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CORNERSTONE OF A SUPERCITY

The Waterloo Region churns out talent and startups, but it needs to strengthen links with Toronto to reach its potential.

By Peter Moreira

The backdrop said as much as the beaming man standing alone on the stage.

The man was Prime Minister Justin Trudeau. He wore no jacket, just a white shirt with the sleeves rolled up and the top button undone. He was casual and friendly and apparently overjoyed to be opening the new Google Canada engineering headquarters in Kitchener.

The audience and cameras were all focused on the PM, but they also took in the backdrop, which is always so important in a political announcement. Standing on a landing behind the stage were a couple rows of programmers, many wearing Google T-shirts. And then there was a row of school children, who had just received a lesson in technology from the Prime Minister.

"What's happening here really, really matters, not just to the region, but to the country and the world," Trudeau said to hearty applause at the event in January. "And it's an incredible pleasure to be here today."

Indeed there was something really, really important happening, and it extended beyond the opening of the Google Building. There is a reason that the young Prime Minister, three months into his mandate, appeared in the Waterloo Region surrounded by young programmers. Again and again in his visit he referred to the potential of the innovation economy, and the Waterloo Region's place at the centre of it. With the oil patch in serious trouble, innovation may be the best hope for the country's economy.

It's well known that the Kitchener-Waterloo tech ecosystem is a phenomenon unique in the Canadian economy. But what's less appreciated is that there may be no place like this little city of half-a-million souls anywhere in the world. Simply put, it is an extremely cost-effective factory for some of the best technology talent found anywhere. For example, 60 percent of the engineers working at the Google building that the Prime Minister opened are graduates of University of Waterloo. Just as it pours out talent, the Waterloo Region produces startups at a dazzling rate. Only Silicon Valley has a higher density of startups. Its support systems – from Communitech to the Waterloo Accelerator Centre to Velocity – stack up well against their competitors anywhere in the world.

But something is missing – a few key ingredients that are preventing the Waterloo Region from becoming a bona fide hotbed in the global innovation landscape. The city is small. It is not the home of many major corporations. There are few venture capital firms operating there. And there is overall a limited amount of funding in the region. To really capitalize on the opportunity posed by the innovation economy, KW needs to strengthen its links with Toronto so they constitute one supercity in the minds of investors and corporations.

"Size matters," said Iain Klugman, the President and CEO of Communitech. "Toronto with 5 million people has the size, but it's missing that edgy thinking, that different culture, that Palo Alto brings to the Bay region.

"If you look at the performance of the other innovation corridors, then you see this big opportunity. If you don't take this opportunity, then you will continue forever to be a farm team to the Valley. If you build it right, you can be a top five ecosystem in the world. Then you're growing the economy at a level greater than the sum of the parts."

He added that there is a strong need for capital to grow the region's

Most venture capital investments take place in major ecosystems

startups, and that most of the funding deals in the world take place in the top five or six ecosystems. Kitchener-Waterloo and Toronto have to strengthen their ties to be considered a unit, a supercity, and attract capital into the fastest-growing part of the economy.

Of course, if you look at a map, the Waterloo Region and Toronto could easily be considered a unit. The gap between the two is only 100 kilometres. But the nightmarish traffic congestion along Highway 401 leaves commuters and visitors wondering if the two municipalities are in the same galaxy. The poor transport links make meetings difficult, deter interaction with Toronto-based corporations and mean Kitchener-Waterloo is treated as a single entity when the global startup ecosystems are ranked. But if KW and Toronto were treated as a unit, then Canada would have the makings of an innovation powerhouse.

"Kitchener-Waterloo is an important linchpin in the most important technology cluster in the country," said John Ruffolo, the CEO of OMERS Ventures. He explained that the lion's share of venture capital deals in Canada take place in five cities: Toronto, Vancouver, Montreal, Ottawa and the Waterloo Region. Toronto is extremely active, he said, combining it with the Waterloo Region would produce an entity responsible for more than half the VC deals in the country.

"Because bigger is better in terms of startup ecosystem, an integration of Toronto-Waterloo would clearly benefit both ecosystems," said the Silicon Valley think tank Compass in its recent report on the Waterloo Region. "With a combined metropolitan GDP of about $350 billion–the 10th largest in U.S. and Canada–the corridor has the assets to compete on the global stage."

Compass – whose report is detailed on pages 10 and 11 -- has rated Toronto as the 17th best ecosystem in the world, and pegs the Waterloo Region at No. 25. The report excludes the Waterloo Region from the top 20 even though it gushes about the startup density and talent that the region has produced. Compass does not quantify talent – it's probably impossible to do so – but it presents anecdotal evidence suggesting that the engineering talent in Kitchener-Waterloo is second to none. Anywhere.

"Something is going on in Waterloo, because the applications we get from Waterloo students are better than those we get from students of any other university," it quotes Y Combinator co-founder Paul Graham as saying.

Ted Livingston thinks he knows what is going on. The Founder and CEO of Kik.com believes the key to the "ridiculous" (his word) talent in the region is the legendary co-op program at the University of Waterloo.

Prime Minister Justin Trudeau opens Google's new Canadian engineering headquarters in Kitchener.

There's a Resounding Call for Improved Transport Links

Collaboration within the community, like this meetup in Communitech, is a key to producing KW's world-class talent.

He said an engineer or programmer studying at Waterloo has six co-op terms, which gives each student an unparalleled breadth of experience in real companies by the time they graduate. It produces a rarefied individual with the technical know-how and the business acumen that are so essential in building companies.

The Compass report also refers several times to the spirit of collaboration that pervades the Waterloo Region's institutions – from Communitech to the Accelerator Centre to the universities. And Communitech itself has become an essential meeting place for the various stakeholders in the community.

Talent alone won't be enough. The Waterloo Region is now home to 1,100 startups, and they will need capital to grow. But Compass says that they now only average about US$45,000 each in seed funding, compared to US$490,000 for Silicon Valley. To access more capital, it may be necessary to be part of a bigger community.

Most investors – angels, VCs and some say even investors in public companies – like to invest in companies close to home, so that they can easily meet with management and observe the company. A closer union between Toronto and the Waterloo region would help Toronto investors feel the KW startups are part of their own back yard. It would also help to convince international investors that they were investing in part of a major centre when backing Waterloo-area companies.

The gaps between Toronto and KW are also compounding another challenge facing startups in the smaller centre – the lack of major corporations.

> **'If you don't take this opportunity, then you will continue forever to be a farm team to the Valley.'**
>
> – Iain Klugman

"One of the gaps that exists for companies in this community is the customer deficiency," said Communitech's Klugman. "We need customers coming out of the gate." He said that the startup community in the Waterloo Region needs stronger ties to Toronto's corporations. What's more, these blue chip companies are realizing the threat to their business from disruptive innovation, and are therefore also interested in stronger ties with innovative startups. Both private and public sectors are therefore calling for better transport links.

"I do think it's going to be very important to connect the two hotbeds of activity," said Sam Sebastian, Managing Director of Google Canada. "I would love to see more interactivity and infrastructure connecting the two cities."

There is broad agreement among the cognoscenti that stronger links between Toronto and KW would benefit everyone. But these people also agree that improved transportation links – especially a high-speed rail service – are at least eight years away.

Kitchener Mayor Berry Vrbanovic on the day of Trudeau's visit called for two-way, all-day GO Transit train service in southern Ontario to attract and retain knowledge workers. But he added in an interview: "If everything went according to plan, there could be a high-speed train in eight to 10 years, but even that's being a bit optimistic."

The transportation problem may prove difficult to overcome, but there are strong tailwinds propelling the region's startup community forward. Communitech and the University or Waterloo's Velocity accelerator (See our story starting on page 7) are both expanding. The region's high growth companies are beginning to generate larger funding rounds, with Kik.com landing a US$50 million strategic investment and Vidyards following with a US$35 million venture capital round. Google and other blue chip companies are expanding in the region. There's a sense of optimism in the air.

"I just have the feeling that Waterloo is on the cusp of greatness," said Livingston. "The biggest problem we have here is getting people to realize how amazing it is." *

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VELOCITY Expands to Meet Demand

Mike Kirkup has welcomed 163 companies into Velocity since he began as Director four years ago. Now the University of Waterloo accelerator is expanding to handle more.

By Peter Moreira

When Ted Livingston was 23 years old, he had a problem not many people that age face: he had to get rid of $1 million.

Livingston is the Founder and CEO of Kik.com, the high-flying chat service that has almost a quarter-billion registered users. In 2011, the company was closing a funding round, and to make the deal work Livingston had to sell some of his own shares, for which he was to receive $1 million. He was worried that wouldn't sit well with the other founders, so he donated every nickel to one of the organizations that helped him get started: Velocity.

"I wanted it to be a statement to the community and to the world," Livingston said two years later. The statement was not just that Kik was something special. It was also that Velocity was special as well.

Velocity is the accelerator of the University of Waterloo. Livingston's seven-figure donation became the cornerstone of the Velocity fund, which each year hands out about $400,000 to companies in the program. The accelerator is based in the Communitech hub, where it has recently expanded to encompass a total work space of 36,711 square feet.

To call Velocity a university accelerator is technically correct. Every company that goes through the accelerator has at least one founder that attended the University of Waterloo. But it also misses the point. Velocity is an organization that has produced companies like Kik and Thalmic Labs and Pebble – startups that draw international attention and customers. At the end of 2015, the accelerator had the capacity for about 74 to 76 companies at any one time. With the recent expansion, the capacity has

> **"The culture of the university has always been entrepreneurial. It was founded by engineers that needed help and expertise to help grow their businesses."**
>
> – Mike Kirkup

risen to 120 companies. It is now the largest accelerator in North America that doesn't take equity in its client companies.

"That may be the largest in the world," Mike Kirkup, the director of Velocity, said in a recent interview in the Hub. "We just had no way to check it beyond North America."

An alumnus of the University of Waterloo and the region's most successful startup, Research in Motion (now BlackBerry), Kirkup has been the director of Velocity since 2011. In that time, a total of 163 companies have entered Velocity, and more than 40 have graduated from the program. Seven have been acquired.

Kik is certainly the posterchild for Velocity, and Livingston's smiling presence shines through at many of the events. But graduates include such companies as Thalmic Labs, whose Myo armband lets users wirelessly

VELOCITY . . . BY THE NUMBERS

Total intake in 2012-2015	163 companies
Number of companies launched	43
Percentage of Velocity companies still active after 4 years	66%
VC raised by Velocity graduates, as of Fall 2015	$250 million
Capacity as of 2015	74 to 76 companies
Current capacity	120 companies
Size of Velocity after its recent expansion	36,711 s.f.

control technology through gestures and motion, and Vidyard, whose platform helps marketers use video to reach their audience. As well as finding clients, the companies have been darlings of venture capital investors. Kik has raised a total of US$120.5 million, Vidyard US$60.7 million and Thalmic Labs US$14.5 million.

In fact, Velocity revealed in the autumn of 2015 that its companies have raised $250 million in "follow-on funding". But there is one proviso about the statement: it assumes that the Canadian and U.S. dollars are at par. When you consider that the C-dollar closed 2015 at just over 72 U.S. cents, it's obvious the Velocity grads have raised substantially more than that amount.

So how have Kirkup and his band of collaborators produced such excellent results?

The first reason is great partners, starting with the University of Waterloo itself. The university is recognized as the preeminent institution for science education in the country. That means it attracts students who thrive on the sciences. Its coop program has operated for decades, so the students get hands-on experience over four years with leading corporations in their chosen field. And finally, the university has a pragmatic bent, so there is virtually no blowback from professors who worry that science is tainted by teaching students to commercialize their work.

"The culture of the university has always been entrepreneurial," said Kirkup. "It was founded by engineers that needed help and expertise to help grow their businesses."

It's also worth noting that Velocity is a cornerstone of the Communitech hub, and that the Velocity companies can tap all the mentorship and industry expertise that is drawn to Communitech. It's a happy, symbiotic relationship.
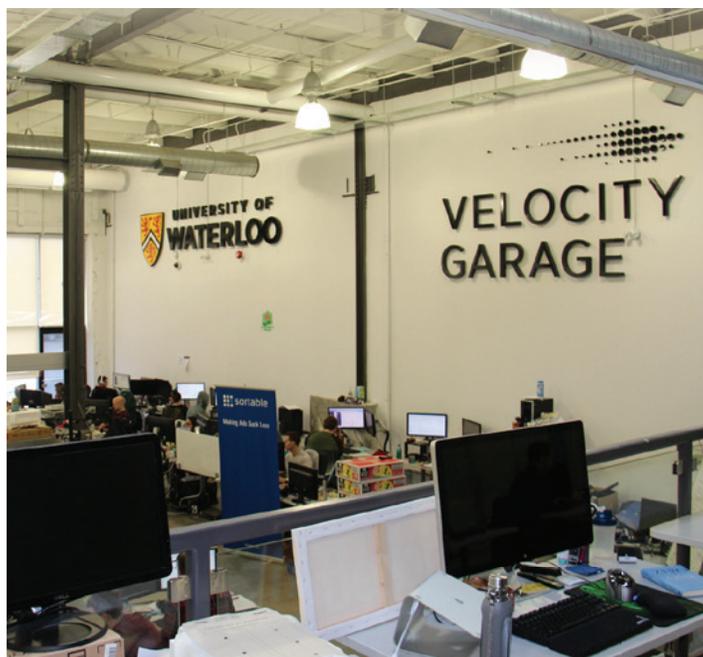
TOTAL FUNDING by High Profile Velocity Companies*

Company	Funding
Kik	**$120.5 million**
Vidyard	**$60.7 million**
Thalmic Labs	**$15.6 million**
Pebble	**$15.4 million**
MappedIn	**$3.4 million**
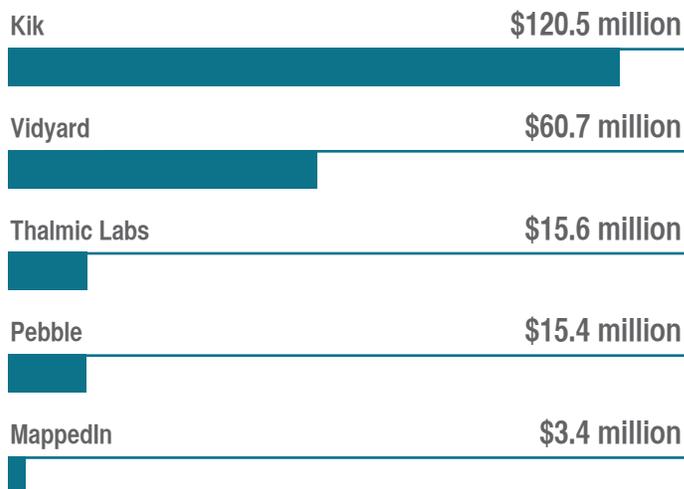
Source: CrunchBase (All figures in US$.)

The second reason for the success is the program itself, which is loosely structured and basically lets founders get on with the business of developing their businesses. It's divided into three main sections (which will be united under one roof with the expansion): Velocity Garage, which houses largely software companies; Velocity Foundry for hardware companies; and Velocity Sciences, which is predominantly for life sciences startups. The participants must be working on their projects full-time, and at least one must have gone to the university. What that means is that the founders are customarily Waterloo grads, but they flesh out their staff with coop students (who learn about startup life through the experience).

Velocity is unlike other accelerators in many ways. There are relatively few formal classroom sessions. The most frequent form of mentorship is the founders identifying what they need to learn and linking up with someone who can teach it to them. Such people are rarely far away. And it is not the customary four- to six-month "accelerated" format, but a process of one or two years. There's not a set time for companies to launch. Usually, successful companies know when it is time to leave because they have outgrown their allotted space, or decided there is nothing more to learn from the Velocity mentors.

Whereas the university is renowned for the quality of its scientific education, Kirkup said students by their nature don't have the experience in life or career that allows them to identify acute pain points. They're keen to solve problems, but they don't fully understand the problems that need to be solved. To overcome this hurdle, Velocity and the university created the Problem Lab. It's a meeting place where corporate executives can get together with students, discuss the company's challenges and work with students on developing technologies that can help. The Problem Lab will get a new space under the recent expansion.

The third factor is the Velocity Fund – which is a rare, possibly unique, facet of a university-affiliated accelerator. The fund awards funding to startups coming out of the university once a semester, or three times a year. It gives $25,000 to each of four startups, plus a $10,000 bonus for the best hardware company. And it also awards $5,000 funding packages

Until recently, the Velocity Garage was a stand-alone unit within the Communitech Hub. With the latest expansion, Velocity Garage, Velocity Foundry and Velocity Science will all be under one roof.

CTO Devon Galloway, left, and CEO Michael Litt are the Co-Founders of Vidyard, a Velocity graduate that has raised $60.7 million in funding.

to three early-stage teams. Ten finalists deliver three-minute pitches in each division before a room packed with students who come out to witness the contest.

"It's super competitive so you really bring your A Game to this competition," said Rachel Pautler, who won $25,000 with her company Suncayr. It has made a marker that tests the effectiveness of sunscreen using ink that only becomes visible when skin is exposed to UV rays. "[With] a lot of other grants, you just sort of apply, you don't really think about it. But you really have to work hard to get to this pitch competition. And doing that really helps you think about things about your business that you might not have thought about."

Now Velocity is growing. On Jan. 12, the facility almost doubled its capacity, all under one roof. Kirkup said the organization now has to "press both ends of the pump at the same time" to develop enough new companies to fill the space. He believes the enthusiasm for entrepreneurship and the quality of research at the University of Waterloo will ensure that they can fill the space in a couple of years.

In short, Kirkup said this new expansion will mean three things to Velocity.

"One, we can repatriate the facilities back into one facility," he said. "Two, we're going to have a dedicated facility for our hardware and life sciences companies that will be a big improvement over what we have today; and three, we will have more space for more companies. " ✳

EXITS by Velocity Companies

COMPANY	BUYER
Bookneto	Unknown
Fora	Andela, New York/Lagos (Nigeria)
DraftingSPACE	BuildDirect, Vancouver
Kitematic	Docker, San Francisco
BufferBox	Google, Mountain View
TrendRadius	Intelex Technologies, Toronto
Jingu Apps	Rebellion Media, Waterloo

Ted Livingston, right, speaks with Mike Kirkup during a Velocity event. The founder of Kik.com donated $1 million to the Velocity Fund when he was 23.

The Big Disconnect

The Waterloo Region has the second-highest concentration of startups in the world, but it's not ranked in the top 20 ecosystems.

By Peter Moreira

To read the Compass.co report on the Waterloo Region's startup ecosystem is to be struck by a massive disconnect.

In Waterloo Startup Ecosystem Report: The David vs. Goliath of Startup Ecosystems, the California research institute said that the Waterloo Region is a global leader in a range of categories.

It has the second-highest concentration of startups in the world. It's edged out of first place only narrowly by the global leader Silicon Valley, and it has about a 50 percent greater concentration than the third-place finisher, Dublin.

The Waterloo Region is the third-fastest growing ecosystem in the world.

Funding in 2015 rose 97 percent, from US$135 million to US$266 million.

And although the 71-page report doesn't quantify the technical talent produced in the region, it says some people rate it as "the very best" in the world.

And yet, Compass ranked the Waterloo region as the 25th top startup ecosystem in the world. Twenty-fifth.

The problems? The region is puny in comparison to the competition, and its startups have challenges in raising money and scaling. And the transportation problems in and around Toronto reduce the benefits that the Waterloo Region should enjoy from being so close to Canada's corporate capital.

"Waterloo's top technical talent, deep sense of community, and the unmatched cooperation and coordination between stakeholders are the pillars of its success," said the report. "If it can help its startups close the funding gap, especially at the seed stage, take steps towards an integration with the Toronto ecosystem, and solve the challenge— shared with almost all non-U.S. ecosystems—of rapidly scaling U.S. sales, Waterloo can become an international success story."

The crux of the problem is that the region's startups take too long to grow and don't raise enough capital to help that growth.

"Waterloo's startup valuations grow more slowly because revenue growth is much slower," says the report. "The root cause is a Global Market Reach gap, centered around customer development … and growth."

Canadian companies in general, it says, don't make it a priority to land customers in other countries, most notably the United States. Canuck founders typically compound the problem by attacking the U.S. market from their base in Canada, which tends to slow sales.

Compass said the financing gap – which is acute in seed funding and also exists in Series A rounds – exists mainly because there are fewer angels and institutions competing to invest in the startups. It said the proportion of startups in Silicon Valley that receive seed funding is four times greater than in Kitchener-Waterloo.

The report offers solutions. Obviously, the startups and their advisers have to make a greater effort to develop sales teams within the U.S. The funding gap could be reduced with a concerted effort by stakeholders and policy-makers.

"Drawing from successful policies executed in other ecosystems, policymakers can help solve gaps in seed and Series A funding through matching funds and tax credit programs dedicated to one type of round," said the report. These parties could also help by "investing as [limited partners] in local funds and foreign funds willing to open offices in the ecosystem."

> **"Waterloo's startup valuations grow more slowly because revenue growth is much slower. The root cause is a Global Market Reach gap, centered around customer development … and growth."**
>
> **— The Compass Report**

Finally, Compass said that the Waterloo Region can improve its standing with entrepreneurs and investors if it manages to integrate more fully with Toronto, and create a truly unified community along the lines of Palo Alto-San Francisco or Cambridge-London.

With a population of a half-a-million, the Waterloo region is clearly a minnow swimming in a school of whales. With the exception of Tel Aviv and Austin, all the major startup centres have populations of several million people. And the report is overwhelmingly complimentary about what the Toronto satellite has achieved.

Concluded the report: "Today the lessons from Waterloo are of global relevance for every stakeholder working on growing startup ecosystems and creating economic growth—from investors and business leaders to policymakers and economists." ✳

THE COMPASS REPORT
BY THE NUMBERS

The Compass report on the Waterloo Region is a goldmine of data on our place in the startup world. Here are just a few nuggets.

LEADING ECOSYSTEMS IN THE WORLD

1. Silicon Valley
2. New York City
3. Los Angeles
4. Boston
5. Tel Aviv

17. Toronto
18. Vancouver
20. Montreal
25. Waterloo

NUMBER OF STARTUPS

City	Startups
Waterloo	1,100
Austin	1,900
Vancouver	2,150
Montreal	2,200
Toronto	3,300
Tel Aviv	3,650

STARTUP DENSITY

City	Density
Silicon Valley	2.2
Waterloo	2
Austin	1.1
Tel Aviv	1
Vancouver	0.95
Toronto	0.56
Montreal	0.54
Avg. YC, LA, BOS	0.51
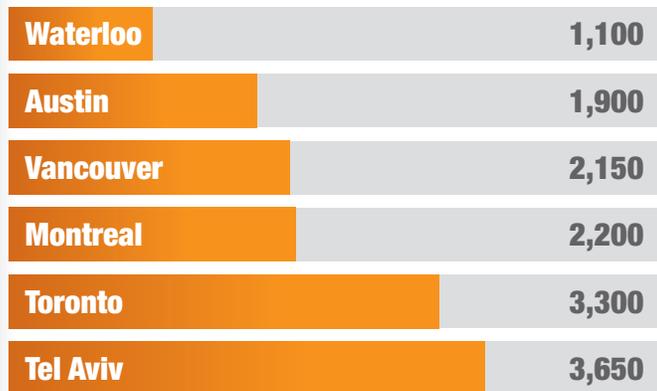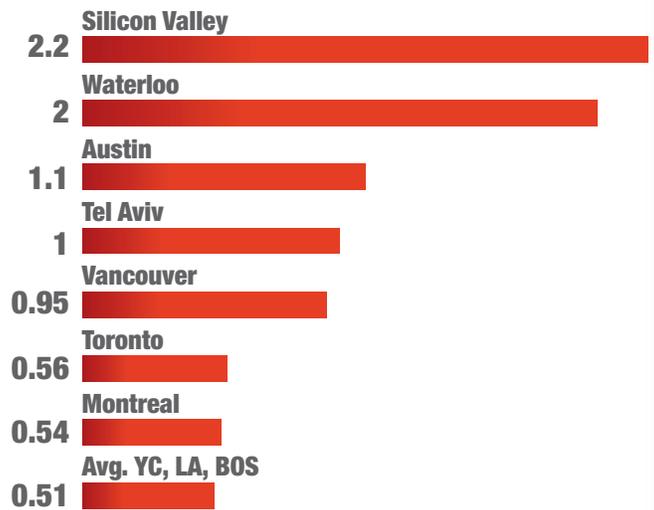
PERCENTAGE OF FOREIGN CUSTOMERS

City	Percentage
Tel Aviv	74%
Vancouver	60%
Montreal	57%
Waterloo	51%
Toronto	40%
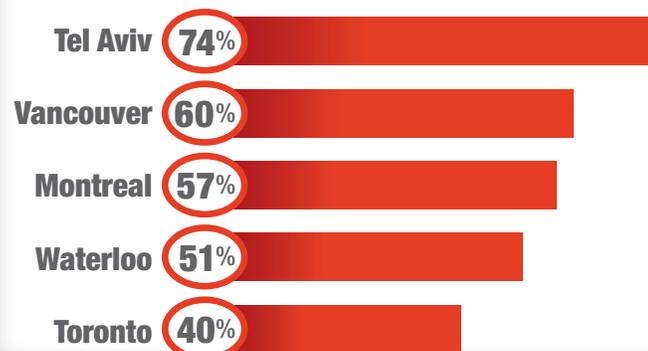
EARLY-STAGE FUNDING PER STARTUP

City	Funding
Silicon Valley	$490,000
Avg. NYC, LA, BOS	$360,000
Toronto	$70,000
Vancouver	$70,000
Waterloo	$45,000

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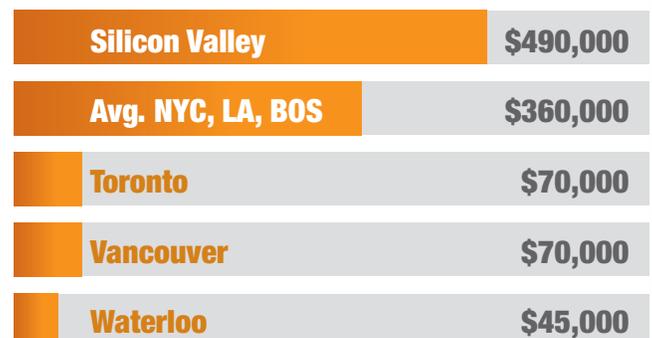
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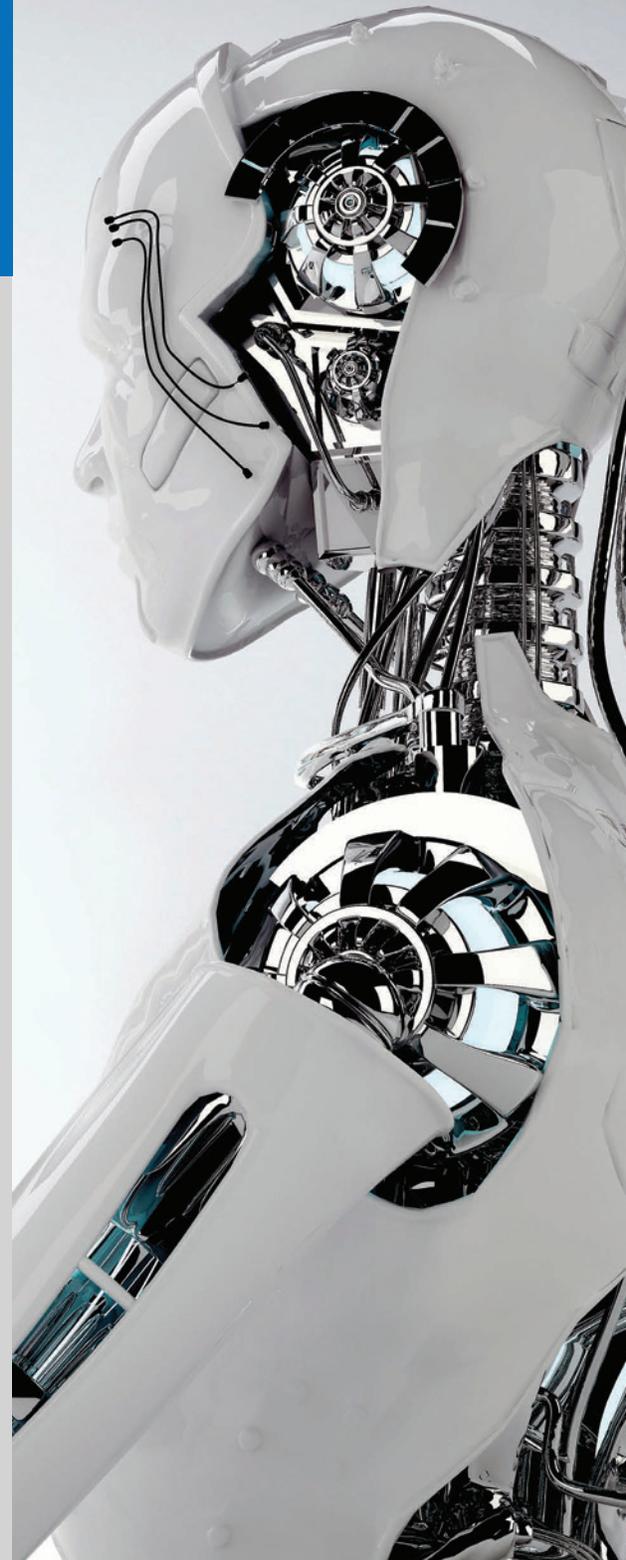
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Bridgit To Expand into U.S.

The maker of a construction industry app was one of the region's hottest startups in 2015, winning the Google Demo Day in Silicon Valley.

By Rose Behar

The construction industry is often considered slow at adopting change but Kitchener-based startup Bridgit has broken ground quickly with its mobile application Closeout, a tool that simplifies communication on construction sites.

"We heard a lot of, 'You're never going to sell software to the construction industry, because it's too old school,'" said Co-Founder Lauren Lake in an interview. "That was the outside point of view. When we actually went and spoke to all these people, they said, 'Of course we want to use software, but there's nothing.'"

Lake and Co-Founder Mallorie Brodie spent six months doing intensive market research on construction sites in the development of Closeout, which replaces the pen-and-paper task of documenting unfinished, damaged or incorrect work, referred to in the industry as a "punch list."

With Closeout, users take pictures of the work areas and upload them along with notes for immediate viewing by the team, significantly streamlining the task.

The app has been adopted by about 100 companies since its launch in March 2014, including powerhouses Minto and CentreCorp. Depending on the scale of the project, these companies pay between $800 and $3000 per month for the software.

Bridgit is now setting its sights on international growth, branching in to the New York construction ecosystem this past fall. The team plans to target other large construction cities such as Seattle, Houston and Washington, D.C., this year. If it continues its average rate of sales growth from 2015 — over 20 percent each month— Bridgit is poised to take a large chunk of the North American construction software market. There are now a range of startups (FinishLine, KO Punchlist) and established companies (Textura, AutoDesk) all vying for domination in this relatively new

Mallorie Brodie, left, and Lauren Lake attribute much of their success to the ease-of-use of their flagship product, Closeout.

> "You can take a site of 500 people and this afternoon they can be up and running with the effort of only a couple people."
>
> — Lauren Lake

arena. The difference between Closeout and the competition is its simple design, said Lake.

"The main thing that we really focused on is keeping it as easy as possible," she said, noting that the software has to integrate quickly in to a bustling construction site.

"You can take a site of 500 people and this afternoon they can be up and running with the effort of only a couple people."

Reflecting back over the past year's successes, Brodie said the key to the team's momentum was continuously getting user feedback to improve the app, while Lake points to the team's focus.

"There's a lot of hype in the startup community," she said. "We've just tried to keep our heads down and drive results."

Instead, they've let the Kitchener-Waterloo community do the buzzing for them. The community played a large role in Bridgit's recent win at Google Demo Day in Silicon Valley, where they represented Communitech.

"It was a really positive experience for us to bring back the prize to Canada and to Waterloo specifically," said Brodie, adding that she and Lake made the conscious decision to build Bridgit in the Waterloo region because of the "great working culture."

After beginning their journey at Western University, where Lake studied engineering and Brodie business, the co-founders used many Waterloo-area and Toronto startup programs including The Next 36, Creative Destruction Lab and, most recently, Communitech's Rev sales accelerator.

The company, now in its third year, wrapped up a round of funding this past summer, and won't be seeking out any more until the Series A, which the co-founders are planning to kick off in early 2017.

There are many things that the pair are excited about for 2016 — among them the expansion into the U.S. and their first solo office space. But when asked if she had any personal resolutions for the New Year, only one came to mind for Lake: "Get more sleep." *

The Holy Grail of Computing

The University of Waterloo's Institute of Quantum Computing is working to revolutionize the way the world processes data.

By Peter Moreira

Here's a fact about the Institute of Quantum Computing that we can all get our heads around: tea is served each day at 4 pm.

It's a custom that Executive Director Raymond Laflamme started at the University of Waterloo facility a few years ago. He imported it from his time at Cambridge University, where he studied under Stephen Hawking. Now it's a daily routine at the institute in the Mike & Ophelia Lazaridis Quantum-Nano Centre at the University of Waterloo.

Other than that morsel of information, discussion of what they do at the IQC can be a daunting subject. The IQC website itself says it's all right to be a bit baffled by the concept and potential of quantum computing. But if the 23 faculty members, four research assistant professors, 108 graduate students and 41 post-doctoral researchers who toil at the institute are correct about the prospects of quantum computing, the whole world of technology will be revolutionized.

"Quantum technology is a topic worth getting very excited about. The possible applications cut across almost every imaginable field, including sensor technology, ultra-secure communications, and high performance computing," said Paul Salvini, CEO of the Accelerator Centre. "Quantum computers will be able to solve problems that even today's most powerful computers cannot easily tackle. The potential impact on society is likely to be on a scale similar to what we have already seen in the era of digital computing."

> ### 'Quantum computers will be able to solve problems that even today's most powerful computers cannot easily tackle.'
> #### ~ Paul Salvini, CEO of the Accelerator Centre

The computing system we use today is digital – meaning that it uses a long string of "bits", which encode either a zero or a one to process information. Quantum computing, on the other hand, processes information using the laws of quantum mechanics. A quantum computer uses "qubits", and a qubit can be a zero or a one or both.

What that means is that – in theory – there would be exponentially more variables that the quantum computer can process than a conventional computer. And that means that successful advances in this new field could render all of the computers we use today obsolete – too slow, too cumbersome, too vulnerable to security breaches.

"Today we are harnessing the power of the smallest quanta of matter," said

Faculty member Michal Bajcsy adjusts the laser setups on an optics table at the Institute for Quantum Computing.

Laflamme. "As a result, technologies in computing, secure communications, medicine and beyond are emerging that will transform our lives. We already have spinoff technologies on the market and the future of quantum technologies is boundless."

There is a huge range of opinion on when universal quantum computing will be a reality. Optimists say it will be five to eight years, whereas skeptics question the entire viability of the concept. Be that as it may, there are already some startups developing around the field at the IQC. They include:

Universal Quantum Devices: Co-founded by Laflamme and Thomas Jennewein, UQD offers devices for the measurement of entangled photon sources – a key component of quantum information science.

Evolution Q: This is a consulting firm in cyber-security – it helps companies and government understand how they can maintain security in their networks should quantum computing become a reality.

High Q: This company is working on extremely sensitive sensors for material science and biochemistry.

And Neutron Optics: this company is building components for the next generation of neutron science.

Some of these companies are working on support for the quantum computing industry, while others are planning businesses using the quantum-based technology itself. They are all pioneers and expect to grow as activity in the field increases.

"From a commercialization point of view, these are still early days, but we already have several startup companies emerging out of research in this area," said Salvini. "We're also very fortunate to have the world-class Institute for Quantum Computing right here at the University of Waterloo." *

Improving the Digital Corridor

Tim Jackson believes a range of leaders need to come together to push for better transport links between Toronto and the Waterloo Region.

By Ellyn Winters-Robinson

Like many in the Waterloo Region, tech executive Tim Jackson knows that the commute to or from Toronto is not just a massive inconvenience. It's a deterrent to economic growth.

Back in 2007, when he was CFO of Pixstream, Jackson commuted daily from his Toronto home to Waterloo. Now, as EVP Corporate and Community Development and Lead Executive at the MaRS Centre for Impact Investing, he finds himself travelling the 401 once again, shuttling on Sundays and Thursdays between his family in Waterloo and his condo in Toronto.

He's not alone. An estimated 10,000 individuals now commute daily from the Greater Toronto Area to the Waterloo Region. Tens of thousands more head the other way.

"As early as 2000, when my family and I decided to relocate here to Waterloo, you could clearly see that a significant sector was being built, as the community transitioned from its traditional manufacturing and insurance roots into a centre for information and communications technology excellence," said Jackson in an interview. "Companies such as RIM (now BlackBerry), OpenText, Descartes and MKS were pioneering the way back then, and were the companies we all looked up to and admired. Alongside University of Waterloo, they were laying the groundwork for Waterloo Region to become what it is today -- an emerging hotbed for startups in North America and a magnet for global tech brands such as Google, Huawei, SAP, Shopify, Square and others."

But the Waterloo Region has not earned this reputation without growing pains. One problem is the 100-plus kilometres between Toronto and Kitchener-Waterloo, which on a good day translates into a typical four-hour round trip.

The individual frustrations aside, the lack of an efficient transportation connection is a business inhibitor, said Jackson.

"While Waterloo Region is highly regarded as a source for engineering talent, the community has always struggled to attract executives [like CEOs and COOs], as well as marketing and sales professionals. Companies in this area need this kind of business talent to grow to the next level. So the question we're wrestling with is, 'How do we better dock with Toronto and the resources it offers to expand our access to capital, talent and customers?'"

Jackson is one of the industry, academic and government leaders who are collaborating on a long-term strategy to solve this challenge. But, Jackson warned, the process will be far from easy and will demand a massive infrastructure overhaul.

"Let's look at what happened with Light Rail Transit in Waterloo Region. It took different groups coming together to speak with one voice and

Tim Jackson

advance the business case," he said. "That effort gave politicians the cover to make the hard decisions. We now need to do the same to move people through the digital corridor. It will require strong intestinal fortitude to make this kind of infrastructure investment, and so we need broad involvement. ... And it needs to happen all the way along the line, involving other municipalities that lie along the corridor including Milton, Brampton, Mississauga and so forth." Glimmers of early cooperation are there. University of Waterloo and University of Toronto recently joined together to publish an op-ed piece.

The Accelerator Centre, Communitech and MaRS are collaborating more, with the Waterloo organizations tapping into the significant health sciences, cleantech and fintech expertise in Toronto. Toronto and Waterloo are also cooperating on efforts to bring capital up from the U.S.

Jackson noted that the resolution to the transportation challenge is likely a decade or more away. "If the ultimate plan is an all-day train link, then these things always take longer than anyone would like. What we need to build is a long-term plan with milestones, and then figure out interim solutions, such as dedicated HOV [High-Occupancy Vehicle] lanes, or train/bus combinations to bridge us to our final destination."

The ultimate result would mean greater economic prosperity for Waterloo Region. "Even a few decades ago you could see that something extraordinary was happening here," said Jackson. "The more we can do to help entrepreneurship flourish and to attract capital, the more all of Canada benefits."

Ellyn Winters-Robinson is President and Chief Marketing Officer for Ignition Communications, a boutique marketing communications and PR firm based in Waterloo Region focused on the tech sector. She also serves as the in-house PR and communications mentor with the Waterloo Accelerator Centre. You can follow her on Twitter @ellynjane. ∗

Rev Revs Up

After a few alterations, the second cohort of the Communitech accelerator is reporting increases in sales.

By Peter Moreira

There is a massive display screen above Marylin Ma's desk in the Communitech Hub and all day, every day, it flashes the weekly sales goals of each team in the Rev accelerator.

It is a constant, Orwellian reminder that the cohort members have to get out and sell, and meet their weekly targets. And it is one reason that all four cohort members – BluePoint Technology, FunnelCake, Knowledgehook and Tallyfi – increased their sales in the first two months of the program, even though the holiday period is usually a dead season for sales.

"This new model is going extremely well," Ma, the Program Manager, said in an interview in January. "We're working with the companies religiously on their sales and marketing strategies."

Rev started early last year as a means of helping companies with revenues to scale. The thinking was that the Waterloo Region was really great at launching companies but needed to pay more attention to helping companies grow. So Rev is a program for companies with a product and that need to get serious about building scalable marketing and sales processes.

After the first cohort successfully concluded with about eight companies graduating, the organizers refined the program.

First, they staggered the intake. Four companies entered the six-month program in November, and another four entered the program in February. By staggering the program with a four-company intake at one time (rather than eight companies at once), Rev allows for more customized programming because each business is unique.

The second change is that the organizers intensified the executives-in-residence positions for the program, naming three of them for the four teams, and deepening their work with the companies.

"The mentors are almost acting as embedded executives," said Ma, adding that these experienced executives are diving into the companies' strengths and weaknesses, coming with them on sales calls and working side-by-side with the founders. "Being in the field allows the executives to gain insights directly from the customers. They're then better positioned to advise where the companies should go."

But for the most part, the goals of Rev haven't changed since the program started a year ago – to grow revenues and develop solid corporate organizations. When the four members of Cohort 2 pitch at Centre Stage (the name for Rev's demo day) in May, they will have to demonstrate how the sales and marketing engine they've built will help them achieve their future revenue targets. It's what Rev companies have to do to graduate.

"We've gone in since Day 1 with that goal," said Ma. "It's never easy but we have a lot of knowledge under our belt now to better guide our companies." *

more accurate data.

BluePoint Technology

BluePoint Technology has developed a hardware product, Kindera, that allows parents to supervise their home Internet from their smartphone. Kindera is a wireless router that parents install in their homes to manage their children's online activities through an easy-to-use web service.

Tallyfi

Tallyfi's hardware is the 21st Century equivalent of the bouncer's counter. It's a handheld wireless device that has big mechanical push buttons suited to bouncers' hands. It counts men and women both entering and leaving an establishment.

THE MEMBERS OF
COHORT 2

FunnelCake

FunnelCake provides B2B marketers with insights into marketing influences across their entire funnel. The company's software aggregates data from existing sales and marketing apps and helps marketers make decisions faster with

Knowledgehook

Knowledgehook's technology enhances math education through gamification. Its products are HomeWork, which gamifies individual lessons that teachers assign to students, and GameShow, which poses problems for students.

Five Ways to Improve your Corporate Governance

Advisory and corporate boards don't have to be complicated. *Gerard Buckley* **has a few simple suggestions on corporate structure to make your company more attractive to investors and acquirers.**

By Gerard Buckley

There is a considerable amount of writing dedicated to corporate governance for public companies. However, there is substantially less published about governance for private corporations considering the number of Canadian-controlled private corporations dwarf the number of Canadian public corporations traded on its various stock exchanges.

The entrepreneurs that start businesses in Canada are often mystified by the amount of jargon and best practices thrown at them under the guise of "corporate governance". In this article I will attempt to give the reader five suggestions that should be implemented if the founder of a tech growth company desires to scale and succeed.

To quote Richard Leblanc, a York University professor, "How a company is governed influences rights and relationships among organizational stakeholders, and ultimately how an organization is managed, and whether it succeeds or fails. Companies do not fail: boards do." Or to paraphrase this for a new entrepreneur, this structure gives investors, acquirers and other stakeholders the confidence that your company is well managed.

It is just not good enough for entrepreneurs to have an idea. They must develop a strategy and it is a board member's responsibility to ensure that the strategic direction is set. When there is a pivot from that strategy, there are good fundamental and business reasons for doing so. Although you will hear me say "strategy without passion or vision is useless," it is incumbent on a board to understand and measure a company's performance against the agreed strategy. In the early stages of a company, this process is

fluid. However, an investor will be motivated when they see achievement against those strategic goals.

In March 2014, BDC discovered, through its extensive research into small business governance in Canada, that only 6 percent of Canadian companies have advisory boards. In addition, 76 percent of companies had neither advisory boards nor boards of directors. However, where either advisory or corporate boards existed, gross revenue was 24 percent higher and productivity was 18 percent higher than those companies without boards. It can be concluded that private companies in Canada benefit from stronger corporate governance.

There are a number of relationships where there is a misalignment or imbalance of skills and experience that a founder will face in starting a business that will include accessing venture capital to being acquired. Putting in place sound governance structures will assist the entrepreneur, evening the playing field.

Although access to capital, talent, partners, and customers are an entrepreneur's most important considerations, having a strong corporate structure ensures confidence in management's ability to succeed. The following recommendations are the "low-hanging fruit" to enable the CEO of a growth company to implement several governance structures without getting overly complicated.

> **'Having a Lead Director or Non-Executive Chairperson is a key criterion for a company's governance structure.'**
>
> ~ Gerard Buckley

1   **Create an advisory board early in the company's growth cycle and set up a board structure just before the company raises a professional investment round.**

When creating an advisory board, you are hoping to recruit significant resources who provide support, knowledge, and access to unique professional networks. When raising a professional investment round,

governance, and board seats can be skewed. Not all board members have the same interest. For example, after a professional round it is often seen that an investor will sit on the board. However, their priorities are increasing capital, and eventually having a big payout, which are not always conducive with what's best for the company. An advisory board is a great sounding board for your strategy and business plan.

2 Appoint a Non-Executive Chair or Lead Director to lead the governance structure.

Having a Lead Director or Non-Executive Chairperson is a key criterion for a company's governance structure. The Chairperson will be a mentor for the CEO, providing guidance, structure, and support. Not only is the Lead Director a mentor to the CEO, but he or she is also a spokesperson for the board, whether it is an Advisory or Corporate Board. This person collects input from the board and from the senior management team for the CEO's annual review, and reports any relevant feedback to the CEO. He or she hosts an executive session without management at the end of the annual review meeting in order to gather feedback, and creates and runs the agenda of the board meeting. A Non-Executive Chair by and large allows the CEO to run the company and the Chair to manage the affairs of the board.

3 Structure the board of the company for the size you want to grow to (i.e. audit, compensation, risk and governance committees).

In order to ensure a solid governance practice in the future, different committees must be established early on in order for the committees to grow with the company. The objective is to allow the committees to function efficiently, all members to participate, and an appropriate level of diversity of experience and knowledge to ensure oversight of the company.

4 Ensure the company uses skills-based criteria to select board members.

It is important for your board to have a diverse skill base. Constructing a quality board is about the calibre and perspective of individual directors as well as the deliberate creation of a dynamic, and a chemistry that allows for the effective execution of corporate governance and strategic oversight. Building a skills matrix that is overlaid on management and board positions ensures the company has the necessary skills to scale, acquire clients, and manage its affairs.

5 Regularly communicate with shareholders through quarterly newsletter, AGM, etc.

Communication between shareholders and directors is strongly beneficial for both parties. Directors will benefit from hearing factual views from shareholders. Investors will benefit from hearing the board's philosophy and perspective related to certain governance and strategic issues, in turn justifying the board's decisions and actions.

Private corporations, such as Spartan Bioscience of Ottawa, have demonstrated that good governance practices – regular shareholder communication and appointment of a non-executive Chair have contributed in the recent strategic investment from Canon USA. "Good governance provides checks and balances for private companies. It's especially important for startups where experienced Board members can help young entrepreneurs avoid mistakes and capitalize on opportunities," said Paul Lem, M.D., CEO of Spartan Bioscience.

Research by BDC shows that companies with boards of advisors or directors produce 24 percent higher gross revenues than those without boards.

Said the Leading Canadian Bank Management Circular: "We believe good corporate governance is an essential foundation for strong performance and fundamental to our success. It provides proper oversight and accountability, strengthens internal and external relationships, builds trust with our stakeholders and promotes the long-term interests of shareholders." This is as true today for private corporations accessing capital as it is for the largest public corporations.

Governance is not meant to thwart innovation, but to allow it to thrive in an environment of trust and communication based on the strategic direction of the company.

Gerard Buckley is the founding partner of Jaguar Capital. In a career that has included work with Scotia Bank and Maple Leaf Angels, he has worked on M&A teams transacting more than $10 billion. He wrote this article with Harlen Suslik. ∗

Gerard Buckley

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