

Beyond the smartwatch: Canada finds its place in the Internet of Things

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John O'Rourke, president and CEO of Sigit Automation, at an oil well site near Calgary on May 21, 2015.

Todd Korol for The Globe and Mail

When a category five tornado ripped through Moore, Okla., on May 20, 2013, John O'Rourke's small crew of six workers found themselves in trouble.

Mr. O'Rourke runs Calgary-based Sigit Automation, a small company that does IT work on oil and gas wells. Communicating through regular channels was nearly impossible after local cell and phone networks were knocked out by the devastating twister that killed 24 people and injured another 350. Luckily, his two half-ton trucks were equipped with fleet tracking equipment from GEOTrac Systems Inc. GEOTrac's gear enables remote workers to send and receive text messages on a dashboard-mounted navigation device, through a satellite-powered

GPS network, meaning no cell signal is required. After a few frantic hours, Mr. O'Rourke's workers managed to get to safety.

It's a dramatic example of what the array of signals technology sometimes called the Internet of Things can do for businesses. Simply defined, IoT is about connecting objects, from trucks to refrigerators and hydro meters, to the Internet. Data gleaned from the sensors and systems applied to these objects can then be used to monitor, control or redesign business processes.

The projections are huge: Networking equipment titan Cisco Systems Inc. believes IoT represents a \$19-trillion (U.S.) global market and predicts that 50 billion devices will be connected to the Internet by 2020.

Most often Canadians hear about IoT in the context of wearable devices: things like the FitBit that promise to improve health and wellness, or more fully featured devices like Apple Watch and Google Glass that also extend such smartphone functions as messaging or Web searching. But while consumer technology is a hot area, IoT will likely have a greater impact in the less sexy parts of the economy: manufacturing, resources and energy, utilities and civic services.

Research from IDC Canada projects spending on IoT in Canada will reach as high as \$6.5-billion (Canadian) by 2018, up from \$2.8-billion in 2013. Tellingly, this year marked the research firm's first attempt to forecast a Canadian market for IoT, and it acknowledges a lack of historic comparison could skew the predictions.

"Canada is actually lagging in IoT growth, behind both the U.S. and Asia-Pacific," says Nigel Wallis, an IDC Canada Internet of Things analyst. "Everyone wants to be a fast follower, not a leader."

Mr. Wallis says Canada is among the world leaders in tele-health, which connects remote communities with medical experts at big-city hospitals like Toronto's Hospital for Sick Children or Mount Sinai. GEOTrac and other fleet services have captured about a third of the oil and gas market in Canada. But there are more examples where we lag behind: When it comes to factory automation, Germany, Japan and some parts of the United States are in the lead, and Western Europe is further advanced with intelligent monitoring of emergency response workers.

A recent IDC survey highlighted one of the key issues with IoT: acceptance. Mr. Wallis says about 15 per cent of Canadian executives surveyed understand the case for IoT, and another 20 per cent think it has the potential to transform their entire enterprise. However, 42 per cent remain on the fence, largely because they have no way to calculate return on investment; the solutions are too new or at least new to their industry.

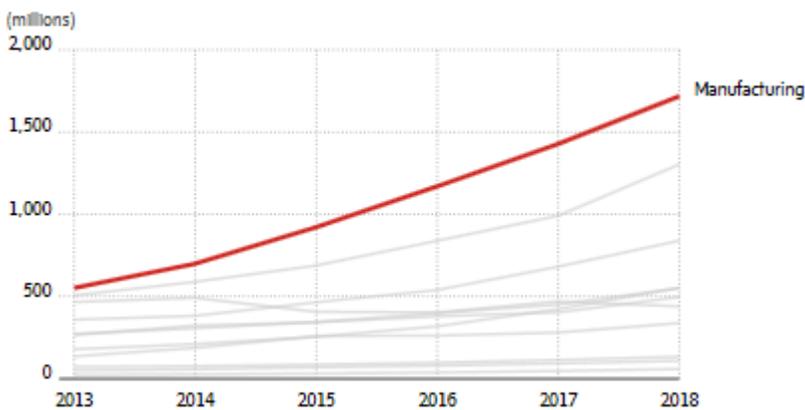
While those executives stay on the sidelines, the world's technology firms are sprinting to own the market. Global giants Cisco, GE, IBM and Intel are in competition with Canadian players like BlackBerry Inc., which unveiled its IoT solution market in January. The Waterloo, Ont.-based company pitches its security reputation as part of its platform for connected vehicles, as well as shipping and asset tracking. At the same time, a constellation of smaller startups are

racing to develop niche solutions for manufacturers, restaurateurs, building managers, utilities, oil drillers and smart homes.

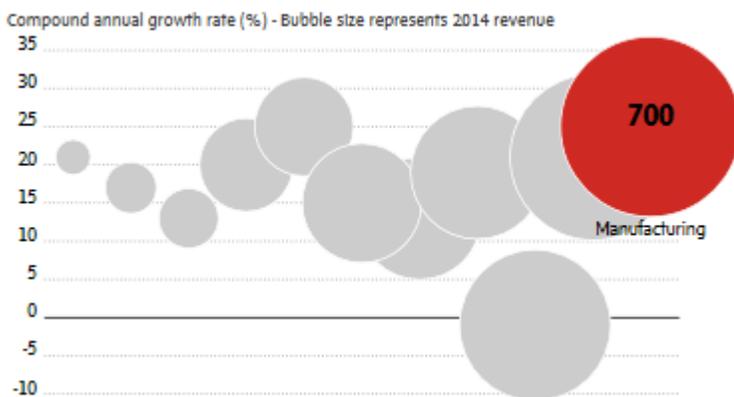
Mr. Wallis describes four feverishly expanding segments: makers and installers of physical sensors; connection providers (land line, wireless, telecoms, etc.); storage and security hardware and software (server farms, the cloud) to hold on to and encrypt all the collected data; and finally the data analysis software. Some companies do all that in one solution; others focus on one piece of the spectrum.

“There are Canadian companies in a whole bunch of those different plays,” he says. Knowing how many of them there are at any given moment is tracking a moving target: “Globally, every three weeks there’s either an acquisition or a new company started up.”

Canadian Internet of Things Revenue by Industry, 2013–2018



Canadian Internet of Things Market Size by Industry, 2014



THE GLOBE AND MAIL » SOURCE: IDC Canada, 2015

‘A massive shift’

Depending on your preference, you could call these systems IoT or Machine to Machine (M2M) or even The Internet of Everything (Cisco Systems’s twist on the slogan). The concept has been

around for decades: In one of the first examples, students at Carnegie Mellon connected a Coca-Cola machine to the Internet back in 1982 (so they could check if their soda would be properly chilled). But even as the concept turned into reality in the past decade, the predicted IoT boom has yet to reshape the economy.

“I don’t think there’s a lot of naysayers, but this is still a massive shift,” says Stephen Gardiner, managing director of Accenture Digital in Canada, which consults on and helps implement IoT systems. “The integration of sensors, devices, connectivity and analytics into a business process ... that’s very difficult for many of our clients to accomplish on their own.”

So far, the scale of the transformation required seems to be the most daunting feature of IoT for many Canadian companies.

One of Canada’s only IoT-focussed venture funds thinks the country has one unfair advantage over some of the global players: An advanced resource economy and vast geography offer a unique testing ground for Internet of Things companies.

Toronto’s McRock Capital only recently finished raising its first \$65-million but has been tracking about 350 Canadian companies working on IoT solutions. The firm focuses on industrial companies, where co-founder and managing partner Scott MacDonald believes Canadians are primed to excel.

“The next thing to do is to go into the field,” he says. “We understand manufacturing in this country, we have natural resources.... If we’re going to compete on a global stage, go after what we’re good at.”

According to Accenture’s research, companies like mining giant Rio Tinto that invest in IoT are seeing productivity increase by 20 times at major field sites. In some parts of Canada’s oil patch, the investments have already been made.

“We did IoT stuff before it was labelled that way, in oil and gas it was called SCADA [supervisory control and data acquisition],” says Yogi Schulz, a partner with Calgary-based Corvelle Consulting. “The Internet has contributed hugely to squeezing more value out of the SCADA data: 20 years ago it was hard to move that data around, the tools for analyzing were not that good. It was a nightmare.”

He says Canada’s oil sands are rich soil for IoT applications, estimating that 80 or 90 per cent of Steam Assisted Gravity Drainage drilling (SAGD) wells are connected so engineers can get real-time temperature and pressure readings.

“When you have better data,” Mr. Schulz says, “you can produce more oil.”

Finding efficiencies

IDC predicts that in Canada the number of devices connected to IoT solutions will grow from 28 million “units” in 2013 to 114 million by 2018 (that estimate excludes such consumer wearable devices as smartwatches).

“Digital is the single biggest growth leader that Accenture has,” says Mr. Gardiner. “Roughly three-quarters of large companies are investing 20 per cent [of their research and development spending] on big data and analytics, which IoT is driving.”

But at this early stage of Canadian IoT entrepreneurship, McRock Capital’s Mr. MacDonald says that while a wide variety of companies are in the game, few big players have emerged. “I haven’t seen any that are \$20-million [in revenue] yet, but there’s a bunch of them that are sort of \$1-million to \$8-million in revenue,” he says.

Several revenue-positive Canadian IoT startups are targeting industrial customers, however. Among them is Bit Stew Systems Inc., which just raised \$17.2-million in financing from GE Ventures on May 12.

According to Bit Stew CEO Kevin Collins, IoT is “a little easier to explain to industrial customers, because they are suffering the pain right now.” Global oil prices hit a six-year low in March, and difficult times have made companies working in the sector hungry to find efficiencies and eager to experiment with technology that can help their bottom lines, Mr. Collins said.

Mr. Schulz agreed, adding production engineers dealing with the oil shock are willing to try just about anything to improve margins. “Everybody is thinking about this all day, it’s a myopic focus.”

Bit Stew software can analyze a volume of data that would take an army of humans to monitor. Right now the company monitors 50 million connected devices around the world, but its systems were built to process data from one billion IoT sensors.

That allows a big utility customer – such as BC Hydro – to monitor voltage both at the substation and also at the 3,000 smart meters down the line. Noticing a pattern of fluctuations that would indicate the meter is about to fail saves time and money, Mr. Collins says. He estimates his software added \$15-million to \$20-million a year in savings to BC Hydro’s smart metering program that began in 2011, which is estimated to have saved the utility a total of \$80-million a year.

BC Hydro declined to comment on its use of the technology.

One of McRock’s first investments was a \$3-million deal in February with Moncton, N.B.-based RtTech Software, which analyzes sensors on manufacturing equipment to pinpoint excess energy use or help predict equipment failure. The company has clients in more than a dozen countries.

“There’s no better validation than the customer wants the product,” Mr. MacDonald says.

Falling costs

One of the ways executives might discover an IoT solution for their business is through a sales rep from one of Canada’s telecom providers.

All of Canada’s telecoms have to look at investing in IoT services as a defensive move, according to Mr. Wallis. “Take something like smart homes – thermostats, front door locks, smart TVs – if [the telcos] are not the one providing the connection layer to those homeowners they might get pushed out over time from something that’s been a source of revenues for them.”

Bell Mobility offers such IoT services as electronic signage, fleet and asset tracking and vehicle telematics (like an airline’s black box data recorder, but for cars), while Rogers Communications Inc. has experimented with mobile couponing for retailers and grew its wireless IoT/M2M connections by 24 per cent in 2014.

In December, 2014, Telus Corp. became the first major Canadian telecom company to open up an IoT marketplace, an app store-like collection that has grown to 62 services from at least 22 providers (some services are subcontracted out). Shawn Sanderson, vice-president of IoT solutions at Telus, is pitching IoT as a better, smarter way to do business and has deployed the company’s army of sales reps to offer IoT solutions to their existing land-line and wireless business clients.

Innovation can be found in even more unlikely places. In most restaurants, health and safety regulations require a manual check of all the temperatures of the ovens, deep fryers, coolers and refrigerators. That means an employee, three times a day, has to walk around the restaurant making paper records.

As a pilot project, Kitchener, Ont.-based BlueRover Inc. installed a system of about 50 IoT sensors to monitor all those devices in a Boston Pizza restaurant in Woodstock, Ont. The sensors record data all day, and can let you know in real time if a freezer is getting too warm. And they offer safety benefits. “You don’t have to stick your arm inside the pizza oven to get a temperature recording,” says CEO Loreto Saccucci. Potentially, the system can save a couple of worker hours a day and reduce human error on logs, benefits that would add up rapidly if Boston Pizza implements the technology across its 350 stores, as BlueRover hopes it will.

Founded in 2007, BlueRover got started because it saw an opportunity in the stringent tracking requirements of then-new Safe Food for Canadians Act, which forced shippers of food to improve inspection and monitoring capacity. One of BlueRover’s clients includes Sysco Corp., the food logistics giant.

But what happened with another client, Brinks, is an example of the technological alchemy that can come with upgrading a traditional business with IoT sensors. Everyone knows Brinks Inc. picks up cash, coins and gold in its armoured vehicles. But after adding BlueRover tech to track

its fleet of trucks, it realized the new systems could also detect humidity and temperature inside the rolling safes, allowing the company to move into a new business: shipping highly sensitive goods like museum pieces and art as well as pharmaceuticals. “They had the perfect story,” says Mr. Saccucci. “Their vehicles are safe.”

One big driver in the growth of IoT systems has been falling costs, not just of connectivity, but in sensors and the costs of operating data collecting and analyzing servers.

“Three years ago we looked at the cost of compute power, and [a startup] couldn’t afford to buy that IT infrastructure,” says McRock’s Mr. Macdonald. “Now that you can rent the cloud from AWS [Amazon Web Services] it becomes very cheap to build your company. The cost of sensors are dropping dramatically, and aggregation of data is becoming cheap, with [Microsoft software] Hadoop and other things.”

Accenture research supports that observation. Mr. Gardiner estimates that in the last decade sensor costs have fallen by half while bandwidth costs are 40 times cheaper and cloud computing is 60 times cheaper.

Where IDC sees costs going back up is in the management of the massive pool of data the growing number of sensors will generate. Mr. Wallis’s survey suggests in the next three years it will start causing issues for corporate networks: “Sensor-based solutions typically have very small ‘chunks’ of data, but the issue for network administrators is that IoT, by its nature, tends toward ‘chattiness.’”

Of course, those issues will be just another market opportunity for an innovator with a solution to all the chatter.

Five Canadian ‘Internet of Things’ solutions



No. 1

Blue Rover

Restaurants are packed with coolers, freezers, ovens and fryers that need to be kept at the right temperatures to keep customers and workers safe. Kitchener, Ont.-based BlueRover provides sensors that monitor dozens of device, and software to see all that data in one place. A Boston Pizza franchise is giving the technology a try.

No. 2

GeoTRAC

You sent that truck out at 2 p.m.: How long did it take to get to its destination? Any stops? Any speeding? Was there a faster route? Did it save fuel? Calgary-based GeoTRAC's fleet tracking and asset management services improve safety and efficiency using GPS technology.

No. 3

Miovision

How busy is that intersection? That road? Cities need data to know if their traffic management systems are working, and Kitchener's Miovision collects that data with cameras and software, instead of summer students standing outside with clipboards and clickers.

No. 4

RtTech

Machines breaking down is a fact of factory automation. Moncton, N.B.'s RtTech uses sensors to tell if a machine is about to conk out, allowing managers to make plans in advance to replace or repair and avoid lengthy downtimes.

No. 5

SensorSuite

Is your boiler too hot? Are you using too much electricity? It's something that property managers are always wondering. Mississauga-based SensorSuite monitors in real-time and provides data analysis to help Canada's multi-unit buildings get more energy efficient.

Revvng up

When the right solution arrives, IoT can reshape an industry practically overnight. In 2013, Desjardins introduced a car insurance plan called Ajusto that installed an IoT telematic device that tracked a driver's habits.

It was designed as a way to offer discounts to good drivers, but there were fears in the industry that consumers would balk at the privacy implications of having everything from speed, braking intensity and travel times and distances reported to the insurance company. According to Accenture's Mr. Gardiner, something like 40 per cent of Desjardins new customers signed up for Ajusto in the first year, and starting in 2014 many of Canada's auto insurers – including the Co-operators, Allstate and Aviva – rushed to offer similar tracking programs.

The data a company collects can also be used to build a new business. For instance, some 2,000 companies have put GeoTRAC gear in 275,000 trucks, and the company has mapped more than 600,000 kilometres of private lease roads for the oil and gas industry, a crucial data set not found

on Google or other public maps. This accumulation has allowed the company to develop “journey management” software to help route planning that accounts for truck height restrictions and areas with chemical transport rules.

And a simple thing, like tracking trucks, can help a company save money. Mr. O’Rourke’s business, Sigit Automation, had to become even more cost-conscious as the price of oil fell rapidly in recent months; while he managed 85 people during the oil boom, now he’s down to just 12 drivers. In the past, workers often treated company vehicles as if they were rentals, making personal stops, going too fast or failing to report accidents. With sensors, monitoring has saved the company money on damages, gas, maintenance, idle times and mileage – all for about \$40 a month per vehicle, Mr. O’Rourke says.

“We’d hit a lot of deer,” he explains. “You can take a deer off a fender and it’s \$4,000 damage, but your truck’s out of commission for two months while it’s at the body shop.” The solution, he says, was in telling drivers to slow down and give themselves time to avoid a collision. Once drivers might have ignored that advice, but now he can ensure they follow it thanks to GEOTrac’s reporting software.

“Touch wood we haven’t hit a deer probably in three or four years,” he says. “We used to hit about three a year.”

Canada’s sweet spot

One final point that technology companies across Canada often speak to is the availability and quality of local technical and engineering talent, especially compared with the superheated labour market of Silicon Valley.

Bit Stew’s Mr. Collins spent 10 years in Silicon Valley, and 30 years in the industry, working on everything from encryption to network engineering. He started his company in California, but returned to his hometown Vancouver in part because this is where he could find employees that understand manufacturing, utilities and mining and resource industries.

“You’re accessing a talent pool that understand the problem space quite well,” Mr. Collins says. “They are not all mathematicians, but they know power engineering and they can apply the technology.”

Mr. MacDonald’s investment philosophy tells him that given the smaller pool of available private venture capital, Canadian investments will go much further in areas where we have some unique insight.

Not that the returns on investment are necessarily worse: The golden example of McRock’s investment thesis is RuggedCom Inc., which built outdoor network equipment designed to withstand both brutal Canadian winters and blazing hot summers. The venture funding arm of Ontario Power Generation chipped in about \$3-million in a funding round while Mr. MacDonald

was working there in the mid-2000s. By 2012, it was recording \$110-million in annual sales before it was bought by global giant Siemens for \$440-million.

If Silicon Valley investors spend billions on IoT tech primarily as a way to sell consumer goods like wearable tech and remote-operated coffee machines, Mr. Collins' vision for Canada's IoT sector is more in line with the engineers at Cisco or GE who collect streams of advanced manufacturing data that can save billions in preventative maintenance and equipment replacement costs.

"It's unsexy," he says, even though his private company did double-digit millions in revenue last year.

The Industrial Internet of Things doesn't have quite the same ringing promise of utopian smart cities and better living through biometric data analysis. But turning data into operational advantages in the country's key industries will give Canada a leg up in the burgeoning connected economy.

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