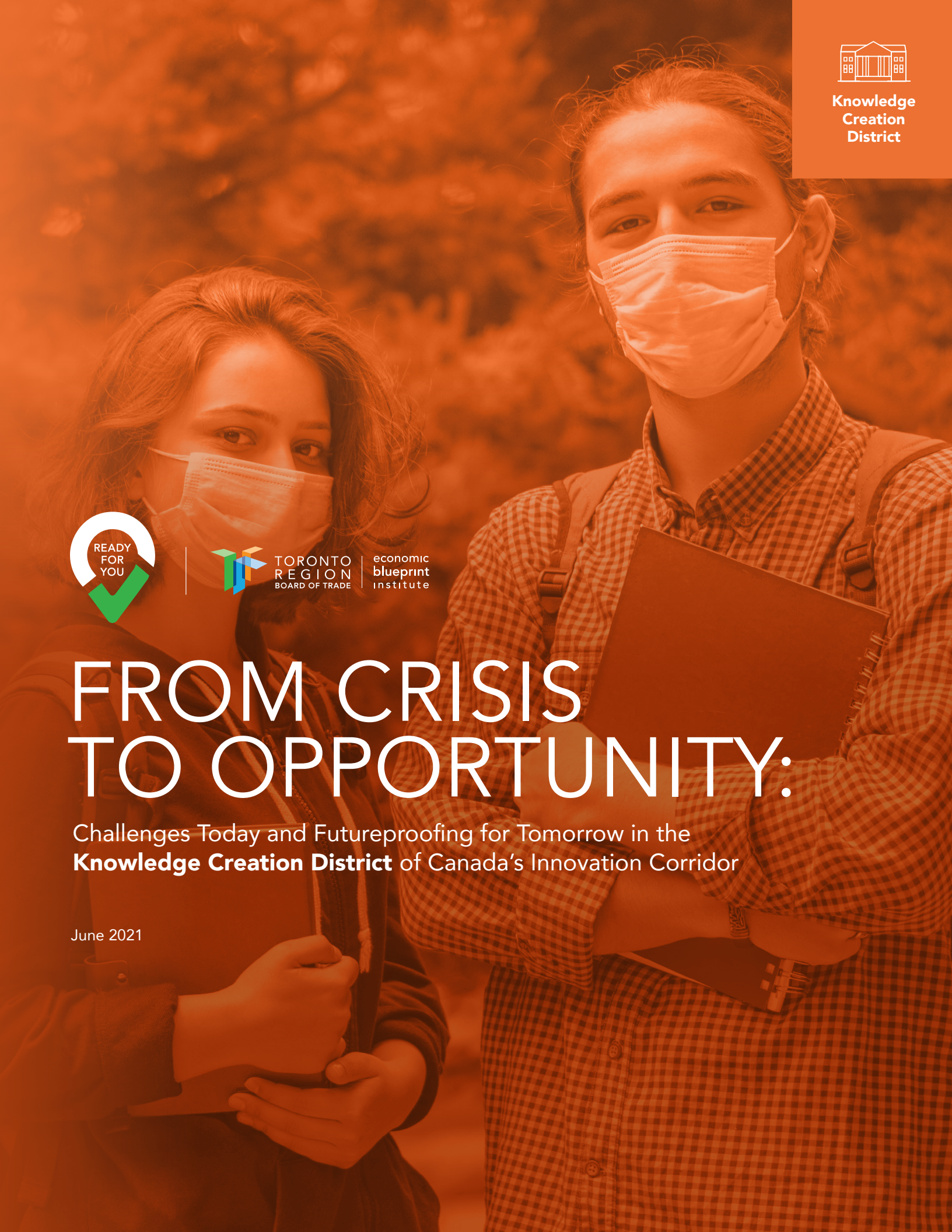


Knowledge Creation District

READY FOR YOU

TORONTO REGION BOARD OF TRADE | economic blueprint institute

FROM CRISIS TO OPPORTUNITY:

Challenges Today and Futureproofing for Tomorrow in the **Knowledge Creation District** of Canada's Innovation Corridor

June 2021

Ready for Reopening and Recovery

To develop a path forward for our economy and the businesses that power it, the Toronto Region Board of Trade (TRBOT) launched its Reimagining Recovery Framework in May 2020. The Framework outlined six specialized recovery work tracks, informed in consultation with 25 stakeholder tables comprised of more than 350 individuals, 300 businesses and all three levels of government, as well as 29 recovery events with over 7,100 virtual attendees. Two of these work tracks addressed the pandemic's impact on our physical workplaces. Two others focused on the pandemic's impact to sectors and our economic zone, the Innovation Corridor.[1]

Building on the work and success of this Framework, TRBOT, with support from the Government of Canada through the Federal Economic Development Agency for Southern Ontario, embarked on a journey to solve for the safe reopening, continued operation, and recovery of business districts.

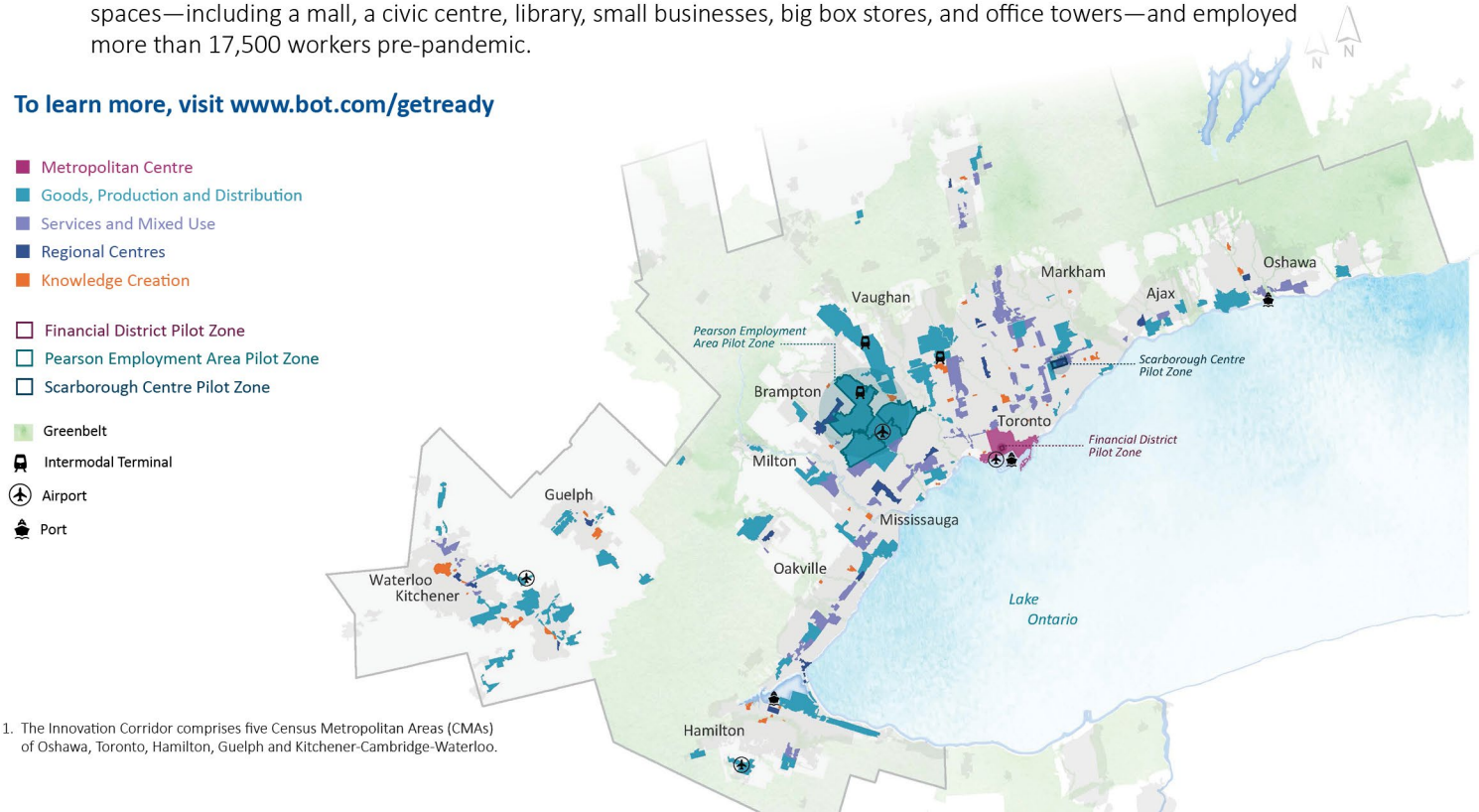
The outputs include five business district reports which examine similarities and differences in mitigation needs and how best to support their recovery. The districts chosen mirror the types of business districts in other parts of Ontario and Canada. These are:

- **Metropolitan Centre**: The dominant urban centre of a region, defined by its density and variety of services – such as finance and professional services, tourism, and retail.
- **Goods, Production and Distribution:** Areas defined by the production and movement of goods — such as manufacturing, warehousing, and logistics.
- **Services and Mixed Use:** Less-dense areas with a mix of activities including professional services, light industrial, and retail.
- **Regional Centres:** Hubs that are home to civic and government institutions, as well as professional and retail services that attract local workers and nearby residents.
- **Knowledge Creation:** Engines of the innovation ecosystem, including post-secondary schools and teaching hospitals.

Additionally, pilot zones were selected in three districts across the Toronto Region. Key organizations were engaged to explore their needs and concerns around continuing to operate safely through the COVID-19 pandemic. For each zone, actionable guides have been created to enable the right conditions to support workplaces in minimizing COVID-19 transmission risk and ensure consistent, clear communications between employers and their workers.

- **Financial District Pilot Zone:** Located in the Metropolitan Centre, the FDPZ is the heart of downtown Toronto. Dominated by financial and business services, this zone employed approximately 118,000 people, 21% of the Metropolitan Centre's 550,000 pre-pandemic workers.
- **Pearson Employment Area Pilot Zone:** In a Goods Production and Distribution District, this zone includes many businesses that have remained open with mitigations in place. Prior to the pandemic, the Pearson Employment Pilot Zone employed more than 200,000 people, 63% of the more than 300,000 workers in and around the Toronto Pearson Airport Employment Zone.
- **Scarborough Centre Pilot Zone:** A Regional Centre, this zone includes many types of workplaces and public-facing spaces—including a mall, a civic centre, library, small businesses, big box stores, and office towers—and employed more than 17,500 workers pre-pandemic.

To learn more, visit www.bot.com/getready



1. The Innovation Corridor comprises five Census Metropolitan Areas (CMAs) of Oshawa, Toronto, Hamilton, Guelph and Kitchener-Cambridge-Waterloo.

Foreword

When the COVID-19 pandemic began in March 2020, all our lives changed. Not just in the practical sense of new routines, new ways of getting around or sharing spaces, but also in the collective way we talked about this historic moment. Terms like "PPE," "flattening the curve" and "herd immunity" are now used and understood widely. This was because the problem – in this case, a highly contagious virus – threatened each and every one of us, so we needed a shared lexicon to overcome it collectively. In other words, a new language for new times. In this report, one in a series on each of the five types of Business Districts, we deep dive into the conditions unique to the Knowledge Creation District (KCD) that will determine a safe re-opening and the economic impacts of the pandemic on the District.

In this series of reports that spotlights business districts across Canada's Innovation Corridor, the Toronto Region Board of Trade introduces a framework for characterizing, understanding and analyzing the region's economic makeup and assessing the impact of the pandemic. Again, a new language for new times. Because the truth is that the pandemic was not the first existential threat to the Toronto region's prosperity, nor will it be the last.

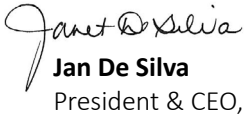
Historic population growth, driven by strong immigration and job creation, left our region as one of the world's most expensive places to buy a home with some of most congested roads, highways and subways. Our fastest growing sectors – like construction, AI, cleantech – are facing a shortage of skilled workers. Businesses that start in the region aren't able to scale here, or they find themselves unable to access new consumer markets.

The ways we've historically tackled such issues are also coming up short. Piecemeal, project-by-project investments by federal and provincial governments can't keep up with the region's expanding list of needs. A legacy funding model fiscally straps municipalities, of which there are 34 across the Corridor, within their own city limits. Yet drivers of our economy – the smooth flow of people and goods, a highly-skilled workforce, a competitive and trading market – transcend municipal boundaries. Now, more than ever, we require more data nuanced ways to understand, plan for and address barriers to growth in our regional economy.

The Business District Report Series, which this report belongs to, are that guide. The reports use research and insights from our data-driven Economic Blueprint Institute to deep dive into five types of business districts first debuted in the Board's 2020 regional recovery playbook, Shaping Our Future. Five ways to view, understand and analyze parts of the Innovation Corridor defined not just by where but by what.

By mapping and profiling these districts we better understand how they've been impacted by the pandemic and what each requires to recover. For instance, financial services offices in downtown Toronto have different needs than warehouses and e-commerce fulfillment centres around Pearson Airport. Because recovery is a global endeavour, this Business District Report Series also provides a methodology for others to apply to their own regions.

After all, when it comes to managing COVID-19 and planning for recovery there is no one-size-fits-all solution. Studying the unique, place-based structure of our economy can give us the map to navigating out of this pandemic-fuelled recession – and seizing on the region's still untapped potential.

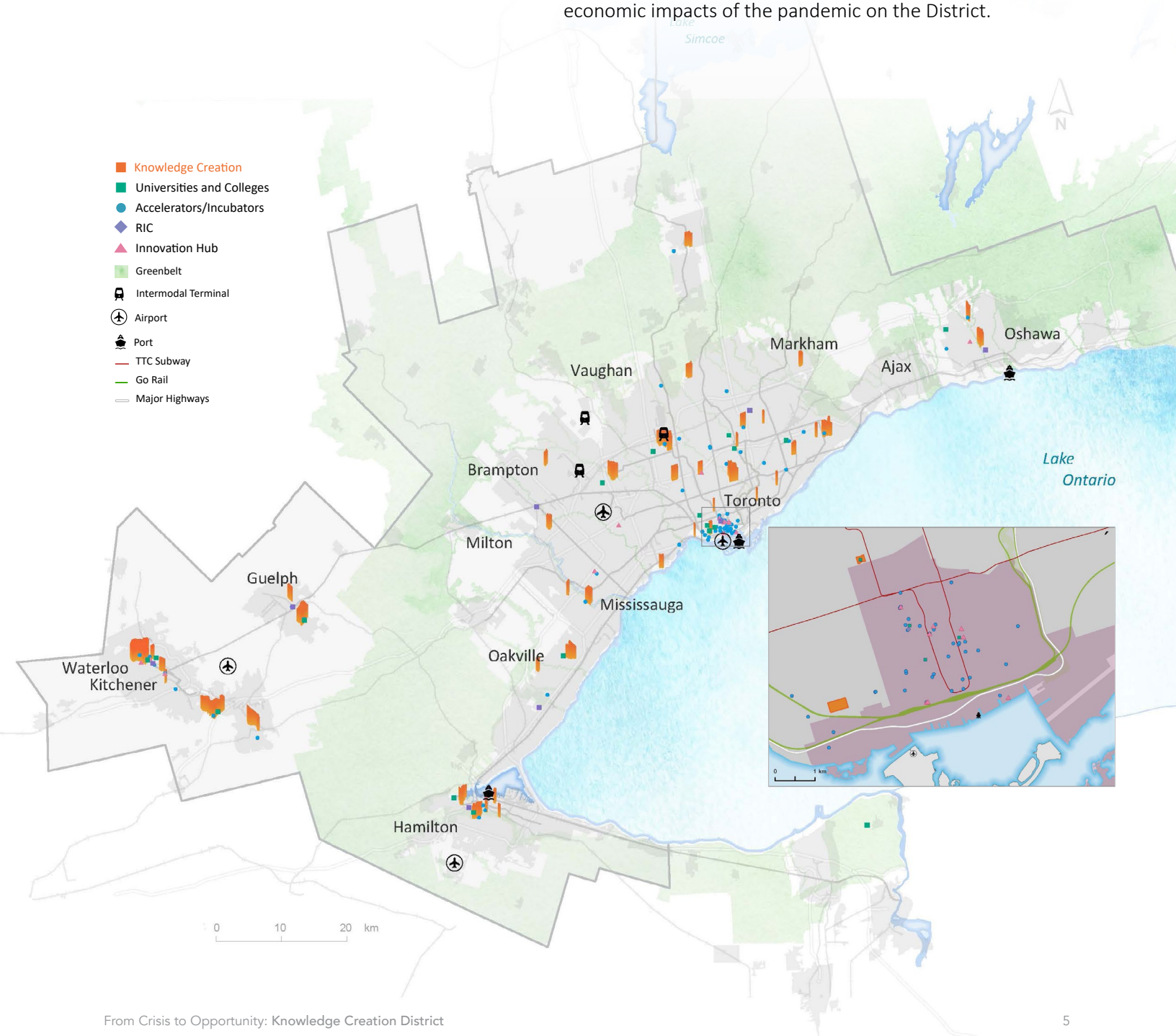


Jan De Silva
President & CEO,
Toronto Region Board of Trade

Executive Summary

In Shaping Our Future, the Toronto Region Board of Trade (TRBOT), through its Economic Blueprint Institute (EBI) introduced a Business Districts framework to measure and track regional economic recovery. These Districts transcend the boundaries of the 34 municipalities that make up the Innovation Corridor (the "Corridor") because this economic zone functions regionally.

In this report, one in a series on each of the five types of Business Districts, we deep dive into the conditions unique to the Knowledge Creation District (KCD) that will determine a safe re-opening and the economic impacts of the pandemic on the District.



Economic Health in the Corridor

More than a year after the pandemic, the negative impacts to the economy persist. As of March 2021, employment in the Corridor has fallen by 243,000, or 5% since the start of the pandemic.[1] There are also notably fewer operational businesses across the Corridor – the number of active businesses declined by 5% between February and December of 2020.[2]

However, the pandemic-induced economic crisis has not prompted widespread bankruptcies. In fact, according to The Office of the Superintendent of Bankruptcy, consumer and business insolvencies dropped 30 and 24 per cent in 2020, respectively, relative to 2019 levels.[3] A similar story is conveyed in Dun & Bradstreet's data on financial stress scores, which have not changed significantly for businesses across the Corridor.

Fiscal support from governments and a formidable pivot in business practices have gone a long way in enabling businesses to stay afloat. Curb side pick-up was quickly established as a norm, and programs such as Digital Main Street and TRBOT's Recovery Activation Program (RAP) have helped businesses go digital and build resilient business processes. Still, to weather the storm businesses have racked up substantial debt. Small businesses in Ontario have taken on an additional $66.7 billion in debt due to the pandemic – an average of nearly $208,000 per business.[4] As government supports wind down, it will be crucial for policy makers to continuously assess the fiscal health of businesses and respond accordingly.

Economic Health in the Knowledge Creation District

The KCD has the smallest geographic footprint of the five Business Districts, yet it has an outsized influence on the regional economy. Home to anchor institutions such as universities, colleges, and teaching hospitals, the District has nearly half the Corridor's jobs in Higher Education & Hospitals (46%) and is critical to the Corridor's innovation ecosystem. These healthcare, educational services, and professional scientific jobs exist in many of the Corridor's largest hospitals as well as educational and research institutions outside of the Metropolitan Centre (MC). Major hospitals in the District include Oakville Trafalgar, Credit Valley, Sunnybrook, Markham Stouffville, and Hamilton General. The District also houses University of Toronto's Mississauga and

Home to anchor institutions such as universities, colleges, and teaching hospitals, the District has nearly half the Corridor's jobs in Higher Education & Hospitals (46%) and is critical to the Corridor's innovation ecosystem.

Scarborough campuses and several other universities and colleges, including McMaster University, York University, University of Guelph, University of Waterloo, Ontario Tech University, Sheridan College, and Humber College.

Pre-pandemic, the Corridor's reputation as a centre of research, innovation, and knowledge-based industries was in large part due to its substantive network of higher education and healthcare institutions that attracted both international students and foreign investment. While driven by Canada's global reputation for publicly funded healthcare, post-secondary institutions, stability, livability, and opportunities, the attractiveness of the region was further bolstered by restrictive immigration policies in the United States. Known for its fast-growing tech sector and specializations in artificial intelligence, big data, and biopharmaceuticals, the region has seen a rise in the number of knowledge workers as well as increasing venture capital investment and government investment in research and development. The Corridor's biggest challenge was its ability to leverage its competitive strengths and commercialize innovation at scale, domestically and internationally.

The pandemic has affected the healthcare and post-secondary education sectors differently. The high number of frontline workers in health care facilities means that the District has the second lowest capacity for remote work among the five Business Districts – 58% of all workers in the District (96,450 workers in total) are unable to adapt to work-from-home measures.[5] 12% alone are registered nurses.

In contrast, the closure of universities and colleges had an immense financial impact on post-secondary institutions and may reduce the District's ability to both attract and retain international students, who are a key source of talent and drive much of the consumer spending across the Corridor.

As the economy of the Innovation Corridor begins to re-open and recover, key factors affecting the continued economic health of the KCD include:

Re-opening

The potential return of students to university and college campuses that were deserted during the pandemic follows the collapse of international student permits in Ontario. The number of international student study permits issued dropped from nearly 200,000 in 2019 to 120,000 in 2020. As of January, only 11,000 have been issued for 2021.[6]

The absence of international students, along with the rest of university and college communities, has reverberated across the KCD. As universities and colleges look forward to reopening in the fall of 2021 with the ongoing roll out of vaccines, a concerted and unified message by governments, institutions, and businesses must be sent to the world that Canada and the Corridor's teaching institutions and hospitals are safe. This must also include appropriate protocols to enable the safe use of transit and ensure the health and well-being of returning domestic and international students. Governments must support universities and colleges in developing their plans and explore the potential for using campuses as vaccination hubs for the community.

Drivers of Recovery

Key drivers that will impact the trajectory for the District include: (i) the Corridor's attractiveness as a destination of choice for international students; (ii) the role of universities and colleges in training tomorrow's workforce; and (iii) the future prospects of the region's innovation ecosystem.

Home to many of the country's largest and globally recognized universities and colleges, the KCD plays a pivotal role in growing Canada's innovation and knowledge economy while attracting talent that can meet employers' skills requirements. If the pandemic has lasting impacts on the Corridor's student population, particularly the presence of international students, this could have detrimental fiscal impacts on educational institutions, economic implications for governments, and diminish the region's ability to meet its talent needs. Continued efforts to expand existing programs to provide a path towards permanent residency for international students and introducing new initiatives to attract additional students will be key to recovery and to maintaining an edge in the global race to attract and retain talent.

Similarly, with increasing potential for automation disruptions, existing skills gaps, and changing needs in the workplace, post-secondary institutions must play a leading role in reskilling and upskilling workers. Life-long learning infrastructure and experiential learning will be required to prepare vulnerable workers in the Corridor for the skills necessary for the future of work. Finally, the region's economic recovery should leverage and continue to build upon the Corridor's innovation ecosystem, including its strengths in Information and Communications Technology (ICT), artificial intelligence, and biopharmaceuticals.

Building a Strategy for Recovery

Pre-Pandemic Pain Points and Opportunities:

High Concentration of Knowledge-Based Institutions
Home to many of the Corridor's largest teaching hospitals and leading universities and colleges, the KCD is at the heart of the Corridor's innovation ecosystem and a key driver of economic growth and prosperity.

Congestion and Infrastructure Constraints
Public transit represents a critical enabler of economic activity in the KCD given the high proportion of students and workers who rely on it. Many students commute long distances to get to campus and infrastructure investment has not kept pace with their growth.

High Dependence on International Students
Universities and colleges have become increasingly reliant on international students – who pay significantly higher tuition fees – to make up budget shortfalls. Institutions across the Corridor have benefited from immigration restrictions in the U.S., which has contributed to higher demand for Canadian schools in recent years.

Pandemic Impacts:

High Risk to Workers Due to Low Capacity for Remote Work
Health care workers, who are highly concentrated in the KCD, are mostly unable to work remotely and have the highest risk of exposure to the virus.

Loss of Student Population
The sharp drop in campus activity and student population has caused significant reductions in consumer spending and transit use across the Corridor. Government support will be needed to manage the fiscal impacts of these losses and bring students and faculty back safely.

Post-Pandemic Recovery Strategy:

Country of Choice for International Students
International students remain essential to the fabric of post-secondary institutions and a key talent stream for the Corridor's economy. Restoring demand will require an acceleration of marketing outreach efforts and support from government to promote to the world the advantages of studying in Canada, with an emphasis on the quality of our institutions as centres of excellence for research and innovation.

Investing in the Corridor's Knowledge and Innovation Ecosystem
Public support for education and knowledge-based institutions, including R&D funding, has played a critical part in the Corridor's success in technology and innovation-based fields. This commitment must continue post-pandemic to preserve these important jobs and capitalize on high-growth industries.

Leveraging Strengths in Life Sciences
The universities, colleges, and teaching hospitals at the heart of the KCD are central to building up the Corridor's biopharmaceutical industry and, in turn, Canada's ability to address the world's greatest medical challenges domestically. Governments should ramp up their investments in these assets as they work to expand the sector.

Futureproofing our Workforce
A successful long-term recovery strategy must include reskilling and upskilling initiatives that prepare workers for in-demand jobs. Post-secondary institutions and employers must work together on curriculum development to tailor it to industry demands, expanding successful initiatives such as co-op programs.

Developing a Business District Framework for Canadian Cities:

The Business District framework developed for the Innovation Corridor is based on two primary data sources: 1) employment area designations captured in municipal official plans and the provincially significant employment zones as referenced in Ontario's growth plan for the Greater Golden Horseshoe; and 2) estimated number and type of jobs based on 4-digit Industry (NAICs) Codes and Place of Work Status for the Employed Labour Force 15 years and older from the 2016 Canadian Census.

To determine a Business District type, we overlaid census tracts with employment areas and where boundaries did not match, we allocated jobs based on percentage of overlapped area. It is not a perfect science. However, the established Business District framework provides a working model for better understanding economic activity in the Corridor that can be refined with the next census, and as more granular economic and jobs data are brought to the project.

Re-Opening Drivers:

Challenges and Opportunities for the Knowledge Creation District

ENABLING SAFE TRAVEL:

Safe Use of Transit is Critical for Allowing Workers and Students to Return to the District

ENABLING SAFE BUILDINGS & DISTRICT:

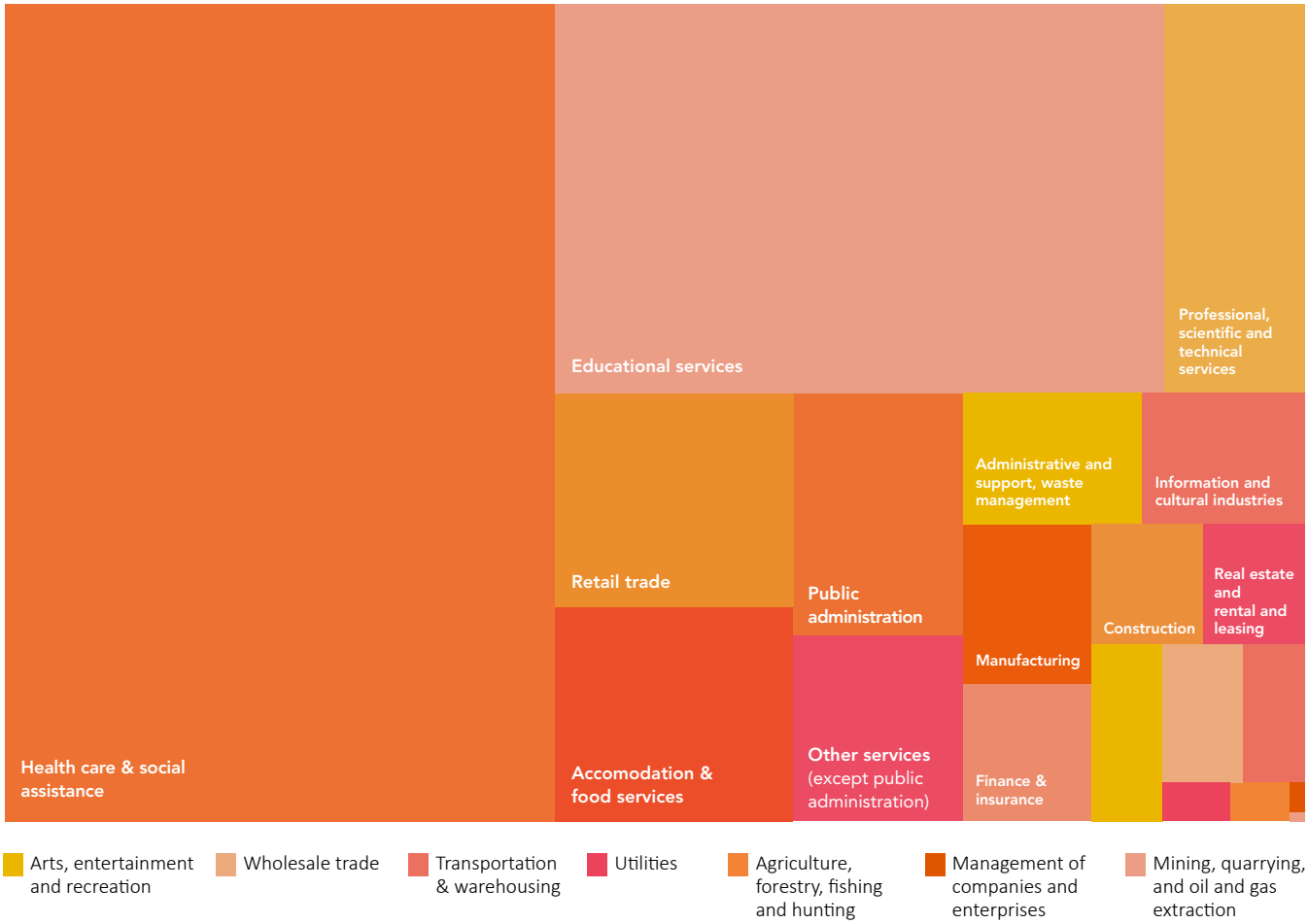
Large Institutions in the District Must Prioritize Collaboration and Strategic Initiatives to Allow for Safe Re-Opening

The international nature of these campuses, as well as the collaboration between students, faculty, and nearby hospitals, are essential to the vibrancy and knowledge transfer activities of the District.

The Knowledge Creation District (KCD) is dominated by the presence of the health care and educational services sectors (Figure 1). Together these sectors account for approximately 65% of the total 166,710 jobs in the District[7], supported by the hospitals and post-secondary institutions that serve as key anchors of economic activity in the region. The pandemic has caused significant upheaval in both sectors, but in markedly different ways. Health care workers, a key line of defense against the pandemic, have continued to work with great risk to their own health. In contrast, universities and colleges – which historically have attracted tens of thousands of domestic and international students – were forced to shut down, with important economic ramifications for the regional economy.

A large focus for reopening the KCD will be on revitalizing campus life for the universities and colleges that characterize the District. The international nature of these campuses, as well as the collaboration between students, faculty, and nearby hospitals, are essential to the vibrancy and knowledge transfer activities of the District. Restoring these will require close attention to how these players interact and strict attention to safety and quarantine measures.

FIGURE 1: **Employment Breakdown by Sector, Knowledge Creation District, 2016**



Source: "Place of Work," Statistics Canada, Census (2016).

Enabling Safe Travel: Safe Use of Transit is Critical for Allowing Workers and Students to Return to the District

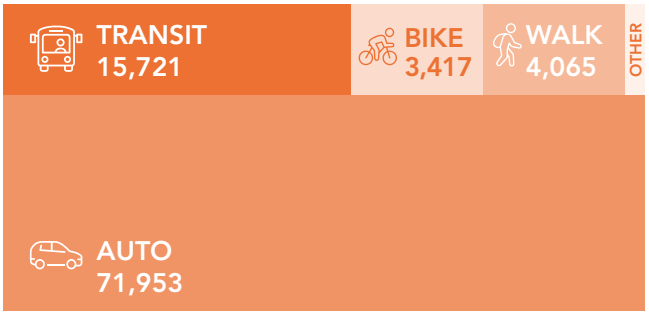
Public transit represents a critical enabler of economic activity in the KCD given the high proportion of students and workers who rely on it. While most trips among commuters (i.e. workers) to the KCD prior to the pandemic were made by automotive transportation (76%), transit use accounted for a sizeable share of commutes, at 17% (Figure 2). Active modes of travel such as walking and biking represented nearly 8% of trips. This diversity of commute patterns should be considered, and potentially leveraged, as part of the District's reopening plans.

Among students, the use of transit is even higher. A 2019 study by StudentMoveTO (a coalition of 10 universities and colleges across the GTHA, Metrolinx, the City of Toronto, and other community organizations) found that nearly two thirds of students (60%) use either local transit (buses, streetcars, subways) or regional transit (GO Trains, GO buses) as their primary travel mode when commuting to campus. Automobile transportation only accounts for 19% of commutes. On average, the students in the study have a one-way commuting distance of 14.6 kilometres and a duration of 45.9 minutes, with the longest commutes attributed to regional transit modes such as the GO Train.[8]

The KCD has had a significant and consistent drop in commuter vehicle trips since the pandemic began (Figure 3). This is likely due to the level of activity in the District directly attributed to universities and colleges and the presence of students and staff on various campuses. While retail and some offices started to reopen over the summer and fall, causing vehicle trips to pick up in other Business Districts, universities and colleges continued to operate mostly virtually.

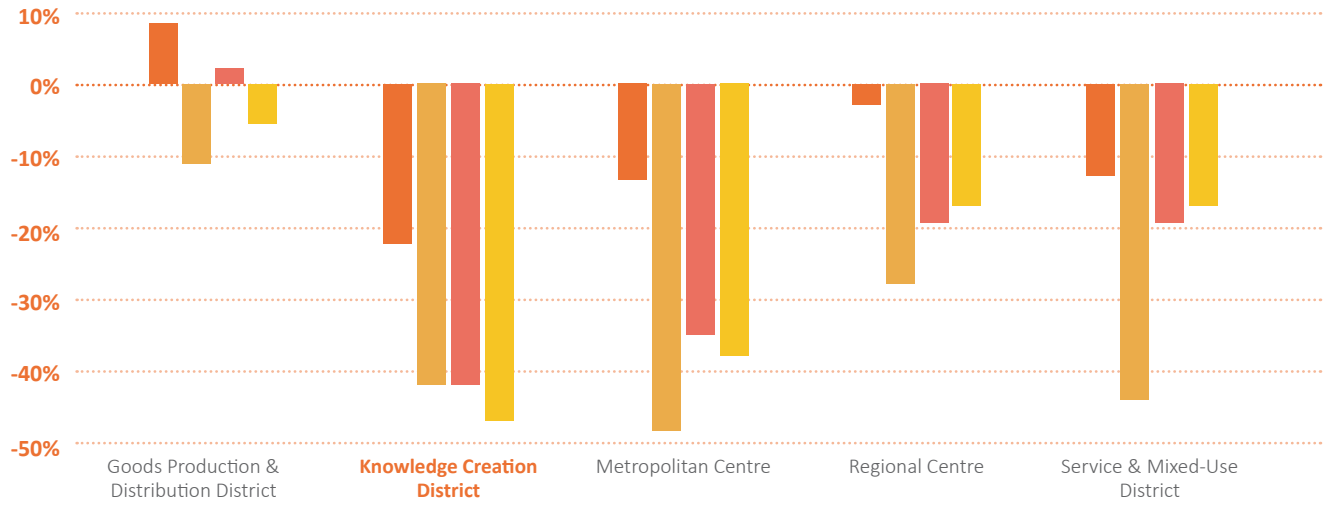
These trends suggest that a substantial return of student and business activity will not take place until post-secondary institutions are reopened and the threat of viral spread is significantly reduced. Improving transit safety should be a priority for reopening, as many commuters to the District, particularly students, rely on it as their only mode of transportation. Transit authorities should continue to prioritize and communicate safety measures to increase confidence among transit users and be willing to add more vehicles to reduce overcrowding.

FIGURE 2: **Commuter Trips by Transportation Mode, Knowledge Creation District, 2016**



Note: "Auto" modes of transport include travel by personal vehicle, taxi, ride hailing service, or a motorcycle. "Transit" transportation includes trips in which the primary mode of travel is some form of transit, which includes both local transit and GO Transit trips. "Work trips" are defined as trips made by workers from their residential zone to their place of employment. Any trips involving intermediate stops between a place of residence and work are ignored in this analysis. Home to work trips captured in this analysis are more representative of commuting pattens. Intermediate trips likely account for a small share of commuting trips and do not have a significant impact on the overall findings of our analysis. Trip counts represent estimates for trips made during a typical 24 hour weekday in 2016.
Source: Data Management Group at the University of Toronto Transportation Research Institute, Transportation Tomorrow Survey (2016).

FIGURE 3: **Year-over-Year % Change in Daily Vehicle Trips for Home to Work Commuters, All Vehicles, Q1 2020 – Q4 2020**



Note: Data represents changes in the average daily vehicle trips for workers that commute from home to work in the Business District by car, truck, or bus.
Source: StreetLight (2020).

Enabling Safe Buildings and District: Large Institutions in the District Must Prioritize Collaboration and Strategic Initiatives to Allow for Safe Re-opening

The KCD has the highest concentration of institutional properties such as schools, hospitals, and places of worship of the five Business Districts.[9] Only an estimated 6% of businesses in the District are 'Main Street'-type small businesses (1 to 19 employees) in sectors such as retail, arts and recreation, and accommodation and services – the second lowest share after the Metropolitan Centre (MC).[10] The District is overwhelmingly dominated by large, public-facing institutional facilities, serviced by a relatively small number of retailers, food establishments, and other shops.

Nearly half the Corridor's total employment in Higher Education & Hospitals (46%) is in the KCD (Figure 4). Most of this is made up of hospitals, as the District covers many of the region's largest hospitals outside of the MC, including Oakville Trafalgar, Credit Valley, Sunnybrook, Markham Stouffville, and Hamilton General. The District also houses University of Toronto's Mississauga and Scarborough campuses and several other universities and colleges, including McMaster University, York University, University of Guelph, University of Waterloo, Ontario Tech University, Sheridan College, and Humber College. In comparison, the MC has the second highest concentration of workers in these industries, accounting for 29% of total jobs in Higher Education & Hospitals across the Corridor thanks to its four university and college campuses and four teaching hospitals surrounding the MaRS Discovery District.[11]

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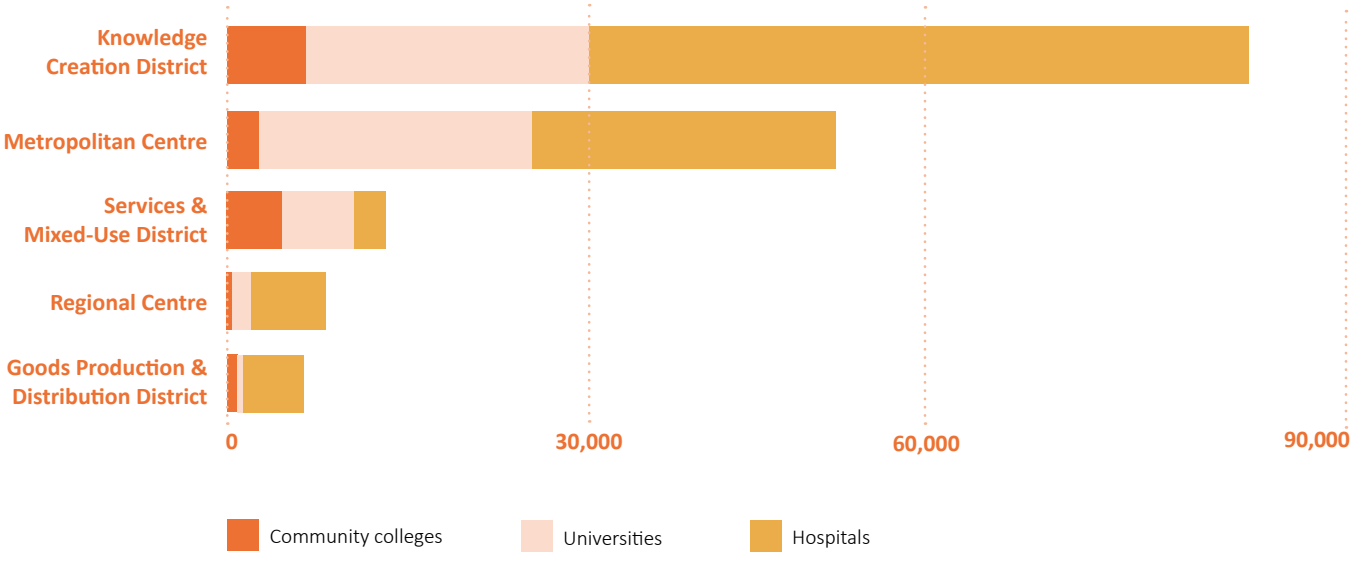
FIGURE 4: **Higher Education & Hospitals Employment, 2016**



Source: EBI Planning Categories analysis based on data from Statistics Canada, Census (2016).

RE-OPENING DRIVERS

Many of the post-secondary institutions in the KCD include sprawling campuses with large amounts of public space, but the risks associated with having groups of students indoors has led to the vast majority of classes being taught virtually. Some universities in the Corridor, including University of Toronto (U of T), Guelph, Waterloo, and Trent, have reopened residences for students, but most institutions are targeting fall 2021, pending widespread vaccination, for a full reopening and return to in-class learning.[12]

A full fall reopening of universities and colleges will involve tens of thousands of students and faculty entering the country for the first time in more than a year. Post-secondary institutions will need to have a clear commitment and plan in place to ensure a safe return of students and faculty. Current regulations state that all international students entering Canada must have proof that they are attending a designated learning institution with a COVID-19 readiness plan approved by the province.[13] These plans must describe how the institution will manage the mandatory 14-day quarantine period, including arrangements for transportation to the students' quarantine location, and provide information to students on how to get items like food, medication, and health insurance. Students are advised to contact their school directly if they have any questions about their school's readiness plan. While these requirements may change by the fall, universities and colleges should still aim to have precautions in place to incentivize students' return.

U of T, which is home to the region's largest international student body[14], with approximately 23,000 students[15], appointed a new Interim Vice-President, International, last summer to lead the charge on helping international students return to campus safely. The role was made permanent in early April 2021.[16] The University has helped over 2,700 students quarantine at local hotels, where they receive staff support to self-isolate for two weeks, including meals delivered to their door.[17] This comprehensive framework could serve as a model for other post-secondary institutions across the Corridor.

Coordination across the District will be especially important for teaching hospitals, many of which are closely linked with universities and colleges in the KCD and must prioritize patient safety before engaging with nearby schools. Ontario has a total of 15 teaching hospitals, nine of which are located in the Corridor.[18] These hospitals have a significant research mandate and work closely with affiliated medical schools to train the next generation of medical professionals. The teaching and research interplay allows students to gain valuable practical experience and current clinicians to keep up to date with the most recent developments in medicine.[19]

A full fall reopening of universities and colleges will involve tens of thousands of students and faculty entering the country for the first time in more than a year. Post-secondary institutions will need to have a clear commitment and plan in place to ensure a safe return of students and faculty.

Each District's reopening plan must consider the dynamic between the post-secondary institutions and/or hospitals at their core, as well as service businesses and other employers drawing from the same community. Hospitals' ability to operate safely is paramount, which is why their normal collaboration with post-secondary institutions may be one of the last activities to come back. Post-secondary institutions must work closely with associated hospitals to ensure their needs are met by any reopening plan.

Governments should work with universities and colleges, in conjunction with other employers in the District, to support them in their reopening plans. Just as many hospitals have made plans to vaccinate staff on site[20], universities and colleges should explore the potential for setting up on-campus vaccination sites. Most institutions have health clinics and common areas that can be repurposed as vaccination sites. Universities and colleges could serve as community hubs for widespread inoculation, which would greatly assist the District in its return to normal activity.

While hospitals have, of course, remained open during the pandemic, along with medical and other research facilities found across the District[21], university and college campuses have undergone drastic change. Without international and interprovincial travel, these campuses will continue to see diminished activity and require support. Institutions must develop a comprehensive strategy in conjunction with public health regulations to enable the safe return of students and faculty.

MITIGATION TOOLKIT

For a full list of mitigations that can be used to help improve safety in the KCD, click here to access the Mitigation Toolkit.

Recovery Drivers:

Challenges and Opportunities for the Knowledge Creation District

Shifts Towards Remote Learning and Maintaining the Presence of International Students

Training the Workforce: Role of Universities and Colleges

Flourishing Innovation Ecosystem

A key plank of the Government of Canada's focus on attracting and retaining talent has been a program to fast-track permanent residency for international graduates. Canada's key competitors in this global race to attract talent includes the United States, the United Kingdom, and Australia. What the Corridor's higher educational institutions, teaching hospitals, and research centres do to keep their competitive edge will have ramifications far beyond the boundaries of the District.

With the upending of in-person teaching, universities and colleges in particular face a radically different environment as many, if not most, standard practices of teaching and campus life have changed. The rise of remote learning, a pre-pandemic trend, will likely continue to some extent, placing increasing pressures on post-secondary institutions. The global attractiveness of the Corridor as a destination to learn, work, and live will require institutions to work with government to re-examine their operations and consider new ways of making post-secondary education more accessible, futureproof, and financially sustainable, all within the context of a dynamic and competitive metropolitan region.

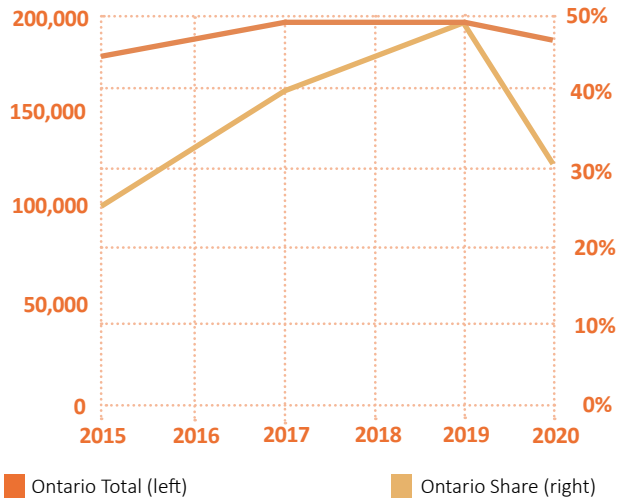
All orders of government, post-secondary institutions, and business should also work together to ensure that the appropriate learning infrastructure is in place to train tomorrow's workers and to build on the Corridor's competitive advantages – including in Information and Communications Technology (ICT), artificial intelligence, and biopharmaceuticals.

Shifts Towards Remote Learning and Maintaining the Presence of International Students

The KCD's universities and colleges have undergone drastic change as classes have gone virtual and international students have left the country. Going into the pandemic, international students made up an increasing share of total student enrollment – rising to approximately 19% in the 2018-19 school year (the latest data available), double the amount from just six years earlier.[22] Universities and colleges across Canada have become increasingly reliant on international students, who pay much higher tuition fees, to make up for budget shortfalls.[23] As much as half of all tuition revenue for Canadian universities comes from international student fees.[24] This reliance is particularly pronounced for Ontario's colleges, where international enrollment grew by 258% between 2008 and 2017.[25] This could become highly problematic as international travel restrictions and fears around COVID-19 persist.

Over the last five years, Ontario accounted for roughly half the total number of international study permits issued in Canada. The overall number also doubled, from 96,000 in 2015 to almost 198,000 in 2019. However, this figure has sharply declined since the pandemic began. In 2020, only 120,000 international student permits were issued in Ontario, and as of January, only 11,000 have been issued for 2021.

FIGURE 5: **Total International Student Permits Issued, Ontario, 2015 – 2020**



Source: Immigration, Refugees and Citizenship Canada (2021).

Over the last five years, Ontario accounted for roughly half the total number of international study permits issued in Canada (Figure 5). The overall number also doubled, from 96,000 in 2015 to almost 198,000 in 2019. However, this figure has sharply declined since the pandemic began. In 2020, only 120,000 international student permits were issued in Ontario, and as of January, only 11,000 have been issued for 2021.[26] Ontario's share of international student permits issued is also declining. This could be a result of more students choosing to not indicate an intended destination as part of their permit application; permits with no intended destination have dropped by 57%, while those specific to Ontario have dropped by 91%.

It is important to recognize that the number of international student permits issued reflects the number of net new international students, rather than the total number. Preliminary data from Universities

Canada suggest that total student enrollment has in fact gone up slightly in the last year, rising from 1.38 million in fall 2019 to 1.4 million in fall 2020.[27] Universities with recognizable brands have fared particularly well; University of Waterloo, for example, had a 16% increase in new admissions for 2020.[28] Much of this increase, however, is likely attributed to part-time students, who are taking advantage of the flexibility of online learning.[29]

The decline in international student enrollment paired with the decline in revenue from campus services could have serious fiscal consequences for Canadian universities. For example, the University of British Columbia has projected a deficit of $225 million this year compared to $60 million surplus budgeted pre-crisis.[30] In Ontario, Laurentian University applied for creditor protection earlier this year, raising concerns for other universities. These losses could extend into the next year, as international students face travel restrictions, increased cost of entry into Canada[31], and the possibility of continued remote learning with potential lags in the vaccine rollout.

International students symbolize much more than revenue for post-secondary institutions; they are invaluable members of our communities. International students bring life and diversity to campuses, contribute to the local economy, and serve as a pool of highly educated individuals for the country's workforce across all sectors. Students also occupy a substantial share of the Corridor's housing stock and have been a major cause of the softening rental market during the pandemic.[32] Students' contribution to the local economy is evident in the persistence of consumer spending losses in the KCD (Figure 6), but also extends beyond individual campuses and includes their economic impacts on the local economy more generally. Economic contributions are not just limited to their own individual spending, as friends and family who visit university students spend money on housing, food and beverage, recreation and entertainment, retail purchases, and transportation. Annual expenditures of international students in Canada, including their visiting families and friends, totaled $22.3 billion in 2018. This translates into a $19.7 billion contribution to Canada's GDP through direct and indirect impacts, over half of which comes from Ontario.[33]

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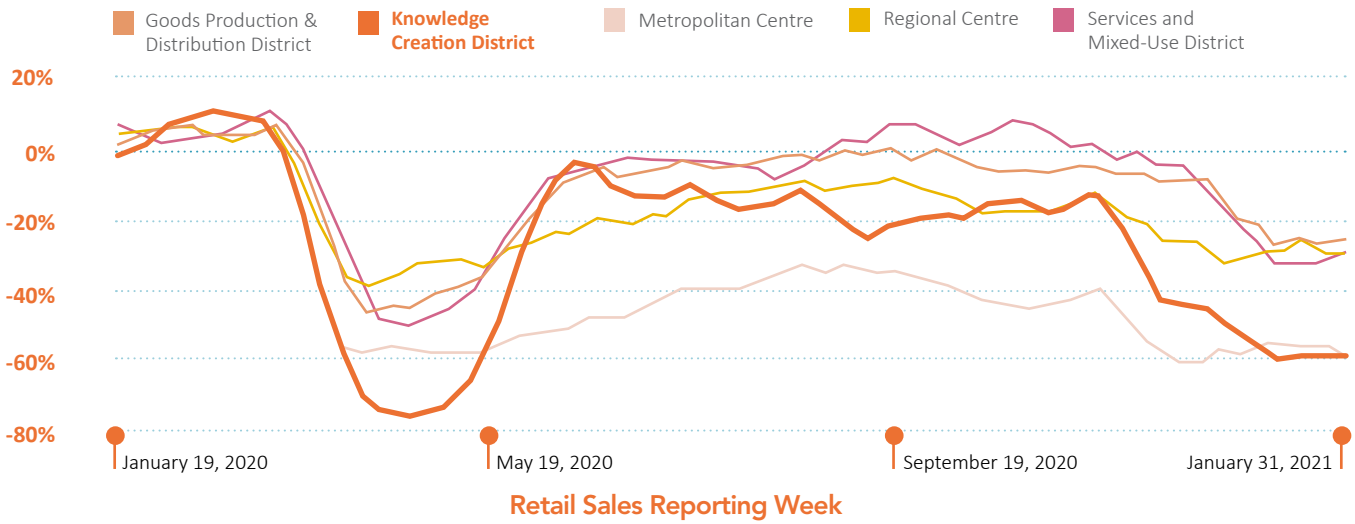
FIGURE 6: **Year-over-Year % Change in Consumer Spending Levels (3-Week Moving Average), In-Store Transactions, January 2020 – January 2021**



Note: Dates for consumer spending data are reported based on the start of the retail sales reporting week, which starts on Sunday. Consumer spending data corresponds to year-over-year changes in weekly transactional dollar volume. In-store transactions are represented by 'card present transactions' recorded by Moneris. In-store transactions that are recorded as 'card not present transactions' are not included. Only Moneris-acquired credit and debit transaction data are included.
Source: Moneris (2021).

RECOVERY DRIVERS

International graduates have become Canada's greatest resource in filling skilled-labour gaps. As the home of many of the country's largest universities and colleges, the KCD plays a pivotal role in this effort. International students have become particularly prominent in knowledge-intensive subjects, which are more likely to withstand economic changes and can support long term economic growth. In the 2018/2019 academic year, international students made up 19% of all students enrolled in STEM[34] or BHASE[35] related programs in Ontario, almost double the 2013/2014 share. More specifically, international students accounted for 24% (or 58,740) of students in STEM groupings and 17% (or 101,380) in BHASE groupings.[36]

While the United States traditionally dominates the market for international students, their political environment and more restrictive immigration policies in recent years have driven many students to Canada – a large share of which have ended up in Ontario. Since 2015, the Canadian government has increased efforts to not only attract talent, but also to retain it. Programs have been introduced to help international graduates fast-track their permanent residency[37], which serves as an incentive for students who now arrive knowing that there is a greater likelihood they can stay. Nonetheless, there remain challenges for international students looking for skilled work in Canada upon graduation. This situation was exacerbated by the COVID-19 pandemic.

Canada may see its attractiveness among international students diminish over the next few years with the swearing in of the United States' new administration and changes to U.S. immigration strategies and accompanying policies. A recent survey of prospective international students shows improved perceptions of the U.S., which may impact the recruiting power of Canadian universities.[38]

Training the Workforce: Role of Universities and Colleges

The COVID-19 pandemic has accelerated the trend towards automation. Across the Corridor, this means that some of the most vulnerable workers – such as those in manufacturing, sales and service representatives, as well as office support workers – may face long-term disruptions. In the Goods Production and Distribution District (GPDD) alone, two thirds of the workforce (600,000+) are employed within industries at higher risk of automation-related transitions, defined as having at least 10% of the workforce with a 70% chance or higher risk of automation-related job transformation.[39] Institutions in the KCD are vital to reskilling and upskilling efforts to help prepare current and future workers across the Corridor for the needs of employers and the jobs of tomorrow.

As of 2019/20, over 1,000 master's students were enrolled in AI programs in Ontario and an estimated 3,000+ AI jobs were created across the province.

Governments, alongside educational institutions, have been preparing for a changing workforce and the increasing need to help workers develop in-demand skills. For example, with support from the Province of Ontario, Vector Institute has expanded Ontario's workforce-ready AI talent pool by working with universities across the province to develop master's programs in core technical and complementary areas such as business and health. As of 2019/20, over 1,000 master's students were enrolled in AI programs in Ontario and an estimated 3,000+ AI jobs were created across the province.[40] Additionally, the federal government recently pledged over $2.4 billion over three years to developing skills and training in the 2021 budget. This includes investments in work-integrated learning programs, expanded student grants to support adults who return to school full-time to upgrade skills, and support for a new Apprenticeship Service.[41]

Post-secondary institutions are critical stakeholders in the development of long-term learning infrastructure. Despite the theoretical nature of their teaching, many universities in the KCD have begun taking on the challenges of digitization and automation in the labour market. In the wake of the pandemic, the University of Toronto recently announced a collaboration with Palette Inc. to work on the upskilling of displaced workers to meet the talent needs of Canada's most innovative companies.[42]

Colleges in Ontario, five of which are in the KCD, are well positioned to take on the reskilling and upskilling of workers. Their programs are designed around experiential learning and are evolving to cover subjects ranging from 3D manufacturing and digital animation to hospitality innovation. Where businesses have been unable to reskill internally, colleges have helped fill those gaps through strategic partnerships. For example, Humber College has partnered with Purolator to train their freight and parcel workers in data fluency to better understand the organization's tracking and warehouse systems.[43] These types of partnerships are forms of 'micro credentials' that compound existing skillsets and credentials, to the mutual benefit of the employer and employee.

Flourishing Innovation Ecosystem

Thanks in large part to its strong universities and colleges, the Innovation Corridor, prior to the pandemic, was emerging as one of the world's preeminent centres for tech and AI innovation. In 2019, Toronto had the fourth largest tech talent labour pool in North America, with close to 37% growth in tech employment since 2015. The Waterloo Region was ranked as the top growth-oriented market in North America, with 51% growth between 2014 and 2019.[44] Between 2013 and 2018, venture capital investment across the region grew from approximately $350 million to over $1.4 billion, in real terms, most of it attributed to software publishers and computer systems design.[45] Public R&D expenditure in the Corridor, which comprises of post-secondary institution as well as government R&D, increased from $1.85 billion in 2011 to $2.08 billion in 2017, in real terms.[46] Startup Genome, a research and advocacy group out of San Francisco, considered nearly 300 ecosystems and placed Toronto-Waterloo in their Top 30 Global Startup Ecosystems rankings for 2020, which ranks regions based on factors such as funding availability, connectedness, market reach, knowledge base, talent pool, and growth.[47] The report notes its strengths in AI and big data, citing major investments by Google and Uber, as well its strong life sciences ecosystem and talent pool.

Thanks in large part to its strong universities and colleges, the Innovation Corridor, prior to the pandemic, was emerging as one of the world's preeminent centres for tech and AI innovation.

The region's economic recovery should be built around leveraging the Corridor's strengths across the tech and innovation landscape. Analysis of industry clusters demonstrates that one of the most promising areas for the Corridor is biopharmaceuticals, which has the highest location quotient (a measure of employment concentration) out of the region's prominent traded industry clusters, and an annual employment growth rate of 1.5% between 2006 and 2016 (Figure 7).[48] Life sciences-related fields have also accounted for the most academic citations from the Corridor, with over 1.3 million citations from Clinical, Pre-Clinical and Health fields between 2015 and 2018, and 1.1 million citations from Life Sciences fields.[49]

Biopharmaceuticals has garnered special attention during the pandemic as countries race to procure life-saving vaccines and drug therapies. While the Corridor has one of the largest life science sectors in North America, as the birthplace of insulin and the pacemaker, it notably does not have vaccine manufacturing capacity, which has forced Canada to rely on purchase agreements with top U.S. and European pharmaceutical companies, including Pfizer, Moderna, and AstraZeneca.[50]

Efforts are underway to address this (the federal and provincial governments have recently committed to investing in a new Sanofi vaccine manufacturing facility in Toronto, which is expected to be completed by 2027[51]), but it will require continued public investment and a shift in industry trends. Much of the region's milestone successes in life sciences are attributed to collaborative partnerships between post-secondary institutions, teaching hospitals, and public research programs. The University of Toronto has been credited with many of Canada's greatest life science achievements, including the development of the polio vaccine in the '50s and the first lung transplant in the '80s.[52] Several other universities and colleges in the Corridor have world-leading health science programs, from the groundbreaking stem cell research at McMaster to agri-food research at the University of Guelph, which is also credited with the development of DNA barcoding in the early 2000s.[53]

The universities and colleges at the heart of the KCD are central to building up the Corridor's biopharmaceutical industry and, in turn, Canada's ability to address the world's greatest medical challenges domestically.

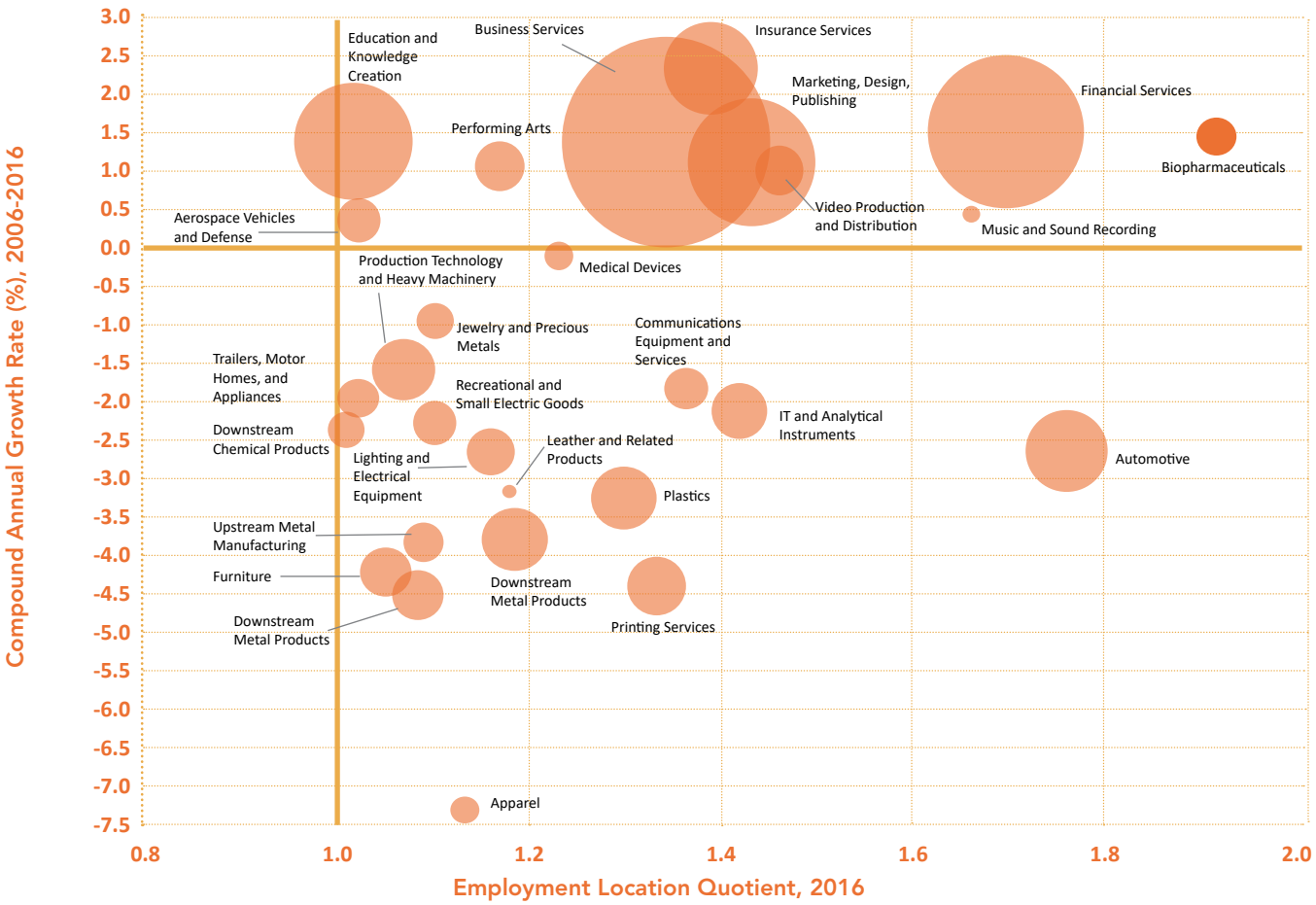
In addition to vaccine manufacturing, the Province is currently investing $1.2 million in McMaster University's newly created Centre of Excellence in Protective Equipment and Materials (CEPEM), working with Canadian manufacturers to design, manufacture, and test PPE.[54] It is also investing $1.1 million in the University of Toronto's Dalla Lana School of Public Health to support its PPE testing facility.[55] More of these kinds of partnerships and investments are needed to leverage our strong footing in this industry.

INDUSTRY CLUSTERS AND LOCATION QUOTIENT

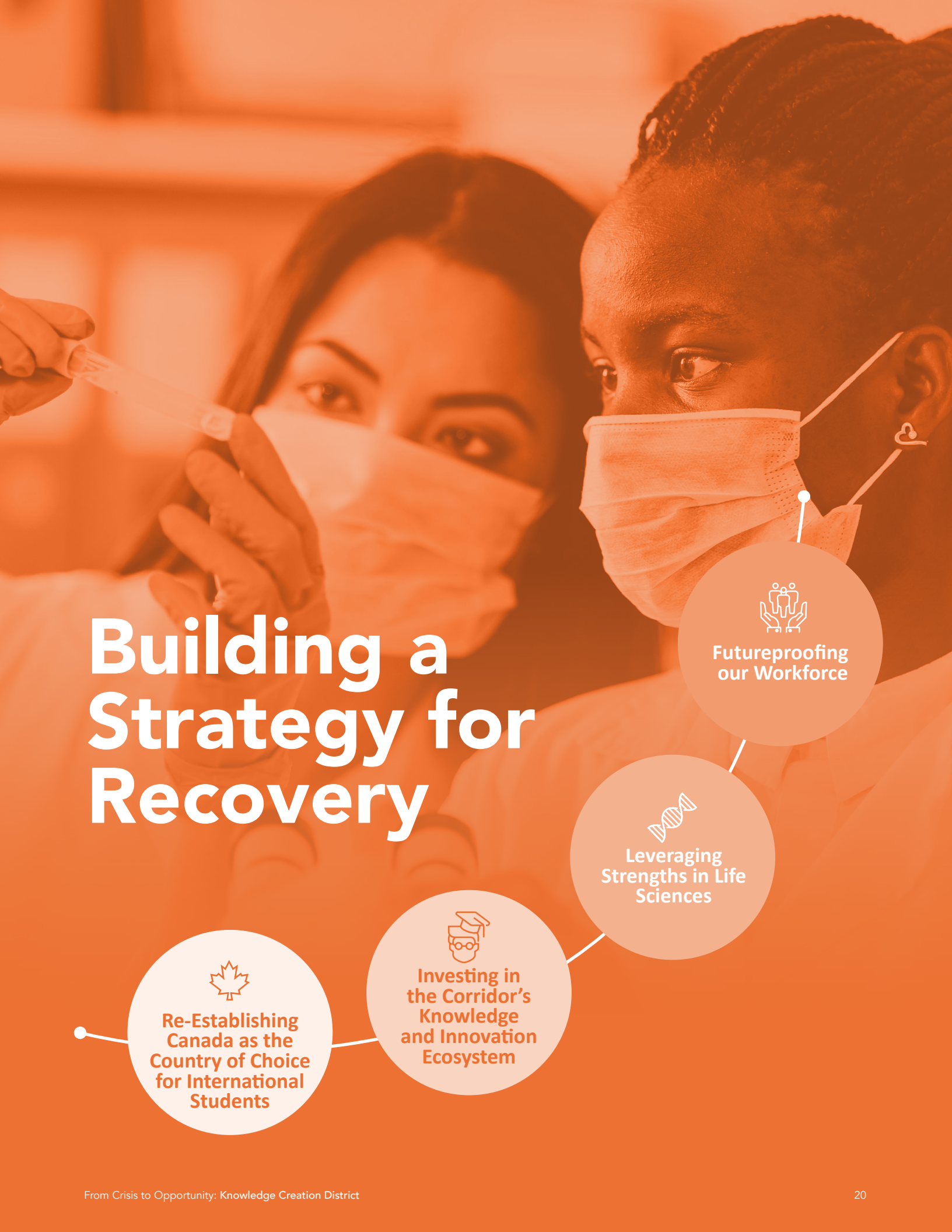
Industry clusters are groups of geographically proximate and inter-related companies and supporting institutions. The level of specialization or concentration of a cluster in a particular region is often measured by estimating location quotients (LQ). Employment LQs are defined as the ratio of the share of employment in a regional industry cluster to the share of employment in the same cluster for the country as whole. A higher LQ translates into a greater concentration of a particular cluster in a region. In equation form this translates to:

$$LQ \text{ for cluster } x = \frac{\%\text{ share of regional employment in cluster } x}{\%\text{ share of national employment in cluster } x}$$

FIGURE 7: **Employment by Traded Cluster, Innovation Corridor, 2016**



Note: Circle size indicates total employment for each cluster in 2016. Only clusters with a location quotient of at least one are included. Traded industry clusters, unlike local clusters, sell their goods and/or services across regions and countries.
Source: Innovation Policy Lab analysis based on data from Statistics Canada, Census (2016).



Building a Strategy for Recovery

Futureproofing our Workforce

Leveraging Strengths in Life Sciences

Investing in the Corridor's Knowledge and Innovation Ecosystem

Re-Establishing Canada as the Country of Choice for International Students

STRATEGY FOR RECOVERY

A successful post-COVID recovery will require careful and effective management of key drivers and trends that pre-dated the spread of the virus as well as impacts that were either brought about or accelerated by the pandemic.

The KCD remains an important driver of the Corridor's talent pool and innovation ecosystem. With strong universities and colleges and a diverse industry base, the region will continue to attract businesses and skilled workers. However, a number of long-term challenges must be addressed as part of economic recovery. Our dependence on international students and skilled immigrants highlights the need to continue attracting this talent, while also underscoring the importance of investing in talent at home. The KCD is well-positioned to build up the Corridor's capabilities in sectors such as AI and biopharmaceuticals, but it will require continued public investment and collaboration across institutions.

A long-term strategy for recovery for the District must deploy policies that address these challenges head on through place-making, infrastructure, and workforce initiatives:

Re-Establishing Canada as the Country of Choice for International Students

International students remain essential to the fabric of post-secondary institutions and a key talent stream for the Corridor's economy. Thanks to Canada's global reputation as a centre of excellence for higher education, Canadian universities and colleges and their research institutions and teaching hospitals are widely recognized. Prior to the pandemic, Canada attracted a growing number of international students. Ensuring our ability to attract and retain students and talent will require an acceleration of these efforts and support from government to communicate to the world the advantages of studying in an open, safe, and equitable Canada, emphasizing the quality of our institutions and the resiliency of our economy. The University of Toronto, the Corridor's most internationally recognized university, has appointed Joseph Wong as their new Vice-President, International. In this role, he is expected to continue providing support to international students and advance U of T's internationalization strategy.[56] Similar strategic efforts will be needed for all post-secondary institutions.

Investing in the Corridor's Knowledge and Innovation Ecosystem

The Corridor's newfound status as a global leader in tech and innovation only comes after decades of public and private investment in research and development to build our ecosystem. The Toronto-based Canadian Institute for Advanced Research (CIFAR) first introduced its "Artificial Intelligence, Robotics and Society" program in 1983, paving the way for the bevy of AI labs setting up in the region today. The Ontario Institute for Regenerative Medicine (OIRM), based at MaRS, was founded in 2014 to build on the region's strengths in stem cell research and biotechnology. However, they lost $5 million of their yearly funding due to provincial cuts in 2019.[57] Public support for education and knowledge-based institutions have played a critical part in the region's success in knowledge-based fields. This commitment must continue post-pandemic to preserve these important jobs and capitalize on high-growth industries. Moreover, additional focus and effort is required to better translate investments in R&D into commercialized outputs, currently a weakness and missed opportunity for the Corridor.

Leveraging Strengths in Life Sciences

Many of the Corridor's greatest assets contributing to its world-class life science sector reside in the Knowledge Creation District, from leading post-secondary institutions such as McMaster University and Seneca College to some of the largest teaching hospitals in Ontario. These institutions should serve as key stakeholders as governments work to expand domestic manufacturing and research capabilities in life sciences. The foundation for manufacturing and research is already here, but it requires continual investment to retain talent and businesses. Building on our strengths in this sector is critical for future pandemic preparedness and economic growth.

Futureproofing our Workforce

A successful long-term recovery strategy must include reskilling and upskilling initiatives that prepare workers for in-demand jobs. Post-secondary institutions and employers must work together on curriculum development to tailor it to industry demands, expanding successful initiatives such as co-op programs. Workforce planning and talent development, particularly for workers who are vulnerable to industry shifts or who have been impacted by the pandemic, should be a major focus for post-secondary institutions and employers. Numerous post-secondary institutions have embraced work-integrated learning as a key component of their curriculum, but this should be expanded further as part of economic recovery planning. The University of Waterloo serves as the gold standard in experiential learning, having developed North America's largest co-op program.[58] As Dave McKay, CEO of RBC, writes, "Campuses need to invest in better placement efforts and market their co-op strength to students and employers need to think beyond cookie-cutter models based on traditional semesters to year-round placements and new types of co-op programs. And faculties need to open up more to each other. The business world is increasingly cross-disciplinary; education needs to be, too."[59] The continued disruption to universities' and colleges' traditional methods during the pandemic reinforces the need for new models of teaching that build on our strengths in work-integrated learning.

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Endnotes

1 "Table 14-10-0388-01," Statistics Canada, *Employment by industry, three-month moving average, unadjusted for seasonality,* accessed April 2021, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410038801.

2 "Table 33-10-0270-01," Statistics Canada, *Experimental estimates for business openings and closures for Canada, provinces and territories, census metropolitan areas, seasonally adjusted,* accessed April 2021, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3310027001.

3 The Canadian Press, "Support from feds pushes Canadian insolvencies to 20-year low," *BNN* (February 5, 2021).

4 Taylor Matchett, *Small Business Debt and Profitability: The COVID-19 Impact,* Canadian Federation of Independent Business (February 2021).

5 EBI analysis based on data from Statistics Canada, *Census* (2016). All employment numbers are provided for employment by place of work, unless otherwise specified. Job numbers are rounded to the nearest 10 jobs throughout the report.

6 "Student permit holders by province/territory of intended destination, gender and year in which permit(s) became effective, January 2015 – January 2021," *Temporary Residents: Student Permit Holders – Monthly IRCC Updates,* Immigration, Refugees and Citizenship Canada (IRCC), accessed March 2021, https://open.canada.ca/data/en/dataset/90115b00-f9b8-49e8-afa3-b4cff8facaee.

7 Statistics Canada, *Census* (2016).

8 Raktim Mitra, Khandker Nurul Habib, Matti Siemiatycki, Roger Keil, and Jeremy Bowes, *From Insight to Action on Transportation for Post-Secondary Students in the GTHA: 2019 Transportation Survey Findings,* StudentMoveTO (September 2020).

9 EBI analysis based on data from MPAC (2020). EBI used MPAC property data to analyze number of properties, total floor area, and property types across the five business districts. A business property in this analysis can broadly be defined as a real estate unit occupied by a business. Excluded from the analysis are properties related to residential, agricultural, or resource extraction purposes, as well as some institutional facilities such as military bases, police stations, and fire halls. Data include active properties as of December 2020.

10 Statistics Canada, *Business Register* (December 2018). 'Main Street' businesses are defined as any business with 1-19 employees in either retail, accommodation and food services, repair and maintenance, personal and laundry services, and arts, entertainment, and recreation, based on eligibility requirements for the Ontario Government's Main Street Relief Grant program.

11 EBI analysis based on data from "Canadian hospitals rated by CBC," *CBC News*, accessed April 2021, https://www.cbc.ca/news2/health/features/ratemyhospital/hospitalratings.html.

12 Maria Sarrouh and Kristin Rushowy, "Should Ontario university students return to residence?" *Toronto Star* (January 13, 2021); Canadian Press, "Some Ontario universities plan for in-person return in the fall," CTV News (March 4, 2021).

13 "Coronavirus disease (COVID-19): International students," *Immigration, Refugees and Citizenship Canada*, accessed April 2021, https://www.canada.ca/en/immigration-refugees-citizenship/services/coronavirus-covid19/students.html#exemptions.

ENDNOTES

14 EBI analysis based on data from the Council of Ontario Universities, Common University Data Ontario, accessed April 2021, https://cudo.ouac.on.ca/page.php?id=7&table=4#univ=1,2,3,8,9,11,12,14,16,17,21,22,23,24,25,27,28,29,30,31,32,33,34,42&topic=A&table_hidden=5&g3=2&y=2018; and Ministry of Advanced Education and Skills Development, College Enrolment Statistical Reporting, accessed April 2021, https://data.ontario.ca/dataset/college-enrolment/resource/07fdeefd-fe44-4df8-bd7d-5419a79f90ec.

15 "Quick Facts," *University of Toronto*, accessed April 2021, https://www.utoronto.ca/about-u-of-t/quick-facts.

16 Geoffrey Vendeville, "Joseph Wong appointed U of T's vice-president, international," *U of T News* (April 6, 2021).

17 Ibid.

18 Based on number of "Acute Academic Hospitals" as cited in "Ontario's Hospitals," *Ontario Hospital Association,* accessed April 2021, https://www.oha.com/about-oha/leadership-councils.

19 "What is a Teaching Hospital?" *UHN: Princess Margaret Cancer Centre*, accessed April 2021, https://www.uhn.ca/PrincessMargaret/PatientsFamilies/Guide_Princess_Margaret/Patient_Safety_Advocacy/Pages/teaching_hospital.aspx.

20 Chris Fox, "These are the 17 new hospital sites that will be delivering the COVID-19 vaccine," *CTV News* (December 23, 2020).

21 Based on "Provincewide Shutdown" guidelines, Ontario Government (December 21, 2020), accessed March 2021, https://files.ontario.ca/moh-provincewide-shutdown-en-2020-12-21.pdf.

22 "Table 37-10-0086-01," *Postsecondary enrolments by status of student in Canada, country of citizenship and gender,* Statistics Canada, accessed March 2021, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3710008601.

23 Sadiya Ansari, "Can Canada's universities survive COVID?" *Maclean's* (September 18, 2020).

24 Joe Friesen, "Colleges, universities expecting large financial losses from drop in international students," *Globe and Mail* (September 3, 2020).

25 Michelle Davidson and Shiv Ruparell, *The Future of Ontario's Workers,* StrategyCorp Institute of Public Policy and Economy (June 2020).

26 "Student permit holders by province/territory of intended destination, gender and year in which permit(s) became effective, January 2015 – January 2021," *Temporary Residents: Student Permit Holders – Monthly IRCC Updates,* Immigration, Refugees and Citizenship Canada *(IRCC)*, accessed March 2021, https://open.canada.ca/data/en/dataset/90115b00-f9b8-49e8-afa3-b4cff8facaee.

27 Joe Friesen, "Enrolment up at Canadian universities, mostly because of part-timers," *Globe and Mail* (November 24, 2020).

28 Ibid.

29 Ibid.

30 Moira Warburton, "British Columbia reports budget deficit instead of expected surplus due to pandemic," *Reuters* (August 31, 2020).

31 Paula Tran, "Canada's expanded travel restrictions too costly, say international students," *Global News* (March 14, 2021).

32 Matt Lundy, "Rental demand takes another hit as many students stay home," *Globe and Mail* (September 8, 2020).

33 Canmac Economics Limited, *Economic Impact of International Education in Canada – 2020 Update* (August 2020).

34 The STEM category includes fields of study in science, technology, engineering, and mathematics and computer sciences.

35 The BHASE category includes fields of study in business, humanities, health, arts, social science, education, legal studies, trades, services, natural resources and conservation.

36 "Table 37-10-0163-01," *Postsecondary enrolments, by International Standard Classification of Education, institution type, Classification of Instructional Programs, STEM and BHASE groupings, status of student in Canada, age group and gender,* Statistics Canada, accessed March 2021, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3710016301.

37 "Immigrate through Express Entry," *Immigration, Refugees and Citizenship Canada (IRCC),* Government of Canada, accessed March 2021, https://www.canada.ca/en/immigration-refugees-citizenship/services/immigrate-canada/express-entry.html.

38 Elle Butler, "Press release: International student perceptions of the US on the way up following Biden win," (March 2, 2021)

39 Marc Frenette and Kristyn Frank, *Automation and Job Transformation in Canada: Who's at Risk?* Statistics Canada (June 29, 2020).

40 Vector Institute, *Ontario AI snapshot: The state of the province's AI ecosystem in 2019/20* (January 2021).

41 Government of Canada, *Budget 2021: A Recovery Plan for Jobs, Growth and Resilience* (April, 2021).

42 "Palette announces new partnership with the University of Toronto to drive reskilling of Canadian workers," Palette (November 12, 2020), accessed March 2021, https://paletteskills.org/palette-new-partnership-with-university-of-toronto.

43 Council of Ontario Universities, *Driving a Prosperous Future: Economic Analysis of the Lasting Impact of Ontario Universities* (2017).

44 CBRE, *2020 Scoring Tech Talent* (2020).

45 Innovation Policy Lab analysis based on Refinitiv venture capital data; real values in 2018 dollars.

46 Innovation Policy Lab analysis based on data from Canadian Association of University Business Officers (CAUBO).

47 Startup Genome, *Global Startup Ecosystem Report 2020* (2020).

48 Innovation Policy Lab analysis based on data from Statistics Canada, Census (2016).

49 Innovation Policy Lab analysis based on data from Clarivate Analytics.

50 Jonathan Forani, "'We took our eye off the ball': How Canada lost its vaccine production capacity," *CTV News* (November 25, 2020).

51 Canadian Press, "Governments investing in new vaccine-manufacturing plant in Toronto," *CTV News* (March 31, 2021).

52 Jonathan Forani, "'We took our eye off the ball': How Canada lost its vaccine production capacity," *CTV News* (November 25, 2020).

53 EBI analysis based on data from Invest in Ontario.

54 "Ontario Supports the Development of the Next Generation of PPE," Ontario Ministry of Economic Development (January 26, 2021), accessed March 2021, https://news.ontario.ca/en/release/60103/ontario-supports-the-development-of-the-next-generation-of-ppe.

55 Ibid.

56 Geoffrey Vendeville, "Joseph Wong appointed U of T's vice-president, international," *U of T News* (April 6, 2021).

57 Mike Crawley, "Ford government scraps funding for stem cell research," *CBC News* (May 16, 2019).

58 "Co-operative Education," *University of Waterloo*, accessed April 2021, https://uwaterloo.ca/co-operative-education/.

59 Dave McKay, "Experiential learning, agile employees: Getting our students on the right path," *Globe and Mail* (May 3, 2016).

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