR/AR company executives interviewed also indicate that Vancouver in particular is in a prime location, close to Seattle, San Francisco, and Los Angeles where business opportunities are expanding for VR/AR technology and applications. BC-based companies surveyed and interviewed believe that encouraging collaboration with US-based companies and investors in the form of partnerships, financing, and exports is critical for BC companies to grow, and to capitalize on the broad base of VR/AR talent in this province.

Exhibit 17
Biggest Opportunities (Next Five Years)



Finger Food Advanced Technology Group

Opportunity is Global

Due to lack of early-stage investment, BC-based VR/AR companies tend to focus on acquiring customers and becoming revenue-generating. Esther Dyson once said that a company's best investors are its customers. This sentiment is shared among local VR/AR companies, with many identifying their biggest opportunities as entering new national or international markets.

For example, companies like Finger Food Advanced Technology Group, Precision OS, Shape Immersive, and Cognitive 3D have mostly US-based customers and partners. Other companies like Conquer Experiences and Ziva Dynamics have customers and partners in Europe and Asia. As our world becomes more interconnected, it is especially common for VR/AR companies to look beyond their geographic boundaries for customers and partners.

Vancouver VR/AR Association Contributes to Export Development

In 2019, the Vancouver VR/AR Association (with the support of Vancouver Hotel Destination Association, Tourism Vancouver, Creative BC, Launch Academy, BC Trade and Invest, Global Affairs, VEC and other key partners) led eight missions from around the US and Europe, totalling over $30+ million in potential deals, partnerships, and investments and $3+ million in actual deals. More than 20 VR/AR companies in Vancouver and BC were supported via these delegations.

The Vancouver VR/AR Association promoted Vancouver and BC as a top VR/AR ecosystem at various global conferences including SXSW, TED, Laval Virtual, Annecy Film and Animation Festival, AWE EU, VR/AR Global Summit, VR Days, and On the Lot. Delegates were often given the opportunity to demo their products at trade show booths or speak on stage. Moreover, delegates often participated in B2B meetings and dinners organized by the Vancouver VR/AR Association. For example, delegates participating in the Los Angeles trade mission had the opportunity to meet with studio executives from Universal Pictures, Disney, Warner Bros. Entertainment, DreamWorks Animation and Paramount Pictures. As a result of Vancouver VR/AR Association's effort in connecting and promoting local companies, more than $30 million dollars of potential deals have been added to the delegates' sales pipelines and more than $3 million dollars worth of deals have already been closed.

Challenges

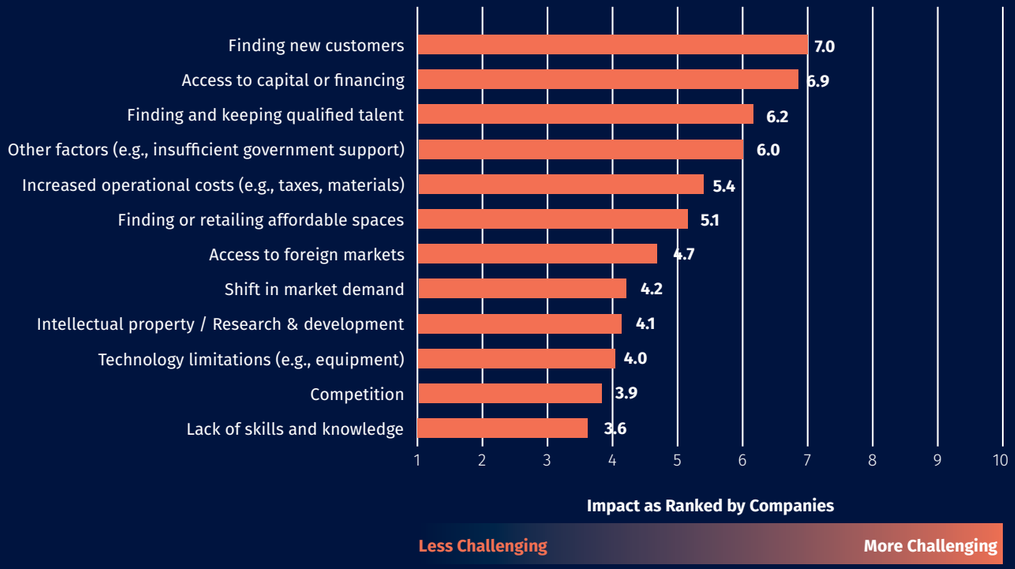
There are many challenges as described by companies interviewed and surveyed for this study: costs of developing and commercializing technologies and operational overhead expenses; financing and access to capital and medium- to long-term investment; acquiring and retaining highly skilled personnel; finding new customers in domestic and foreign markets; technology limitations in equipment and software; and other challenges.

The most salient challenges faced by BC VR/AR companies are shown in the next chart. “Finding new customers” and “access to capital or financing” are the two greatest challenges cited.

Sixty-seven companies in the survey ranked the challenges on a one to 10-point scale. Among the challenges garnering more than five points are “finding and keeping qualified talent," “operational costs," “finding and retaining affordable spaces.”

Notwithstanding the specific ranking of challenges, however, an important overall observation to derive from this chart is that there are many and varied challenges to overcome. These all need to be addressed both individually and as a whole, to help developing companies scale up and grow their business to their full potential.

Exhibit 18
Challenges Faced by Companies



Stambol

Finding the Right Customers and Investors Proves Challenging

Stambol is a creative technology studio that specializes in hyper-realistic VR and AR immersive experiences. Made up of a team of dedicated artists, designers, and engineers with a proven track record of success, Stambol has completed many innovative projects for clients in real estate, health care, and tourism. To Stambol’s CEO, Dogu Taskiran, bringing more awareness to key stakeholders is a key challenge. VR and AR are such frontier technologies that very few industries have only begun to adopt the technology. This often means that there is a lot of education involved in project discovery processes with potential clients.

Despite interest in VR/AR being at an all-time high, most industries are still experimenting with the technology and understanding its ROI. For Stambol, finding customers that understand the true value of VR/AR will be key to help the company grow and eventually transition from a service-based company into a product-driven company.

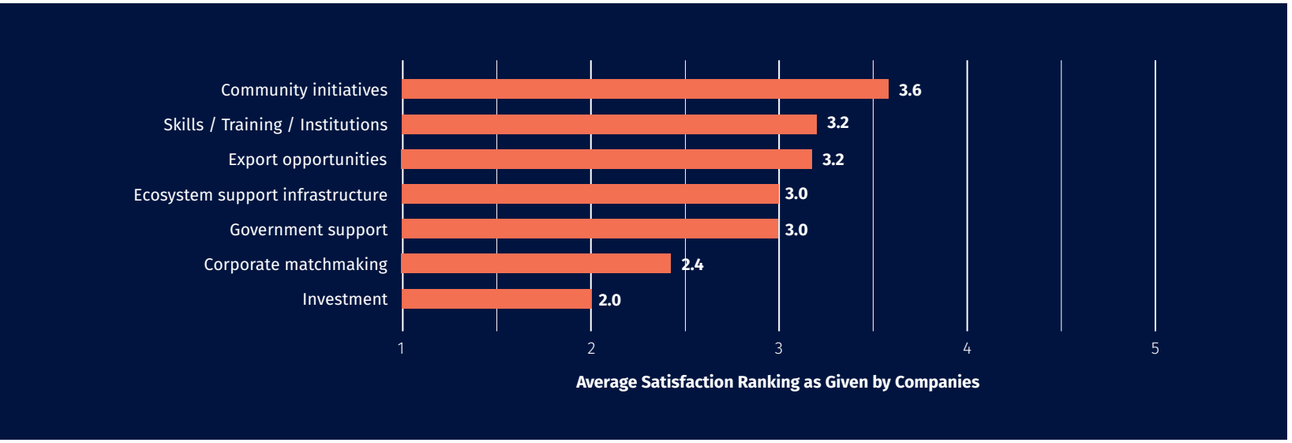
Accessing capital or financing has been challenging for many early-stage VR/AR companies like Conquer Experience.

Conquer Experience is the company behind PeriopSim, a digital learning platform designed to bridge the gap between class and the operating room. It helps healthcare practitioners to learn procedures, anticipating the surgeon and instrumentation, before they go into the operating room. Research shows that PeriopSim performs 6x faster and is more effective than traditional methods. Angela Roberts, CEO of Conquer Experience, said:

“The challenge for us has been securing investment. We are a digital health company and it is challenging for us to find investors who are willing to invest in this vertical. The Vancouver and BC ecosystem only has a small number of local investors who understand our segment. More work needs to be done to build investor collaboration and formulate a set of cross-border investment terms that work for Canadian, US and European investors.“

Gap Analysis & Policy Recommendations

Exhibit 19
Satisfaction with BC's VR/AR Ecosystem
Ranked from 1=Low to 5=High



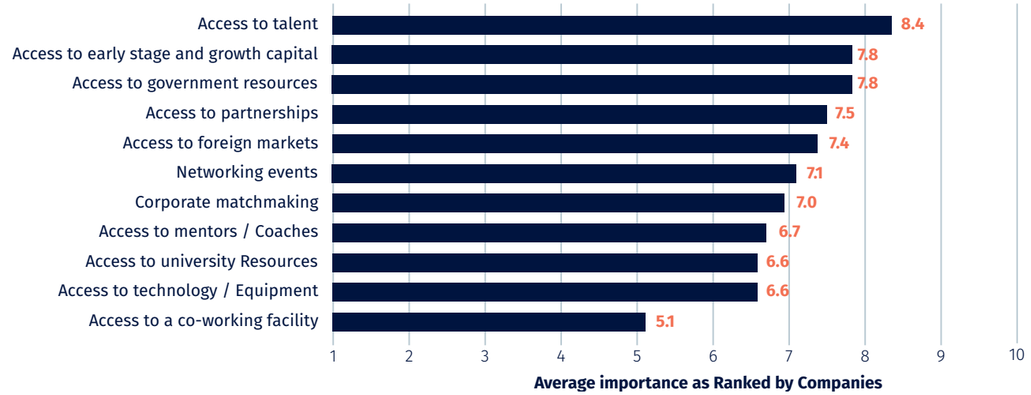
The survey enables some gap analysis by providing company responses showing levels of satisfaction/ dissatisfaction with ecosystem support mechanisms in BC. The chart above suggests that the most important gap is investment, both early-stage and growth financing. This gap was also emphatically conveyed in interviews and other consultations with companies and stakeholders in the BC VR/AR community.

Generally, there is not a high level of satisfaction by VR/AR companies in all ecosystem support categories shown in the chart. There is room for measurable improvement in all of them — the major gaps being in investment, corporate matchmaking, and government support.

Investment: early-stage and growth capital
Corporate matchmaking: pilot projects with corporates
Government support: IRAP, SR&ED, other resources
Support infrastructure: accelerators / incubators / mentors
Export opportunities: trade missions / delegations to foreign markets
Skills / Training: post-secondary education, upskilling programs
Community: networking events, conferences, meetups

> **"VR/AR is poised to generate $1.5 trillion in GDP by 2030 and Vancouver has all the right ingredients to become the number one VR/AR hub in the world.**
>
> **As an industry, we must drive more momentum and capitalize on our advantages. We cannot afford to lose steam now."**
>
> **Dan Burgar**
> Vancouver VR/AR Association

Exhibit 20
Importance of Ecosystem Activities & Services
Ranked from 1=Low to 10=High



In order to identify possible policy implications relating to ecosystem gaps noted by the companies surveyed and interviewed, the survey asked companies what ecosystem activities and services were most important.. They were also asked what could be done to ameliorate deficiencies in the ecosystem and to help them achieve success in their business. Feedback from companies and stakeholders provides some solutions to the challenge of closing these gaps, including measures to promote VR/AR by introducing or enhancing government support programs and services, facilitating marketing opportunities, stimulating investor interest, and sponsoring network events.

The above chart provides a ranking by companies of the importance of activities and services that policy makers should address. "Access to talent," "access to early stage and growth capital," and "access to government resources" are seen as the most important, when ranked on a scale from one to 10. Helping to create partnerships, providing access to foreign markets, networking and corporate matchmaking are also priority areas for policy makers to consider as solutions to close gaps in the ecosystem.

During the consultation process for this study, companies made specific, noteworthy suggestions with policy implications, including creating or making the following available:

- a corporate R&D lab to empower local industries to adopt VR/AR technology and to experiment with it to solve real-world problems;
- incentives for US investors to invest in Canadian companies alongside Canadian investors;
- a shared facility to house and showcase local companies and technology;
- a CEO coaching service;
- tax benefits beyond the SR&ED program provided with the aim of enabling companies to reach out to foreign markets; and,
- small exhibition events to educate stakeholders and potential customers.

Finally, several companies suggested there should be greater support to industry organizations – such as the Vancouver VR/AR Association – with the to build stronger teams, able to further promote and foster growth in the Vancouver and British Columbia VR/AR industry.

Comparison with Other VR/AR Ecosystems

The global context of VR/AR as the next computing platform and the BC and Vancouver VR/AR ecosystem were described earlier in Sections 1 and 2. The importance of this emerging high-tech industry should not be underestimated, and its current and potential economic impact should be recognized. Other Canadian and worldwide jurisdictions have prioritized VR/AR as an important area to receive strategic financial support.

There are many examples in which similar jurisdictions are advancing infrastructure initiatives and programs to grow their local and regional companies, while also assisting industry groups and associations. Such support from government and private bodies helps tilt the playing field in favour of local companies engaged in developing and using VR/AR technologies. The following are some examples of these very significant VR/AR undertakings drawn from other comparable ecosystems.

Alberta and Calgary

Alberta Innovates, a provincially-funded research and development organization, has launched what it is calling a "first-of-its-kind" program focused on Alberta's virtual, mixed, and augmented reality ecosystem for health innovation. The program is called eXtended Reality Health Economic Acceleration and Development (xR HEAD) and is delivered in partnership with the Alberta VR/AR Association. This program's goal is to bring together Alberta's healthtech ecosystem to co-develop virtual, mixed, and augmented reality innovations in order to enhance patient care by integrating with healthcare systems and providing training to health professionals. It also aims to provide advice and "matchmaking" support for participants looking for input from healthcare delivery professionals and patients. Each approved project under the new program will receive funding of up to $250,000 from Alberta Innovates. The number of projects planned for the program has not been specified.[3]

In Calgary with the support of the Opportunity Calgary Investment Fund (OCIF) – a $100 million fund owned by the City of Calgary that invests in initiatives that grow the city's economy – Finger Food Advanced Technology Group has opened up an advanced technology centre. This will lead to the creation of 200 full-time jobs in the city by 2023. This represents an expansion to Calgary of Finger Food, a Port Coquitlam, BC-based firm that builds custom technology solutions using artificial intelligence, AR/VR, and blockchain. Finger Food will receive $3.5 million from OCIF to open their new Calgary-based facility.[4]

Vancouver VR/AR Association

3 https://betakit.com/alberta-innovates-launches-new-vr-health-innovation-program-amid-recent-cuts-layoffs/

4 https://betakit.com/finger-food-receives-3-5-million-from-opportunity-calgary-investment-fund-for-new-office/

RLab, New York University Tandon School of Engineering

New York

The first city-funded virtual and augmented reality lab in the US was launched in New York City in October 2018. This lab, called RLab, is being administered by the New York University Tandon School of Engineering, with a participating consortium of New York City universities, including Columbia University, CUNY, and The New School. RLab operates in the Brooklyn Navy Yard and its goal is to cement New York City's status as a global leader in VR/AR, creating over 750 jobs in the industry. RLab is fueled by a $5.6 million investment from New York City Economic Development Corporation (NYCEDC) and the Mayor's Office of Media and Entertainment (MOME). This facility supports startups, talent development, and research and innovation, along with a workforce development centre at CUNY Lehman College in the Bronx. The intention is to attract VR/AR talent from around the world and to complement a range of RLab entrepreneurship programs to commercialize ideas and technologies emerging off of the New York City's universities, as well as corporate innovation programs designed to help companies adopt new technologies.[5]

China and Asia-Pacific

China (and Asia-Pacific as a whole) is now doubling down on its investments in the VR/AR industry. Besides the rapid deployment of high-speed networks across the region, varied government initiatives are fueling an aggressive trend for developing and adopting VR and AR.

The Shenzhen Municipal Government, for example, has linked arms with HTC to establish a Shenzhen VR Investment Fund worth US$1.45 billion. At the same time, it will build a new China VR Research Institute to boost the VR ecosystem in that country. Also, China's Guizhou province is building a so-called Beidouwan Virtual Reality Town, a project that is developing its own VR/AR ecosystem in that province. A VR intelligent party school was opened for the public in Beidouwan VR Town last year, and VR technology was integrated in all of its exhibition halls. The Beidouwan VR Town aims to support industrial development by building the entire infrastructure required for research, development, manufacturing and servicing support for VR related industries.[6]

In South Korea, the national government in 2016 announced plans to invest $363 million in the VR/AR marketplace over five years. The government opened the Korean Virtual Reality-Augmented Reality complex (KoVAC) in Seoul in 2017, and since then six more such centres have been created. The government plans to increase to 20 by 2020. Meanwhile, Japan's Ministry of Economy, Trade and Industry (METI) has offered grants to content creators using advanced content creation technologies, including VR, to promote products, services and tourism in the country's regions. Similar initiatives are underway in Australia, India and Malaysia, where local/provincial governments have partnered with VR/AR companies to promote educational and tourism applications and activities.[7]

European Union

The Horizon 2020 (H2020) program of the European Union, the largest EU Research and Innovation program to date, created a coordination and support action project called XR4ALL. This project is intended to attract investors from around Europe and beyond for VR/AR initiatives.[8] The project aims to create a pan-European XR-tech community and awards grants for innovative technology initiatives. The XR4ALL project helps to strengthen and accelerate the growth of European XR and immersive technology by connecting startups, companies, and investors active in XR, and it has €1.5 million to distribute to successful applicants to the program.[9] XR4ALL should prove beneficial to developers, engineers, computer scientists, inventors, entrepreneurs, financiers, investors and users.

5 https://www.prnewswire.com/news-releases/unveiling-rlab-the-first-city-funded-vrar-center-in-the-country-opens-doors-at-brooklyn-navy-yard-300736936.html

6 https://techhq.com/2019/12/china-set-to-soar-ahead-with-xr-technology-by-2030

7 https://www.computerweekly.com/news/252475777/APAC-region-to-drive-global-enterprise-VR-adoption-through-to-2030

8 http://xr4all.eu/about/

9 https://www.vrfocus.com/2019/07/xr4all-opens-financial-applications-to-distribute-e1-5m-across-european-xr-startups/

Vancouver VR/AR Association

Recommendations

From the previous brief overview of some significant programs and initiatives in other leading ecosystems, it is clear there is competition globally for leadership in VR/AR technology. Support is being provided in other jurisdictions — both in Canada and around the world — to help local and regional VR/AR infrastructures and communities advance and contribute to economic growth.

The gap analysis, and the views expressed by BC- and Vancouver-based companies on their challenges and opportunities, suggest that this is a time for action in this province.

The following recommendations emerge from the findings of this study. The recommendations are broken down by the key issue areas of concern expressed by the VR/AR community in BC and Vancouver.

1 | Community

Fund basic operation costs for key community organizations to facilitate regular workshops, networking events and talks.

Objectives

Strengthen the relationships between key community organizations and unify the organizations to achieve strategic goals that benefit the entire ecosystem; and enable people in the community to learn from one another and explore new business opportunities with each other.

Rationale

Knowledge and access to resources are best disseminated through a network of connections. The more connected an ecosystem, the more efficient the flows of knowledge and access to resources. The less connected, the less effective the ecosystem is at nurturing potential ventures as they attempt to grow into successful startups.

Fragmentation of different community building efforts potentially creates confusion and dilutes resources. It is best to have a unified ecosystem with all stakeholders acting on a common front to support the community, evangelize, and to promote and adopt the technology. For this reason, aligning the goals of the Vancouver VR/AR Association, Vancouver VR Community, AWE Nite Vancouver, VR/AR Global Summit, and DigiBC is desirable. Assigning different stakeholders to focus on different areas of ecosystem building would help make the support infrastructure more effective.

2 | Talent

Incentivize post-secondary institutions, incubators, accelerators, and bootcamps to develop skills training programs.

Objectives

Address shortage of qualified talent for VR/AR companies to grow and scale; and address gaps in practical business knowledge to help founders be investment-ready.

Vancouver VR/AR Association

Rationale

Public policies can catalyze and support practical skills training programs to address the skill gaps in ecosystems. For technical training, there are already a number of coding bootcamps, computer science programs, 3D modeling and animation programs, and game design programs that are applicable to VR/AR use cases. However, post-secondary institutions should consider developing specialized VR/AR programs to meet future increase of VR/AR talent demand.

Vancouver Film School, BCIT and Centre for Digital Media have all taken the initiative to develop such programs. On the practical business knowledge side, early-stage founders of VR/AR startups need access to practical business acumen programs such as Launch Academy's Lean Entrepreneur Acceleration Program. These programs help founders to reduce the risks encountered at their early stage of development.

3 | Support Infrastructure

Establish a shared facility to incubate early-stage VR/AR startups and provide mentorship, coaching, and device rental services.

Objectives

Reduce startup costs for early-stage founders and increase quality of investment-ready startups.
To implement this recommendation, it would be necessary to identify who would be responsible for managing this shared facility.

Rationale

Having a centralized facility to incubate VR/AR startups and host community events, workshops, and office hours will provide tremendous value to the overall ecosystem. The cost to launch a VR/AR startup is typically high due in large part to the cost of headsets and equipment requiring capital outlays. Having a centralized place for all shared resources will greatly reduce startup costs and empower more VR/AR entrepreneurs to innovate.

Launch Academy is the perfect example of a successful incubator. Since 2012, they have helped over 3,500 entrepreneurs from 100+ countries. 300 startups have grown to Seed and Series A stage. These companies went on and raised over $300 million dollars. This resulted in the creation of 2,500 jobs, producing tens of millions in annual tax revenue.

4 | Investment

Foster the creation of angel networks and investor education programs; and fund inbound delegations of foreign investors to meet local companies.

Objectives

Educate investors on how to invest in a VR/AR startup; and help local early-stage startups connect with foreign investors without the need to travel.

Rationale

Vancouver and BC do not have sufficient funding options for early-stage VR/AR startups. There are too few active angel investors in our ecosystem – and those few investors are not sufficiently educated about investing in VR/AR startups. Future efforts should be oriented towards forming an angel network and educating high-net-worth individuals on how to invest in VR/AR startups.

Quarterly workshops and meetings can be organized for angels to learn what to look for in a VR/AR investment deal and to identify the type of risks associated with such deals. Private semi-annual startup demo days can be organized so angels can participate in fundraising rounds at the right time and evaluate multiple deals at the same time. Inbound investor delegations are also a great way to inject more investment capital into our VR/AR startup ecosystem. Twice a year, a group of investors can be flown to Vancouver where they could meet the top VR/AR startups in our ecosystem. Private dinners can be organized for foreign investors and startup founders to strengthen their relationships.

Vancouver VR/AR Association

5 | Corporate Matchmaking

Connect VR/AR startups with domestic traditional sectors to explore new innovative use cases of VR/AR technology in these sectors.

Objectives

Help enterprise innovate at the speed of startups; and help startups commercialize their technology.

Rationale

Due to a lack of early-stage capital in the ecosystem, startups tend to have to bootstrap before funding can be secured. In this case, a startup's customer is often their best investor. Building a VR/AR research and development lab and introducing a corporate matchmaking program will help enterprises innovate at the speed of startups.

Such a corporate matchmaking program will allow enterprises to enter the market faster if they first partner with VR/AR startups with expertise in prototyping emerging technologies. On the other hand, the expertise and assets of industry incumbents will create opportunities for the startups to experiment and validate their technology. As a result of these partnerships, both enterprise and startups will generate more revenue, create more jobs, and bring more economic prosperity to the ecosystem.

Canada's Digital Technology Supercluster is a great example of how corporations, post-secondary institutions, startups and government can work together to drive innovation and economic success. To date, 21 projects have been announced with one project that aims to use augmented reality to enhance transportation inspections. However, only the top one or two VR/AR companies are involved in these projects and the funding does not trickle down to the majority of the VR/AR industry. A more agile corporate matchmaking program will ensure more inclusiveness and fairness to the majority of VR/AR companies.

Vancouver VR/AR Association

6 | Tax Incentives

Increase the BC Interactive Digital Media Tax Credit from 17.5 percent to 25 percent and advocate for fair distribution of Telefilm and CMF funding in the interactive and experimental programs.

Objectives

Provide higher tax incentives for companies to adopt VR/AR technology to create more content. VR/AR founders can reinvest money from tax credits to grow their businesses. Support the fair distribution of federal funds that are currently skewed towards Ontario and Quebec, and increase the chances of BC companies being funded by the CMF and Telefilm.

Rationale

Currently, the BC Interactive Digital Media Tax Credit (IDMTC) issues a 17.5 percent tax credit for qualified labour expenses that can be attributed to the production of interactive digital media products.

As of spring 2018, this definition has been expanded to include VR, AR and mixed-reality products and software. However, compared to the Ontario Interactive Digital Media Tax Credit, which issues qualifying companies a tax credit of 35 percent or 40 percent of their eligible expenditures. BC's IDMTC is at least half of Ontario's. Moreover, there is an unfair distribution of funding by CMF and Telefilm. A recent research study conducted by the Vancouver Economic Commission shows that Telefilm distributes 34.8 percent to Ontario and 43.3 percent to Quebec, whereas BC only received 4.4 percent of the funding from 2009–2019. Similar patterns are noticed in CMF's distribution of funds where 4,313 projects in Ontario received 41.7 percent of the funding and 5,721 projects in Quebec received 35.4 percent of the funding while only 1,403 projects in BC received 10.4 percent of the funding.

7 | Export Development

Fund operational costs for organizing trade missions to foreign markets.

Objectives

Empower industry associations to represent local VR/AR companies, and help them to facilitate international business deals.

Rationale

In 2019, the Vancouver VR/AR Association and Launch Academy have organized and led eight trade missions to Europe and USA, which resulted in more than $30 million in potential deals and $3 million in actual revenue generated. Many trade missions were supported by CanExport, Global Affairs BC Trade and Invest, Creative BC, and trade commissioners of multiple regions.

The grants received typically cover 75 percent of eligible expenses including airfare, per diem, conference registration, booth fees, and marketing. However, since the costs of organizing, planning, and administering these trade missions are not covered, this currently is not a sustainable funding model for industry associations who disproportionately bear the costs of organizing these trade missions.

Government grants need to make operating costs an eligible expense for reimbursement so industry associations are incentivized to build these programs and continue to form partnerships with foreign markets to promote export development.

YDX Innovation

Appendix

Methodology and Analysis

The Vancouver VR/AR Association and the Vancouver Economic Commission (VEC) created an extensive database of all known VR/AR entities comprised of VR/AR businesses, post-secondary institutions, nonprofit organizations, investors, and other organizations adopting VR/AR technology. This database of 253 entities is the most complete database produced to date and is an accurate representation of British Columbia's entire VR/AR ecosystem.

An online survey was sent out to 237 entities via e-mail. The survey was also promoted via community partners, social media groups, newsletter and various social channels. Participants had a period of four weeks to fill out the survey and three survey reminders were sent out during this period.

Researchers tallied 91 total survey responses (82 completed responses; 9 partial responses) giving an overall response rate of 38 percent.

Survey data was augmented with six in-depth interviews with the following CEOs of VR/AR companies at various stages:

- Dogu Taskiran, CEO Stambol Studios
- Tony Bevilacqua, CEO Cognitive3D
- Tomoko Okochi, CEO of Codeca Educational Technology and Services
- Dr. Danny Goel, CEO of Precision OS
- Ollie Rankin, CEO of Pansensory Interactive
- Angela Robert, CEO of Conquer Experience

The following questions were asked during the interview.

1. What are the key challenges affecting your business today? (e.g. early stage of technology adoption, lack of qualified personnel, slow sales growth, regulatory or legal restrictions, competitive pressures, capital shortages)
2. Please describe what you envision as your biggest opportunity areas for business growth over the next five years (e.g. exploring different business models, entering or creating new markets, attracting foreign investors, working with evolving new technologies)
3. If your growth opportunities materialize as you envision, how might that growth evolve, and what factors would have an impact on its direction? (e.g. acquisition by a larger company, organic growth, IPO, licensing intellectual property, opening additional regional or global offices)
4. What are the unmet business needs that would help your company reach its full potential that could be provided for by the local, provincial, or national VR/AR infrastructure and support institutions? (e.g. better access to mentors, affordable office space, improved tax or regulatory benefits, public or private investment in key enabling technologies, training of highly qualified personnel)

Contact Us

We are the voice of Vancouver and BC's VR/AR ecosystem

Our mission is to make Vancouver and BC a world leading hub for growing and scaling VR/AR companies. Through leadership and advocacy, we represent our VR/AR industry and improve its global competitiveness. We also promote technology adoption, incubate early-stage companies, facilitate international trade, attract foreign investment and build communities.

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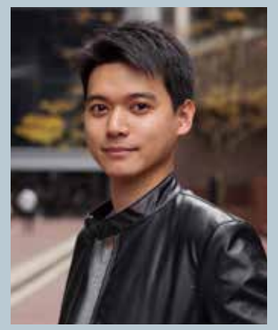

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VANCOUVER VR/AR ASSOCIATION

Reality Check:

The State of Vancouver and BC's VR/AR Ecosystem

VANCOUVER ECONOMIC COMMISSION

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