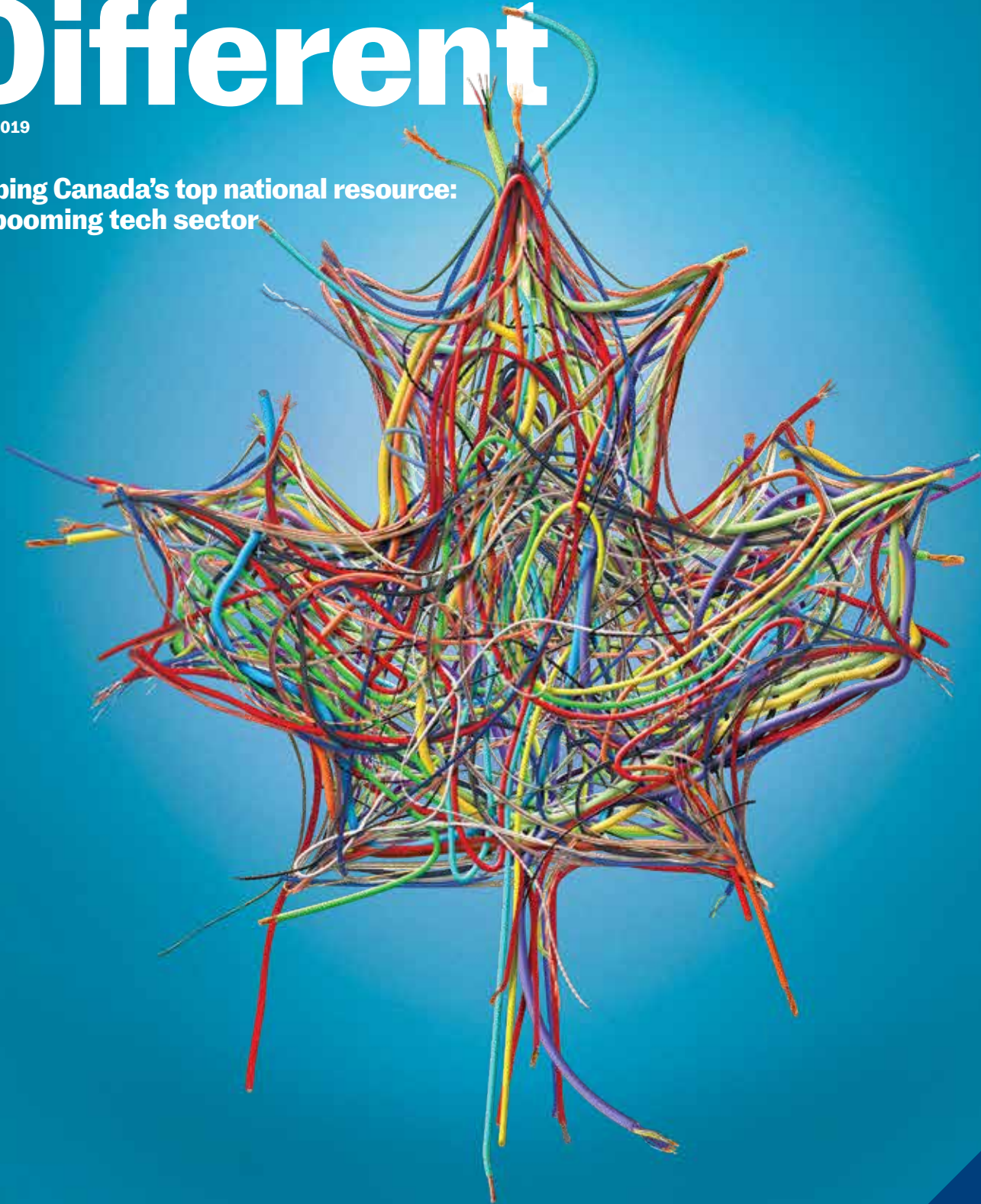


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Wired Different

MAY 2019

**Tapping Canada's top national resource:
its booming tech sector**



**Special
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Wired Different

Canada's diversity is paying dividends as an inclusive model of innovation that solves real problems takes root

By **YUNG WU, CEO, MaRS**

Canadians are wired differently. Our way has always been to reach out and build bridges rather than pull back and close doors.

Canada is where the idea of multiculturalism was born. When others feared division from difference, Canadians saw strength in diversity and fostered immigration to build vibrant cities like Toronto, where more than half the population is foreign-born.

Today, this global outlook gives Canadians a unique place in a world that is being rewired. Rapid advances in technology are causing the poles of the global economy to shift and tilt toward centres of innovation.

Concepts like artificial intelligence, virtually unheard of in mainstream media five years ago, are now poised to transform entire industries. Algorithms already determine what we see on social media and are being integrated into the apps we bank with and the cars we drive. Soon, they could be used for everything from identifying potential medicines to optimizing manufacturing processes and controlling traffic flows in congested cities.

The lesson from the burst of innovation that gave us smartphones and social media platforms is that these technologies will have far-reaching, long-lasting effects. We can't anticipate all of them, but we stand a better chance of developing

new technologies that solve real problems if we bring a wider range of perspectives to bear. Research has shown that teams with cultural and gender diversity break out of thought bubbles and make better decisions for it. Diversity sparks creativity.

That's why Canada has been pursuing a path of inclusive innovation. Two years ago, it created a fast-track program that enables talented foreign workers to get a visa in as little as a few weeks, opening the door wider to talented people from around the world. At MaRS, the innovation hub I lead, we're working hard to address the gender imbalance in tech, with initiatives like the StandUp Ventures fund and Women in Cleantech challenge to support female entrepreneurship.

The results of these efforts are showing in Canada's burgeoning tech sector. Toronto is outpacing both San Francisco and New York in creating tech jobs and, in a single month last fall, \$1.4 billion in investment poured into the city as Uber, Shopify and Microsoft all announced expansion plans. With talented workers and investors looking to Canada in increasing numbers, Vancouver, Montreal and Ottawa are all rapidly growing as startup hotspots.

This activity is a major boost for Canada, creating thousands of well-paid jobs and setting us up to prosper in the new global economy. But I'd argue it's also good news for the world. Canadian innovation punches way above its weight in sectors like clean technology and healthcare. As our planet warms and societies age, these are the areas where our entrepreneurs will drive the biggest impact to real people, real businesses and real communities.

This magazine coincides with the first Collision conference in Toronto, which is expected to draw 25,000 tech insiders to the city and solidify its reputation as a centre of startup creation. In the following pages you'll discover some of the people, places and companies that are behind this new wave of Canadian innovation. They're firms like Axonify, which is helping workers bridge their skill gaps with a new microlearning platform, and Farmers Edge, which is helping farmers increase their yields in the face of climate change.

These firms are innovative. They're impactful. And they're helping us build a better world. ●

Wired Different

Featuring entrepreneurs, thought leaders, innovation hubs and organizations pushing Canada's entrepreneurial edge.

This magazine was generously supported by members of the MaRS ecosystem that are making Canada a global hub for innovation. All are working together to support the startups that will have the biggest global impact.

We would also like to thank the University of Toronto, BDC and other supporters of this magazine for helping MaRS in its efforts to promote our region's innovators globally. And special thanks to the Government of Ontario, a long-time supporter of the Toronto Region's innovation ecosystem.

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Inside Toronto's fintech revolution

Fuelled by international investors, global talent and cutting-edge startups

By **NICK ZARZYCKI**

In just a few years, Toronto has transformed into one of the fastest-growing financial technology hubs in the world, according to a recent report from Toronto Finance International, researched and written by Accenture and McMillan LLP.

Based on its findings, equity financing deals among Toronto region financial technology startups nearly tripled between 2014 and 2017, and today, the region boasts one of the highest growth rates in the world.

Fuelled by early investment in artificial intelligence (AI), funding from all three levels of government (federal, provincial and municipal), a variety of innovation centres at universities, incubators and accelerators across the region and a federal fast-track visa program, the city is booming right now.

This momentum is drawing the eyes of the world's finance community to Toronto. Earlier this year, Funding Circle, a global SME loans platform that has lent over \$10 billion (CAD) to more than 60,000 businesses globally, announced plans to open its first Canadian office in Toronto, according to a recent announcement by the organization. This follows the recent move of Silicon Valley Bank, a UB-based lender focused on tech startups and venture capital firms, which opened its first Canadian office in Toronto.

The fast-developing ecosystem of the region is also attracting global accelerators. In 2017, US seed accelerator Techstars became the first international accelerator to open a Toronto office, signaling the growing global perception of Toronto's market maturity, according to the report.

"Close to 45 per cent of the venture-capital investment we saw in Canada last year came from U.S. investors," says Jennifer Reynolds. "They're seeing the opportunity here, and they're starting to understand what Toronto has to offer."

Reynolds is President & CEO of Toronto Finance International (TFI), a public-private partnership between the government, the financial-services sector and academia whose mission is to promote the Canadian financial sector on the global stage and Toronto's prominence as a leading financial centre.



190+ fintechs · 2nd-largest financial centre · 240k+ workers

TFI also works with the domestic financial services ecosystem partners to develop and enhance the growth and competitiveness of the sector. This most recent report by Accenture and McMillan LLP was commissioned by TFI to look at the competitiveness of Toronto Region's fintech ecosystem.

Over 190 fintech companies now call Toronto home. Among them, **Wealthsimple**, an online investment advisor that has raised more than \$165 million in financing since launching in 2014 and currently manages more than \$4 billion in assets.

Other Toronto-based fintech stars include **FundThrough**, **Borrowell**, **Coinsquare** and **Clearbanc**, each of which has successfully raised significant rounds of growth capital in recent years and continue to advance areas as diverse as personal and business lending, payments and financial analytics.

While the city is the financial centre of what the World Economic Forum describes as one of the world's soundest banking systems, "What would surprise people," says Reynolds, "is that we're also the second-largest financial centre in North America."

Pool of highly skilled talent

It's Toronto's strength in traditional finance, its scale, and its sheer concentration of industry talent that Reynolds says makes it

a powerhouse for financial and technological innovation.

"One in 12 people in Toronto are employed in the sector," says Reynolds, "a huge concentration of financial talent in one area." Sitting alongside that, the Toronto region is home to more than 240,000 tech workers, 17,000 tech companies and 5,200 startups, making it the third-largest technology cluster in North America.

This talent pool should lead to big wins, particularly in transformative areas like AI, she says. "Toronto is the beneficiary of early investment in AI, including machine-learning technologies at its universities, which are graduating some of the most promising AI talent," says Reynolds. More than 30 years of focus in AI has put Toronto at the forefront of this broad field and has ultimately led the region to having one of the highest concentrations of AI startups in the world—including standouts like **Rubikloud**, **DeepLearn.ing** and **Flybits**.

Another big leg up Toronto has on talent is an immigration policy that is open to newcomers and technology talent. "This thriving financial centre is already one of the most diverse cities in the world, and openly welcomes skilled talent from around the globe," says Reynolds.

"Torontonians and Canadians understand that diversity is good for Canada, it's good for business and good for the economy." ●



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In search of the elusive Narwhal

By JOHN LORINC



When the French pharmaceutical giant Ipsen announced in February that it would be spending US \$1.04 billion to acquire Montreal biotech firm Clementia, the transaction showcased the remarkable narrative of a company that had sped from idea to acquisition in just seven years.

Entrepreneur Clarissa Desjardins founded Clementia after reading about an unexpected therapeutic application for a new compound: It wasn't very effective against lung disease, the intended target, but did help people suffering from an exceedingly rare bone disorder. Seeing

an opportunity, Desjardins, who has a PhD in neurology, built Clementia quickly with help from the Business Development Bank of Canada, which acquired a 14.5 per cent stake for \$20 million (worth more than \$130 million after the acquisition).

Clementia, observes Robert Simon, managing partner of BDC's information technology venture fund, offers a case study in how rapidly scaling Canadian firms can surmount the billion-dollar valuation mark. It also shows, he adds, that Canada's approach to tech innovation is producing results.

Such success stories depend on an ecosystem

that not only encourages a proliferation of startups, Simon observes, but provides them with the resources and time they need to grow. He says that Canada is building an increasingly dense network of angel, early-stage and venture funds—"dozens where none existed 10 years ago." They, along with traditional sources of capital, have begun to produce a species rarely seen thus far: "narwhals," the Canuck term for what are known elsewhere as "unicorns." These are tech companies estimated to be worth more than \$1 billion based on investor valuations alone, that is even *before* they've been bought up or gone public.

Tech watchers say narwhals are crucial

because, as “anchor firms,” they have the heft to attract talent, global investors and capital for further innovation. Several Canadian companies are closing in on this plateau, but entrepreneur and economist Charles Plant, a senior fellow at the University of Toronto’s Impact Centre, which tracks the phenomenon, says there should be more. The U.S., he pointed out in a recent study, has 150 unicorns, while the Kitchener-based Kik, the popular mobile messaging app, is currently Canada’s only example.

Plant does, however, see an upside: Within a year, Canada has almost doubled the number of firms on track to become narwhals. He estimates that last year 25 tech companies raised on average \$40 million each (plus \$100 million each for two healthcare companies) in new capital. More recently, a U.S. biotech company struck a deal in January with Toronto-based drug developer Triphase Accelerator that is expected to be worth \$1 billion down the road.

Canada also boasts a number of software giants that were once private-equity darlings, such as **Shopify** and Montreal-based payments firm Lightspeed, whose share offering in March pushed its valuation to \$1.4 billion. Other rapidly growing Canadian tech firms include Slack, Hootsuite, FreshBooks and Element AI.

Their success, after the decline of hardware-oriented icons like Nortel, Research in Motion and JDS Uniphase, shows that the gears have been shifted. “The Canadian tech sector has firmly arrived on the software side of the equation,” says Shopify founder and CEO Tobias Lütke. Carol Leaman, CEO of Waterloo-based startup **Axonify**, agrees: The sector “is probably stronger than it’s ever been.”

There is certainly no shortage of startups, especially in southern Ontario. With thousands of attendees descending on Toronto for the Collision conference in late May, the global tech community will have a first-hand look at Canada’s densest innovation hub. The Toronto-Waterloo corridor is now home to 17,000 tech companies and 5,200 startups, as well as burgeoning fintech and artificial-intelligence sectors. Stuart Lombard, founder of the smart-thermometer developer **ecobee**, points out that tech firms benefit from the region’s diversity, cultural vitality and post-secondary research network.

Beyond southern Ontario, the biotech sector has deep roots in Montreal, which has also seen a boom in AI investment, while Vancouver is a centre of cleantech and game development.

The country’s open-door approach to newcomers has made it a destination for global talent. Simon points out that giants like Google and Amazon have been recruiting newcomers in their Canadian subsidiaries as a way of working around the U.S. immigration restrictions imposed by the Trump administration.

For all those pluses, Plant says his research has shown that Canada’s tech firms often stall in their growth trajectory because they have so much difficulty hiring seasoned sales and marketing executives. Leaman, whose Waterloo-based firm creates online micro-training modules for employers with far-flung workforces, says she has had to recruit in the U.S. because “there are not enough sales leaders who have that experience in Canada.”

Lütke, however, believes there are other factors as well. For example, some entrepreneurs simply sell their companies too early, for too little. Also, Canadian firms often seem more focused on discovery than commerce. “Canada really, really loves inventions and academic progress, but somehow doesn’t see the same value in the engineering-heavy process of getting a product to market,” says the Shopify leader and head of a federal advisory committee looking at a digital industries strategy. “I would love to turn that around.”

One obstacle in the way may be the relative dearth of larger tranches of investment money. Randy Cass, founder of **Nest Wealth**, a four-year-old Toronto designer of generic fintech platforms for financial institutions, says some companies have little choice but to go to the U.S. for serious financing. “I don’t think we have all our bases covered right now,” he says, adding that OMERS Ventures, operated by a large Ontario

public-sector pension plan, is the only tech fund “writing \$20- to \$50-million cheques.”

Leaman, however, points out that some U.S. lenders are so quick to open their wallets that they may be creating a unicorn bubble. She has opted for a more measured approach and feels that massive cash infusions can not only cause ill-prepared startups “to get out over their skis” but virtually ensure that they are sold to buyers in the U.S. and eventually move there—a point of contention for many Canadian tech advocates.

Lombard isn’t so sure. While ecobee had to go south for scale-up capital, he’s confident the Toronto region, with its concentration of well-educated engineers and researchers, serves as a strong base as the company expands its suite of energy and home-focused products. And it doesn’t hurt that, even with recent cuts to U.S. corporate taxes, the cost of doing business in places like Seattle, San Francisco and Silicon Valley has skyrocketed.

“Those of us in Toronto’s tech scene know how strong it is,” says Nest’s Cass, noting how attractive the city is to young people. “There’s no other place in the world I’d rather be starting a company.” ●

- ▶ **Shopify**, shopify.ca
- ▶ **Axonify**, axonify.com
- ▶ **ecobee**, ecobee.com
- ▶ **Nest Wealth**, nestwealth.com



Why Canada can win the global AI race

By MATT GURNEY

The doctors said it could be nothing, or it could be disaster.” That’s how Brendan Frey recalls the moment that led him to realize artificial intelligence and genetics could work hand in hand. It was in 2002 and a gene test on the baby he and his wife were expecting had turned up an anomaly. Although the human genome had recently been sequenced, the doctors couldn’t say what, if anything, it meant. Making sense of life’s code would take years—there was simply too much data to work through.

“As an engineer and a scientist, that was very frustrating to me,” says Frey. He turned to his expertise in AI—a field then so niche that it was borderline esoteric—and started building programs to crunch all that information.

Thirteen years later, after a series of major research breakthroughs, Frey founded **Deep Genomics**, now one of Canada’s more promising AI startups. The company uses AI to accelerate every aspect of drug development, from telling patients which mutation is causing their disease to getting regulatory approval for new therapies.

Deep Genomics works on the very limits of our scientific understanding. But it’s also on the leading edge of another phenomenon: a wave of AI innovation coming out of Canada. Says Frey, “There has never been a better time for entrepreneurs to build world-changing startups and scaleups in Canada.”

BY SOME ESTIMATES, AI could add more than \$15 trillion to the global economy in the next decade. A race is on to dominate the field, and the U.S., China and Europe are pouring funds into the effort.

But Canada was fastest out of the blocks—and is determined to hold on to its lead.

Two years ago, as news about artificial intelligence was making the leap from science journals to mainstream media, Canada’s government made a bold decision: If AI were the future, it should be shaped by Canadians. It became the first country in the world to rally around this new technology with a national plan to become one of its leaders.

Since then more than a billion dollars have been invested

in the AI industry, with Toronto, Montreal and Edmonton emerging as internationally important centres for research and development.

Hardly a month goes by without an announcement of a major lab or office opening. Uber is developing self-driving vehicles in Toronto. Google Brain has opened hubs across Canada. DeepMind, whose software was famously the first to defeat a master of the complex board game Go, has opened an office in Edmonton. Microsoft is establishing a talent hub in Montreal. Samsung is expanding its machine-learning and robotic AI presence in Toronto and Montreal.

This astonishing growth is being fuelled by Canada’s deep reservoirs of talented computer scientists. By some estimates, the global population of skilled AI engineers numbers in the tens of thousands. Thanks to its relaxed immigration policies, Canada is attracting many to its shores.

Ed Clark, the former CEO of TD Bank who now chairs the Vector Institute for Artificial Intelligence, considers Canada perfectly placed to ride the AI wave: “It has great health systems, great education systems, good transportation systems and an immigration model that’s open to skilled people.”

Reihaneh Rabbany of the Montreal Institute for Learning Algorithms points out that Canada’s “welcoming reputation” has made it an attractive destination. The arrival of Collision, one of the world’s leading tech conferences, will bring 25,000 delegates to Toronto in May, and further solidify that reputation.

But there’s another reason Canada has so much expertise: It is, in many ways, AI’s spiritual home.

Much of the research underpinning current AI technologies was conducted in the labs of such superstar scientists as Geoffrey Hinton at the University of Toronto and Yoshua Bengio at the University of Montreal, who both worked on these ideas for decades before most others woke up to their potential. Much like Silicon Valley’s “PayPal mafia,” employees who went on to found or develop other big-name companies, Canada has a large cohort trained in its university labs who are now leading research efforts or building companies of their own.



“

There’s nothing wrong with us saying, ‘You know what? We’ve done well.’ Let’s shed that Canadian need to play down our successes. Because we’ve really got one here.”

**Ed Clark
Chair, The Vector Institute**

”





Brendan Frey
Founder and CEO, Deep Genomics

Arms-length government agencies such as the Canadian Institute for Advanced Research also looked to the long term, investing as far back as the 1980s in what Elisa Strome, executive director of CIFAR's Pan-Canadian Artificial Intelligence Strategy, calls "high-risk fundamental science."

Focusing on basic science, says Strome, has equipped researchers to take a successful idea "to a place where it is now incredibly commercially viable." Or, as Martha White, a fellow at the Alberta Machine Intelligence Institute (Amii) in Edmonton puts it, letting AI pioneers work on what "they thought was important" allowed them to flourish.

That helped Canada assemble one of the great concentrations of AI talent. The question now: What should the country do with it?

FOR PEOPLE LIKE CLARK, the answer is simple: commercialize.

He points to other countries—China especially—now focused heavily on creating real-world applications for AI. "They're saying, 'You guys can win the theoretical side. We're going to win the applied side.'"

That's why Vector is dedicated to helping turn research into products. "We want to create as many applications for AI as we can," he says.

Kerry Liu, co-founder and CEO of **Rubikloud**, which applies AI to the retail sector, goes further: "The only thing that matters here is commercialization."

Canada's lead is already being eroded, he says. "The misconception is that AI and machine learning is going to be a niche field, where you need to get a PhD to be successful. The reality is, every country in the world is going to teach this at the undergraduate level, maybe even high-school level."

One challenge here is Canada's small population; companies have fewer potential clients close to home. "If you're

\$252M

Venture capital invested in Canadian AI companies in 2017, a 460% increase YoY.

VECTOR INSTITUTE

236

Leading international AI researchers drawn to the Toronto region since the 2017 opening of the Vector Institute.

TORONTO GLOBAL

1000

Number of AI master's students the Vector Institute aims to graduate in Ontario each year.

VECTOR INSTITUTE

\$19.8T

Amount AI could contribute to global GDP by 2030.

PRICEWATERHOUSECOOPERS

in China, India, the U.S.," says Ian Collins, CEO of Toronto's Wysdom AI, "you might be mostly selling local. Canadians don't have that option."

So, Canadian companies have to think global right out of the gate. **Wysdom**, which produces AI-powered customer-service chat systems, has expanded to the U.S., Caribbean and is now focused on Europe.

Also critical, says Martha White, the Amii fellow and an assistant professor of computing science at the University of Alberta, is building bridges between academe and commerce: AI programs should include some business-related instruction to give students a better sense of how their work could be applied.

She also feels those trained in machine-learning should have career opportunities within traditional fields. "The routes for graduate students shouldn't just be research or starting their own companies."

But some caution against losing sight of how Canadians made their name.

"Having government funding that allows people to pursue these less popular, potentially more fundamental questions is very important," says Angel Chang, an Amii associate faculty member relocating from Silicon Valley this year to Simon Fraser University in Vancouver. "That's where Canada can have its advantage."

It's a compelling argument. By keeping a focus on where it's strong while pursuing areas where it can shine, Canada can both stay competitive and make good use of what it has invested already.

"We've got everyone's attention now," Ed Clark points out. "There's nothing wrong with us saying, 'You know what? We've done well.' Let's shed that Canadian need to play down our successes. Because we've really got one here." ●

-
- ▶ **Deep Genomics**, deepgenomics.com
 - ▶ **Rubikloud**, rubikloud.com
 - ▶ **Wysdom**, wysdom.ai

CIFAR: Addressing science and humanity's most important questions

How collaboration is dissolving international boundaries

“The greatest challenges and questions of our time are not bound by political or disciplinary boundaries—nor are their solutions.”

—Dr. Alan Bernstein, president and CEO, CIFAR

The world is a messy place. It faces myriad questions so pressing and so complex that no single nation—or academic pursuit—can hope to address them alone.

Which is why CIFAR, a Canadian-based, global charitable organization, convenes some of the world's very best scientists and scholars to address science and humanity's most important questions. Its research programs span disciplines and continents. In this regard, it is unique in the world, say researchers who work on some of today's fundamental questions ranging from ‘how we can harvest energy from the sun?’, to ‘what are the origins and mechanisms of consciousness?’.

Since its inception in 1982, CIFAR has supported excellence and risk-taking. Its long-term commitment to collaboration provides top researchers from around the world with the time and structure they need to made radical advancements. CIFAR also thinks and commits long term, creating an environment of trust, transparency and knowledge sharing in which international and interdisciplinary research can thrive.

Over 35 years, CIFAR's model for collaboration has proven its worth time and time again. For example, the revolution in artificial intelligence (AI) started under CIFAR's auspices. All three of the celebrated pioneers of AI—Geoffrey Hinton of the University of Toronto, Yoshua Bengio of the Université de Montreal and Yann LeCun of New York University, acknowledge CIFAR's role in sparking the era of deep learning that allows Siri to understand what you say, Netflix to predict what you'd like to watch and cars to drive you from place to place on their own. More advanced applications are being explored in health, international security and nearly every sector of society.

At a recent dinner event celebrating his

accomplishments in Toronto, Hinton said he chose Canada because of CIFAR's support of “curiosity-driven research,” which he called “the goose that laid the golden egg.”

During the “AI Winter” of the 1980s, CIFAR provided critical support to Hinton and his colleagues while he developed deep neural networks, currently the most powerful form of machine learning. With its typical acumen and willingness to take risks, CIFAR consistently backed Hinton's ideas as they took shape.

That investment forever changed the way we work and live. Hinton's foundational work in machine learning is now the basis of smartphones, virtual assistants and self-driving cars.

Today CIFAR continues to build scientific capacity in AI, while encouraging its eth-

Emeritus of Pediatrics, University of California, San Francisco and a former co-director of CIFAR's Child & Brain Development program, in his new book, *The Orchid and the Dandelion*.

“Under the protective, emboldening freedom of CIFAR's multidisciplinary mandate, [we] quickly closed in upon the captivating research question: How do genes and environments work together to produce individual differences in susceptibility, behavior, health and disease?”

Barbara Sherwood Lollar, Canada's pre-eminent geologist and one of CIFAR's newer program co-directors, agrees that collective effort leads to great things—that conversation is an effective tool. In fact, she feels it can change our understanding of the earth beneath our feet.

CIFAR's portfolio of 13 research programs spans four broad themes:

- **Life & Health** (Humans & the Microbiome, Fungal Kingdom, Molecular Architecture of Life)
- **Individuals & Society** (Boundaries, Membership & Belonging; Innovation, Prosperity, Opportunity; Child & Brain Development; Azrieli Program in Brain, Mind & Consciousness)
- **Earth & Space** (Gravity & the Extreme Universe, Earth 4D)
- **Information & Matter** (Bio-inspired Solar Energy, Learning in Machines & Brains, Quantum Materials, Quantum Information Science)

ical application. In 2017, the Government of Canada appointed CIFAR to develop and lead the Pan-Canadian Artificial Intelligence Strategy, the world's first national AI strategy.

All of CIFAR's programs convene diverse teams of scientists and scholars from a range of disciplines. Child & Brain Development is a longstanding research program that examines how early childhood experiences affect lifelong health. It has led to global recognition of the impact that experiences in early childhood have on lifelong health and informed the introduction of full-day kindergarten in Canada (Ontario and British Columbia) and Australia.

“CIFAR has become a dazzlingly unique Canadian idea and organization, with no true counterpart anywhere else in the world...” writes Thomas Boyce, Professor

“There are not a lot of mechanisms to really allow that much free thinking,” she explains. “We will be able to bring together people from extremely different perspectives, and then give them the intellectual freedom to challenge each other and challenge themselves to change the thinking.”

CIFAR's president and CEO is optimistic about Canada's place in the international research landscape.

“Now is the time for international researchers from around the world to work together to understand the fundamental drivers of the world's big challenges,” Dr. Bernstein says. “We must create an environment of free inquiry for the most extraordinary minds of our time. If more countries approached these questions the way Canada has been doing for decades, just imagine what might be possible.” ●

Look North

The world's eyes shift to North America's next great tech centre

By NICK ZARZYCKI

From Niagara Falls in the south to Oshawa in the north, the arc of cities around west Lake Ontario is home to more than 9 million people—one out of every four Canadians. The birthplace of the electron microscope, telephone and smartphone, and also where insulin and stem cells were discovered, the region has produced world-changing research and innovation for more than a century.

Ontarians have historically kept a lower profile than their neighbours to the south, but today, the region's tech industry is under a global spotlight. Local entrepreneurs are increasingly receiving international attention—more than 40 per cent of venture capital raised by Canadian startups last year came from outside the country—and the region is a leader in AI research and

commercialization. According to CBRE, in 2018 Toronto created more jobs than the San Francisco Bay area, Seattle and Washington, D.C., combined, and also topped New York in a ranking of “talent markets.”

With their powerhouse universities for research and engineering, Toronto and Waterloo have long been central to the region's startup success. But today, you have to zoom out to get the full picture. From Hamilton's world-class industrial R&D facilities, to a vibrant startup scene in suburban York Region, Ontario is turning into North America's next great tech centre.

Take a tour through Ontario's booming tech sector as we profile seven centres putting the region on the world's innovation map.



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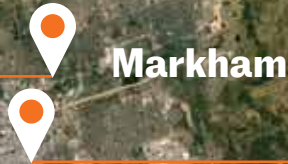


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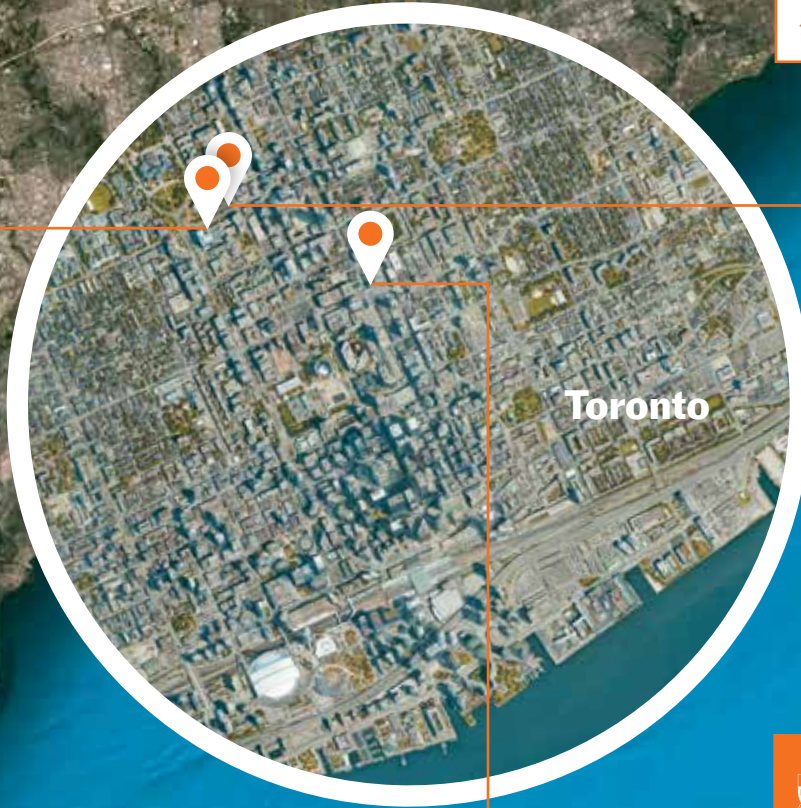
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Entrepreneurship

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uoft.me/thisistheplace

DMZ

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dmz.ryerson.ca

MaRS Discovery District

Launchpad for startups

Few places reflect Toronto's growing tech sector like **MaRS Discovery District**. A decade ago, MaRS was an incubator for the city's startup community. Today, it's North America's largest urban innovation hub and a gateway between Canada's most promising young companies and global markets. From its 1.5-million-square-foot campus in the heart of downtown, MaRS supports over 1,200 fast-growing tech companies that together have raised \$4.8 billion in capital and generated \$3.1 billion in revenue since 2008. Based across Canada, these firms are innovating in areas like clean technology, healthcare, financial technology, enterprise software, advanced manufacturing and artificial intelligence.

Some are already familiar names, like Wealthsimple, a robo-investment firm that manages over \$4 billion in assets and serves over 140,000 clients. Or Ritual, a food-ordering app whose "pick up here" signs hang over 5,000 restaurant counters. Other companies are advancing life-changing discoveries, like Highland Therapeutics, which is developing a new drug therapy for ADHD. All



these companies are commercializing innovative products and creating new jobs for Canadians.

In the view of MaRS CEO Yung Wu, Canada's future \$1-billion companies are already in the pipeline, and high-growth scale-up companies supported by MaRS could soon break into tech's top flight. His reason for optimism: Canada's investments in attracting transformative talent and supporting entrepreneurship are paying off.

"We have a large number of high-quality companies that are scaling up," says Wu. "MaRS' job is

to accelerate that growth and help launch based-in-Canada ventures into global businesses."

MaRS is a destination for the global customers, talent, capital and markets that these companies need. MaRS makes these connections while supporting Toronto's inclusive style of innovation, which contrasts with the dash-for-growth model seen elsewhere.

"It's the Canadian character—how we are wired. It leads us to innovation that's impactful and inclusive," says Wu. ●

The DMZ

Toronto's global accelerator

The DMZ, Ryerson University's business accelerator, has soared during Toronto's tech boom. In just a few years, it has helped 383 companies raise more than \$563.6 million in funding, established a sales growth accelerator program averaging \$1.1 million raised per startup, and assembled a world-class network of advisors and investors. Last year, UBI Global ranked it the best university-based incubator in the world.

"Our mindset is strictly focused on the entrepreneur, more than anything else," says executive director Abdullah Snobar. For him, that means helping entrepreneurs get what they want most: growth, and access to international markets. "Companies are coming to the DMZ not just to have a place to live, but also to strategically expand their business through sales and revenue."

The DMZ has been relentless in its quest to help its entrepreneurs grow and go global, giving them access to U.S. investors and customers through its two-week DMZ Roadshow and a new DMZ satellite office in New York.



Today, it's setting its sights even higher, throwing its doors open to entrepreneurs from around the world through its new DMZYYZ program.

"We appreciate that we have a lot of great Canadian startups coming out of the space," says Snobar. "But if we're not getting into the international market, then we're not doing our job, which is to help startups build great businesses."

DMZYYZ will fly international entrepreneurs to Toronto for two weeks and give them a crash

course in everything Toronto tech, one-on-one meetings with investors and access to the DMZ's rolodex. "And, of course, we complement that with the Start-up Visa program, which we're a designated organization for," says Snobar.

The ultimate goal? Convince the world's best founders to start companies in Toronto.

"It all comes down to our first value, which is to put founders first. Does it support our founders? If the answer isn't yes, then it's not worth while doing." ●

University of Toronto Entrepreneurship

Move over, Stanford

When Uber was scouting a location for its first international artificial-intelligence lab, it decided on Toronto, under the watchful eye of AI pioneer and **University of Toronto** professor Raquel Urtasun.

That, says Dr. Vivek Goel, its VP of Research and Innovation, shows why U of T is quickly becoming a world leader for research commercialization and entrepreneurship—on par with elite institutions like Stanford and MIT.

“There are lots of places in the world that are launching startups. What’s unique about the University of Toronto ecosystem is that our startups are coming out of long-term research programs.”

In the past 10 years, entrepreneurs on campus have launched over 500 startups and secured more than \$1 billion in investment. Goel says their success—particularly for AI-based companies like Blue J Legal and Deep Genomics—wouldn’t be possible without U of T’s unique strengths in research.

“You start with the work of great AI pioneers



such as Dr. Geoffrey Hinton. And then entrepreneurs in medicine and law are able to collaborate with colleagues in the computer sciences to create cutting-edge AI companies.”

Goel says most entrepreneurs can only dream of having access to the capital, co-op experience and international markets that partnerships with multinationals like Uber give those at U of T.

“The result of all those big companies setting up here is that we have now a clear pathway for

discoveries to get commercialized, and then taken to global markets.

“We are consistently among the top five institutions globally in total research output alongside Harvard and Stanford. And our graduates are regularly ranked among the best in the world in employability rankings,” emphasizes Goel.

“And you know, we don’t want to sell ourselves on price, but starting a 500-engineer company in Toronto costs a fraction of what it would in Silicon Valley or Boston.” ●

Communitech

Waterloo’s innovation engine

In 1997, a group of entrepreneurs came together to help themselves—by helping each other. The result was **Communitech**, whose founders set out to boost Waterloo Region’s tech sector by attracting talent, investment and support.

Today, it is a globally recognized public-private innovation hub for more than 1,400 startups, scale-ups and large global players.

“Waterloo Region is one of Canada’s most dynamic technology hubs, punching well above its weight class and helping to put Canadian tech on the world map,” says Iain Klugman, Communitech’s CEO.

The 1,400 companies employ 23,000 people and attracted more than \$1.4 billion in private investment over the past five years. Communitech services include the Edge and Rev accelerators for seed- and growth-stage companies, and the Fierce Founders accelerator for startups led by women.

The hub also offers scale-up programming and houses corporate innovation labs for more than two dozen partners ranging from Thomson Reuters and TD Bank Group to the LCBO and Royal



Canadian Air Force. It is home to the Canadian Digital Media Network, which connects 29 innovation hubs across the nation.

From a foundation of stalwarts including BlackBerry, OpenText, COM DEV, Descartes Systems, Sandvine and D2L, several high-growth companies have emerged in recent years, including North, eSentire, Aeryon Labs, Vidyard, Kik, Magnet Forensics, OTTO Motors, Axonify and Miovision. Larger players such as Shopify, Google, Square, NetSuite, Intel and SAP have also set

up operations here, drawn by the region’s rich talent pool. Klugman also points to the more than 50 events it holds every year, including True North—the region’s largest tech gathering.

Supported by the University of Waterloo and its Velocity incubator, as well as The Accelerator Centre, Wilfrid Laurier University and Conestoga College, the Waterloo tech community thrives on the same collaborative spirit that brought Communitech’s founders together in 1997—the spirit to succeed. ●

City of Hamilton

Where cool ideas go to work

For more than a century, Hamilton has been a linchpin of Canadian industry, a place where new technologies are put to the test. “It’s where all the cool ideas go to work, if you will,” says Ty Shattuck, a long-time local entrepreneur and engineer. He thinks Hamilton’s unique focus on applied innovation is turning it into one of the most exciting places for research commercialization in Canada. “While the next generation of AI algorithms may be in development in Toronto or Waterloo, we’re applying them to aerospace, automotive, biotech and advanced manufacturing.”

Shattuck is CEO of **McMaster Innovation Park** (MIP), a sprawling 52-acre research facility that houses more than 100 startups, established technology businesses and advanced research labs. MIP’s mandate is to capitalize on research coming out of nearby McMaster University and Mohawk College—both renowned centres for industry-led explorations in biotechnology, healthcare and advanced manufacturing.

One tenant, the McMaster Automotive Resource Centre (MARC), has already become a leading



centre for electric and hybrid vehicle innovation. Established in 2013 with partners such as Nokia, IBM and Ontario’s Autonomous Vehicle Innovation Network, MARC is an initiative of the Innovation Factory—another MIP tenant—which has helped more than 1,700 Hamilton startups scale and take their products to market since opening in 2009.

Also in the park: McMaster’s new Biomedical Engineering and Advanced Manufacturing (BEAM) research centre, which is developing the next generation of bioengineering technologies

in partnership with Germany’s world-renowned Fraunhofer Institute. Meanwhile, the nearby CanmetMATERIALS research centre—the country’s largest materials R&D operation—and McMaster’s Steel Research Centre are turning Hamilton into a world leader in advanced manufacturing and high-tech steel, both crucial in the race to build lighter, more fuel-efficient vehicles. “It’s a perfect fit, given our historical strengths,” says Shattuck. “We’re standing on the shoulders of Hamilton’s giants, doing what we’ve always done best.” ●

York Region

A magnet for talent

The Greater Toronto region is ready to break out as a leading global tech hub, outpacing established regions like Seattle and San Francisco’s Bay Area in job creation, talent and workforce diversity.

The secret of its success may be greater than Toronto itself. “When we talk about the startup community, people think of downtown,” says Sarah Howe of York University. “But you need to get out of downtown to get the full story.”

Howe would know. She is director of Innovation York, the university’s innovation unit, and last year presided over the launch of **YSpace**, a tech accelerator that serves the Regional Municipality of York, which runs 70 kilometres north to Lake Simcoe and has a population of more than 1.2 million.

Within six months of opening, Howe says, YSpace had to double its floorspace. “The demand from startups who were raising seed or series A rounds, hiring people, looking for co-op students and interns was just unbelievable.” And in just one year, YSpace’s 22 startups have raised



\$1.3 million in funding and generated \$2.4 million in revenue.

Thanks to the support of accelerators like YSpace, the Applied Research, Innovation and Entrepreneurship (ARIE) program at Seneca College, and the ventureLAB Regional Innovation Centre in Markham, many talented workers have found jobs at rapidly scaling local companies like SkyX, Densify, Doxim and Pond Technologies, which together have raised over \$90 million. In fact, York Region has more workers

employed in tech per capita than any other place in Canada.

A total of 4,300 technology companies call York Region home, including multinationals like IBM, Siemens, GM, Qualcomm, Oracle and GE. And many of these companies—for example, Magna International, ATI Technologies and Compugen—were actually founded in the region. “I don’t think people recognize the potential that has already come to fruition here,” says Howe. ●

City of Markham

Building global tech titans

If you've ever assembled a computer, you've probably heard of ATI Technologies. The company caught Silicon Valley's attention in the early 2000s with its blazing-fast GPUs—graphics cards that let computers produce eye-popping visuals and made devices like the Xbox 360, Nintendo Wii and the MacBook Pro possible.

ATI captured a leading share of the GPU market, beating out better-financed rivals like NVIDIA and reaching annual revenues of more than \$2.2 billion in the process. But maybe the most impressive thing about ATI's ascent is that they did it all without setting foot in Silicon Valley.

From the moment Chinese-Canadian immigrant Kwok Yuen Ho founded the company in 1985 with a bank loan, to when it was acquired by AMD in 2006, ATI Technologies kept its research and development and head office in the City of Markham, located on the northern boundary of Toronto. For the past 13 years, AMD has continued to invest and grow its operations in Markham.

"I think the AMD story demonstrates just how prevalent the entrepreneurial and innovation spirit is here in Markham," says Markham Mayor Frank Scarpitti. "Transformative technologies, global talent and a free flow of ideas are at the core of Markham's thriving ecosystem."

For Melissa Chee, a Markham resident who helped build a successful semiconductor startup, ATI's story captures what Markham is all about: world-class talent, entrepreneurial spirit, and a drive to think and act big.

A local launchpad to global markets

Today, Chee is president and CEO at **ventureLAB**, the leading tech hub for Markham and the surrounding York Region. Its mission? Help local startups scale and build the next generation of globally competitive tech titans.

ventureLAB has supported more than 2,000 tech companies since it was founded in 2011, offering advisory services and access to its 50,000-square-foot innovation hub in the IBM Innovation Space-Markham Convergence Centre. Today, the innovation hub houses nearly 50 tech companies.

ventureLAB's Capital Investment Program, which helps connect companies to capital from the private and public sector, has helped ventureLAB startups raise more than \$100 million in funding.

"This community is about building global-scale enterprises. We're not talking about startups going for a fast exit," emphasizes Chee. "We're talking about startup founders who have



the knowledge and the acumen to really grow and scale a company to a global market."

Home to startups and multinationals

Markham's success in tech is even more apparent after a visit to Markham Centre, the city's vibrant new downtown, which seems packed with the world's most recognizable tech brands. At the heart of Markham Centre is a one-kilometre, purpose-built innovation corridor



anchored by IBM's Canadian software lab—the largest software development lab in the country. Markham Centre is also home to YSpace, York University's community innovation hub. Within its first year, YSpace ventures created 71 jobs, generated \$2.4 million of revenue and raised \$1.3 million in funding.

Many multinationals have significant research, development and business operations in Markham, including GM, Qualcomm, Honda, Lenovo, Toshiba and Nokia.

"Markham is the ideal location for the future of automotive engineering and innovation as we look to transform our industry with electric, self-driving, connected vehicles and shared mobility services," says Travis Hester, president and managing director, GM Canada. "With access to a highly skilled workforce, rich ecosystem of educational partners and business incubators, GM's decision to choose Markham made perfect sense."

Homegrown tech successes such as Real Matters, Redline Communications, Enghouse Systems, Book4Time and Everlink are also significant players in Markham's tech ecosystem.

More than 4,300 tech companies call Markham and York Region home, the highest concentration of tech workers in Ontario's Innovation Corridor and the highest concentration of tech companies relative to population in Canada.

A global perspective

"Markham is where people and creativity thrive," says Mayor Scarpitti. "This is where entrepreneurs from all over the world scale and grow their companies alongside established global giants, and the world is taking notice."

Indeed, Markham is Canada's most diverse community: 78 per cent of Markham residents identify as a visible minority and 60 per cent were born outside of Canada. "We're able to attract technology companies because of the breadth of talent and opportunities here," says Mayor Scarpitti.

"So, when we talk about a successful ecosystem, it's not just about having a great idea," says Chee. "It's about the people in the community, the talent pool, and having the knowledge and know-how. That's something that Markham has in spades. ●"

Canadian innovation, global impact

By BRYAN BORZYKOWSKI

Canada has always been a nation of innovators. From the invention of the telephone and the light bulb (Edison bought the patent from the two Canadians who got there first) to the development of the pacemaker and creation of the space shuttle's robotic arm, Canadian technologies have changed the world.

Today, BDC Capital is playing a vital role in supporting the next wave of Canadian innovation. As the investment arm of BDC, the only bank in Canada devoted to entrepreneurs, BDC Capital supports more than 700 growing technology companies throughout the country.

With more than \$2 billion worth of assets under management, it invests in innovative companies at every stage, helping those that work in clean technology and healthcare, as well as information and communications technology, access

the capital they need to turn breakthrough ideas into breakout products.

BDC Capital also supports other technology-focused funds and works with partners to provide the large financing rounds that later-stage companies need to scale up their operations. As well, it bolsters Canada's wider innovation community by providing entrepreneurs with expertise and resources, and venture-capital partners with education.

As the country's most active venture-capital investor and a for-profit Crown corporation, BDC Capital has a unique mandate and acts as a first mover, supporting opportunities the market has overlooked.

Two years ago, its Women in Technology fund was created to fill one such gap: the persistent lack of capital for female entrepreneurs. The \$200-million fund—the largest of its kind in the world—helps to

level the playing field both on its own as an investor, and by supporting emerging venture-capital funds that focus on women-led tech companies.

The results of all this work are reflected in Canada's burgeoning tech sector, which is attracting record levels of investment and becoming an international leader in vital areas like artificial intelligence and clean technology.

On the following pages, discover 10 of the growing companies in the BDC Capital portfolio. From FI.Span, which is creating new ways to bank, to e-bee's energy-saving smart thermostats and Miovision's technologies to make cities safer and more efficient, they show how the next generation will bring Canadian innovations to global markets. ●

For more information about BDC Capital and the companies it has backed, see bdc.ca/capital.



Driving efficiencies

Scott Everett became fascinated with vehicles as a boy working on his family's farm. His parents sold the farm but his love of machinery eventually led him to mechanical engineering and now a place in the auto industry.

His Fredericton company, **Eigen Innovations**, uses artificial intelligence and predictive analytics to help car-part makers be more efficient. "We want to speed up the number of parts made per hour," Everett says. To do that, Eigen analyzes data many factories already collect, in addition to that from its own sensors, such as video-imaging, to help boost production.

As efficient as manufacturing has become, things like introducing a new material can be costly. Everett's tech assesses the impact—"It can automatically detect when something is changing," he says—and tells factory staff "how to run their machines better."

Convincing customers was a slog back in 2012 when Everett and a partner founded Eigen—"we'd get blank stares," he recalls. But that soon changed, and today he does business in the U.S., Europe, Japan and Mexico.

Now he is ready to branch out. "The auto industry was an interesting place to start because they have to guarantee quality," Everett says. "But as the cost of tech comes down, we can push it into other areas."

► **Eigen Innovations**, eigen.io



Pay less, travel more

When is the right time to book? Airline and accommodation rates fluctuate, and the early bird doesn't always get the best deal, so "there's tremendous anxiety around the purchase of flights and hotel rooms," says Frederic Lalonde, founder and CEO of **Hopper**, which offers a solution.

Having already founded an online hotel-booking company (sold to Expedia in 2002), Lalonde realized that budget-conscious travellers would appreciate knowing when to pull the trigger. It took six years and \$12 million, but since 2014, Hopper has been using artificial intelligence to parse online pricing data and predict the best time to book.

Lalonde admits his business model is different: "We only make money when people buy from us, but three-quarters of our resources are dedicated to telling people it's not a good idea to book." Even so, he says, more than 100 million trips have been arranged through Montreal-based Hopper, making it the most-used travel app in North America.

What's next? Besides hotels and flights, Lalonde thinks his predictive analytics can also help customers save money on such things as travel insurance and excursions. "We have a 30-year plan to build a \$100-billion market-cap company," he says.

► **Hopper**, hopper.com

Smart homes made smarter

Most entrepreneurs would never dream of competing with Google and its nearly unlimited resources, but not Stuart Lombard. The founder and CEO of Toronto-based **ecobee** is happy to go head-to-head with the technology giant and its Nest brand. "Google may have more money than God, but we can beat them," he says.

So far, so good. Since disrupting the industry with the world's first wi-fi smart thermostat in 2007, ecobee has helped millions of homeowners manage their energy consumption and owns about 30 per cent of the smart-thermostat market. He says ecobee will continue to grow, thanks to the company's focus on providing a superior customer experience to that offered by its competitors. "We know we need to have a world-class user experience," said Lombard, on why he regularly reads customer reviews and answers support calls.



According to Transparency Market Research, global spending on smart-home tech may hit \$100 billion by 2025, so Lombard is determined to deliver great products. The ecobee smart thermostat is the company's bread and butter, and uses temperature and occupancy sensors placed throughout the home to deliver better comfort to occupants while saving up to 23 per cent annually on heating or cooling costs. Lombard estimates ecobee customers have saved enough energy to power all the homes in Las Vegas.

For Lombard, who launched ecobee just as the iPhone was released, there's nothing better than building a business that helps people conserve energy and save money in the process. "We want to make the world a better place," he says. "That's a really fun thing to do."

► **ecobee**, ecobee.com

Better business banking

Lisa Shields launched Vancouver's **FI.SPAN** with one goal in mind: "We want to make business banking not suck," she says. That may be a tall order, but she is making progress.

Shields, a long-time fintech entrepreneur, founded the company in 2016 to fix the many frustrations small-business owners have with their vendor-related transactions. Typically, when a company needs to pay a vendor, it sends a file with payment instructions to its bank. The bank must act on those instructions, report whether the money was transferred successfully, and then someone has to enter the information into the company's enterprise resource planning (ERP) software. "It's really old school," Shields says.

To make life easier for both bank and business, she creates application program interfaces (APIs) that allow financial institutions to tap directly into a company's ERP system, quickly sending and receiving the data needed to make transactions happen. Businesses will know in nearly an instant whether a payment went through.

Speed is just one issue Shields hopes to address. By using her APIs, banks and other fintech companies will be able to offer services more efficiently. For instance, if a bank could tap into a company's ERP system and get a full picture of its payables and receivables, in some cases it would be able to offer loans at lower rates. "Imagine if you could accept a lower rate with a push of a button," she says. "The data to do that is available."

It may still be a while before all the world's banks see the value in sharing data, but with more clients demanding better banking products, that day will come. "Banks have fundamentally superior financial products, but they have inferior user experiences," she says. "We want to change that."

► **FI.SPAN**, fispan.com



A solid way to cut carbon

Robert Niven is determined to reduce the carbon footprint of urban areas across the globe. With the support of a network of global leaders, including financial backing from Breakthrough Energy Ventures, whose investor group includes Bill Gates, Jeff Bezos and Michael Bloomberg, Niven and his team are poised to reduce CO₂ emissions by 500 megatonnes per year, roughly equivalent to taking 71 million cars off the road annually.

Niven's mission began in his university days in the early 2000s, when the British Columbia-born chemist and engineer was studying the way carbon dioxide reacts with concrete. After realizing just how much CO₂ is emitted when making cement—a key ingredient in concrete—he went about designing a way to put it to good use and founded **CarbonCure**, based in Halifax, in 2007.

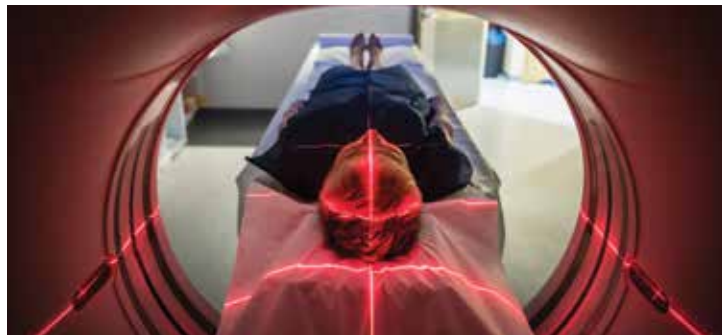
CarbonCure's technology, now in 132 plants around the world, including LafargeHolcim,



Brampton Brick, Permacon and CBM in Toronto, injects waste CO₂ as concrete is being mixed. It reacts with calcium ions, and is then converted into a mineral and locked in the concrete, prevented from being released as a greenhouse gas. Not only is the process cost-effective, the end product is stronger concrete.

To achieve Niven's ambitious goals, the technology, which requires no capital investment—CarbonCure charges its customers a monthly licensing fee, which is offset by cost savings resulting from manufacturing efficiencies—needs to be in 100,000 plants worldwide. However, large concrete suppliers own many plants, so the mission isn't totally impossible. "Companies like the technology because it's a plug and play," he says. "It's cleantech that can work in Shanghai and Birmingham."

► **CarbonCure**, carboncure.com



Cancer meets a profound opponent

Millions live with prostate cancer, yet only 200,000 men a year undergo surgery to address it—and those who do can face serious side-effects.

There is another way. In 2007, scientists at Toronto's Sunnybrook hospital discovered a non-invasive way to treat the second most common cancer among men. Ultrasound can kill most of the cancerous cells—a ground-breaking idea and one they wanted to commercialize.

Since then **Profound Medical Inc.** has been testing and perfecting the procedure, which it calls the Tulsa-Pro. Doctors use real-time MRI guidance to insert a tube into the urinary pathway, and then use ultrasound waves to heat the prostate to 55 degrees Celsius. It's quick and has nearly no impact on the patient.

The potential of this technology, which is already being used in Europe and could reach the U.S. market this year, is enormous, says Dr. Arun Menawat, Profound's CEO. "I built two billion-dollar-type companies before this," he says. "I can tell you Profound has more potential."

That's because so many men attempt to live with prostate cancer rather than undergo a surgical procedure that can result in a total loss of erectile function, and leaves about 30 per cent of patients wearing diapers for life.

► **Profound Medical Inc.**, profoundmedical.com

Making projects manageable

John Laslavic's road to entrepreneurship started in 2001. While working for Siemens Canada, he had a major project fall apart because the many partners involved used computer software and processes that would not communicate. "We couldn't standardize processes and workflows because everyone had their own custom systems," he says.

The experience was so frustrating that Laslavic, a longtime engineer and consultant, quit his job and went about finding a way for disparate enterprise systems to interact. In 2016, he started Toronto-based **Upchain**, which provides a product lifecycle management platform that lets designers, engineers, salespeople and others share and collaborate on complex design data easily across the supply chain.

As well as speeding up work flow, he says, his AI-enabled technology helps factories become more efficient. "We can analyze engineering changes and then give information to robots (on the floor) on how to change their work."

According to Laslavic, the platform has been gaining momentum with customers around the world, including OHB, a space system company, and ATS, a factory automation operation. Annual recurring revenues jumped by 621 per cent in 2018. "We have an advantage in a niche market that has more than 20 million engineers involved in bringing products to market," he says. "There's a blue ocean ahead of us."

► **Upchain**, upchain.com



Learn to love accounting

Before he co-founded **Wave**, Kirk Simpson ran an outdoor webcasting company. Keeping track of invoices, taxes, payroll and accounting was a major pain, but he couldn't find any programs to help. "If my sister wasn't a CPA, I would have been in a whole bunch of trouble," he says. He figured there must be a better way, so in 2010 he and co-founder James Lochrie, CTO at a tax prep company, created Wave to help service-based small business owners do what they love by automating what they didn't.

Simpson knew his audience—entrepreneurs or startups with no more than 10 employees—and he knew their pain. With Wave, he and the team created software to run their business and offer the traditional banking needs in one seamless platform. The bet has paid off. Today, Wave serves over four million customers, generates \$50 million a year in revenue and is growing fast, with 235 employees based in Toronto's east end. "There's an opportunity to build a global company in this sector from Canada," Simpson says.

With more people working for themselves these days, Wave's cloud-based software will always be needed, and it will evolve with the capabilities of technology. Machine learning and artificial intelligence are big priorities—Simpson thinks the billions of financial transaction data points Wave collects can be used to automate accounting even further. And introducing more financial services, all embedded into the core software, is on the horizon as well. "We want to be the one-stop-shop for small businesses, a place where they can run their entire financial lives," Simpson says. "It's about simplifying their life and speeding up their cash flow."

► **Wave**, waveapps.com



Drug discovery 3.0

In 2014, when his father was diagnosed with pancreatic cancer, Alexandre Le Bouthillier did what any son would do: he sought out the best medical care. Two years later, the disease prevailed, leaving Le Bouthillier determined to make the best care better. The co-founder and chief operating officer of Montreal's **Imagia** is hardly a novice entrepreneur, having sold his previous tech company in 2012. When his father was diagnosed, he joined long-time friend and fellow entrepreneur Nicolas Chapados to work with Yoshua Bengio, one of the fathers of deep learning, on applying artificial intelligence to cancer research.

In 2015, they launched Imagia and developed EVIDENS, an AI-enabled, collaborative platform that pairs artificial intelligence with clinical expertise to accelerate access to personalized healthcare. For example, the software can look for ways to improve treatment decisions based on a patient's type of cancer and genetic makeup.

The company recently partnered with a global technology firm to develop a colonoscopy-related system that will help doctors better analyze potentially cancerous polyps in real time. The ultimate goal, Le Bouthillier says, is to deliver more personalized care that leads to better outcomes.

What would his father think?

"He told my first 15 employees, 'You're not going to be able to save me, but please continue the good work, and I'm sure you'll make a difference,'" Le Bouthillier recalls. "He would be proud."

► **Imagia**, imagia.com

Stopping drivers from seeing red

Wish you'd hit more green lights on your way to work?

Kitchener's **Miovision**, co-founded by Kurtis McBride in 2005, uses sensors, artificial intelligence, and connected software to grab a steady stream of detailed traffic information. Then, the technology assesses the info—anything from how many left turns people make, the time it takes to drive down a street and how many cyclists ride through an intersection—to improve traffic flow. "We want to help make every intersection more drivable," says McBride.

With its technology in 65 countries, Miovision is growing exponentially. It's also improving road safety and helping the environment by reducing the number of idling cars on the roads. For instance, it helped reduce morning commute times on a Milton, Ont., street by 17 per cent just by making it easy for the city to see (through data) how to improve traffic flow by changing signal timings for northbound drivers.

Going forward, Miovision wants to create smarter, safer cities. It also wants to ensure that cities can use data collected by Miovision products across other systems and departments, not limited by technology constraints. "We want to collect data in a way that ensures everyone has access to that information," he says.

► **Miovision**, miovision.com



Responsible disruption

Bringing positive change to people's lives

By **TIM FALCONER**

Disruptive technology doesn't have to mean an end to jobs or a traditional way of life. Many of Canada's top ventures are using technology for responsible disruption to change the future of work, commerce and society. That means providing social benefits rather than creating havoc, which is good news for the country and for the world.

Technology from Winnipeg's **Farmers Edge**, for example, helps growers make dozens of decisions with up-to-the-minute data. This not only increases profitability, but sustainability: Farmers who use less fertilizer, insecticide and herbicide save money, benefit the environment and give consumers what they want.

The company, which services over 40 million acres in Canada, the United States, Australia, Brazil and Eastern Europe, has always focused on productivity and sustainability, but chief product and strategy officer Ron Osborne sees a new trend: traceability. Consumers will be able to check how and where the ingredients in, say, their morning cereal were grown—eventually right down to which farm. “Our view is not to use technology to completely disrupt what people have been doing for generations and millennia,” says Osborne. “We use technology so we can all do business better, more efficiently, more profitably, of course, but when doing all that properly we're also helping with all of the social benefits.”

Healthier and happier workers are crucial to a better future. Montreal-based **Dialogue** provides healthcare, including mental-health services, through a phone app or computer. That can reduce both absenteeism, not just sick days, but late arrivals and early departures, and “presenteeism”—workers who are on the job but distracted by health worries. Employees see the service as a valuable perk, so it helps firms attract and retain talent. Dialogue now has 350 client companies, representing 150,000 employees and family members; revenues increased 300 per cent in 2018, and expansion to Germany has begun.

But co-founder and CEO Cherif Habib believes the company has done more than merely grow. “There's been a lot of talk of more flexible ways of work and better ways for employers to help employees manage their work-life balance and a lot of talk

about stress and anxiety in the workplace,” he says. “I think we play a super-positive role in the discussion.”

Healthy employees also need to save for the future. But investing has often seemed inaccessible or unwelcoming to women, younger people and anyone without a lot of money. **Wealthsimple** is changing that. With an online investment service that's inexpensive and simple, it uses technology and human expertise to offer smart financial services and advice to everyone regardless of who or how rich they are. And for clients who want to do some buying and selling on their own, there's now Wealthsimple Trade, a no-commission stock-trading app.

The Toronto company has 230 employees and operates in Canada, the U.S. and the United Kingdom. It now has over 140,000 clients and assets under management of more than \$4 billion. “We believe that financial freedom is one of the greatest forces for good in the world,” co-founder and CEO Mike Katchen said in an email. “It enables people to live the lives they want, to provide for their loved ones and to invest in their communities.”

When it comes to investing in communities, Rohan Mahimker and Alex Peters had an ambitious mission: help children everywhere love to learn. Today, kids in 180 countries use the math game the two started in 2011 as an undergraduate project at the University of Waterloo. **Prodigy**, their Burlington, Ont., company, now has 250 employees and uses a “freemium” model, offering a free version of the program and a paid one with enhanced entertainment.

For the 5.6 million monthly active users, including 20 per cent of all Grades 1 to 8, a video game offers a judgment-free way to learn. Eliminating math phobia means giving boys and girls the foundational skills they need to succeed in STEM (Science, Technology, Engineering and Mathematics).

“If we are able to do that,” says Mahimker, “we are literally creating a better future for our species.” That's the kind of Canadian disruption no one can argue with. ●



“
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good in the world.”

Michael Katchen
CEO, Wealthsimple

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- ▶ **Farmers Edge**, farmersedge.ca
- ▶ **Dialogue**, dialogue.co
- ▶ **Wealthsimple**, wealthsimple.com
- ▶ **Prodigy**, prodigygame.com



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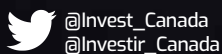
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