Leading in a Digital World:

Canada is Winning the Digital Race

But we are early in the race and the pace is about to increase

A Discussion of the Impact of Digital Technology on Public Policy

Tom Jenkins, Ivey – Thomas d'Aquino Lecture on Leadership Ottawa, October 19, 2016

Bon soir a tous.

Une grande merci à son excellence pour ces mots gentils.

il a été un grand plaisir de travailler avec le gouverneur général sur le programme de prix de l'innovation et le livre eingénieu, un histoire de l'innovation de notre payee.

I would also like to take a moment to thank our sponsors this evening, the Ivey School as well as Tom d'Aquino, a great Canadian from whom I have learned a lot about public policy.

Governor General, Madame Justice, Ministers, Distinguished Guests, Ladies and Gentlemen,

Congratulations to everyone here. No one will question your intelligence after tonight. After all, you chose to be here instead of watching the Presidential debate!

My topic tonight is about leadership in the digital world.

Canada is winning the digital race. Although we are concerned about our productivity and the ability of our largest corporations to remain competitive, we are actually doing very well. Over the past few years, Canada has been recognized for it's digital capacity. The Waterloo – Toronto corridor is recognized as the second largest ICT cluster in North America and one of the top ten places in the world to start a company. That's right. We are the most significant alternative to Silicon Valley. That is not a very "Canadian" assertion, yet the evidence is there.   And don't take my word for it. All you have to do is read the headlines regarding major multinationals choosing to make Canada a critical part of their global footprint.   The

Prime Minister welcome Thomson Reuters back home to Toronto just last week and earlier this year General Motors, CISCO, Microsoft and Google have all made major investments in the GTA

While that is fine for attracting Multinationals, we are rightly concerned about our ability to maintain our domestic corporations and our technology edge as we see some of our brightest stars of previous technology eras dim. Yet, we may not recognize that this is just part of a natural life cycle known as "creative destruction" and we should take note of the ascending stars of the latest technologies. A quick review of the TSX IT sector chart gives us hope for the future when we find CGI, a startup from Quebec, has more than 60,000 IT professionals and is one of the largest firms in the world that regularly deploys digital solutions in every country. Open Text, a University of Waterloo startup that I have the privilege to be Chair and former CEO, is now one of the largest software

companies in the world with almost 1 billion users.   And there are more. Constellation, Enghouse, Descartes, Shopify, Hootsuite are also on the TSX and the Communitech, DMZ and MARS incubators have thousands more startups coming up. For a country that is 1/10 the size of the United States, that is quite an achievement. We are not exactly hewers of wood anymore!

As a country, Canada is winning the digital race but we need to do more.

Remember the lesson of the crow and the rabbit!

A crow was sitting on a tree, doing nothing all day. A small rabbit saw the crow, and asked him, "Can I also sit like you and do nothing all day long?

The crow answered: "Sure, why not. So, the rabbit sat on the ground below the crow, and rested. All of a sudden, a fox appeared, jumped on the rabbit and ate it.

The Lesson: To be sitting and doing nothing, you must be sitting very, very high up.

All of us in this room think deeply about public policy and its ability to be a force for good in our society. We have the good fortune to be standing on the shoulders of great policy thinkers and implementers that have come before us. Last week, here in Ottawa, we discussed many of Canada's economic challenges at the Growth Summit. We may not know all of the answers to these challenges but we at least know about them and have national discussions. We are aware.

But Digital is different. We do not debate digital policy in depth. We are not aware.

Yet, we know it is important. We have all seen the impact of digital everywhere in our society driving great productivity gains and providing society with new ways of

shopping, tele-medicine and entertainment. We generally regard digitization as a force for good. But is it?

Have we really discussed the public policy challenges presented by an "always on" world that continues to evolve rapidly?   Digital has transformed our lives mostly for the better. But the challenges of Digital may become profound in the long term.

What happens in a society where most people no longer work for value?

How do we achieve inclusive growth then?

Some question whether our very survival as a race might be eclipsed by a new race of machines that we ourselves created. That is profound. Yet we rarely discuss this in policy development. Perhaps it is due to lack of knowledge or a desire to avoid adding complexity onto already tough issues. But it is coming. Fast. And that will be my essential point this evening. We are doing a lot in Canada

to respond to digital both in the public and private sector. We have created some of the largest digital companies in the world and we continue to create them. But are we doing enough?

But do we really understand what is happening to our society both here in Canada and throughout the world?

Do we understand the implications of the Fourth Industrial Revolution that is now upon us?

For example, the brain of a millennial is physiologically different than that of their parents. Something that once took tens of thousands of years to shape has been modified in one generation. That has never happened before at this rate. That has implications. For example, our education system is set up for a different type of human brain.   Let's consider these implications in terms of the major public policy issues that face Canada at the moment:

1. PRODUCTIVITY & INNOVATION

2. INFRASTRUCTURE

3. INFORMATION AND SECURITY

4. GOVERNANCE & MACHINES

5. TALENT & EDUCATION

PRODUCTIVITY & INNOVATION

The world is in a global race of innovation.   With low cost global communications we identified the concept of "The world is flat" and this has reshaped the world in less than 20 years. This year at Davos and the World Economic Forum, we heard that the next technology wave can be considered as the fourth industrial revolution. It is estimated that we will grow from 3 billion connected people to 1 trillion connected devices within 10 years with a combined computing ability that will surpass the human brain within 5 years.   The rise of the analytics capacity has

another possible and profound short-term economic impact of the Fourth Industrial Revolution: massive unemployment in some sectors. If you are a truck driver, a taxi driver, an uber driver, even a banker, an accountant, a lawyer, all of these jobs may be substantially eliminated in the next 10 years. We are now automating so many jobs that there is now a race between the old ones being replaced by machines and new ones being created by new capabilities. So far, humanity has been able to take advantage of these productivity improvements and create better quality of life and standard of living.

But something is changing.

Our ability to create those productivity improvements and our ability to benefit society has noticeably started to slow down and in some cases reverse. Why? It may be that in this next Fourth Industrial Revolution is that the machines are thinking so fast they are moving beyond our capacity

to keep pace and thus we are losing the race to remain relevant. This is the opposite of the Model T Ford effect of the last century.

If you recall, Henry Ford made history by selling a low cost automobile such as the Model T Ford that would be bought by the very workers that were building them and this created a virtuous circle that lifted the quality of life for the middle class in America and this pattern was soon repeated elsewhere.

So, the overall innovation impact is still progressing at a rapid pace but there may be an issue with the human participation as we reach the "singularity" as envisioned by Ray Kurzweil. Is this a foreshadowing of what he predicts about humans and their relationship with the machines? He is concerned that the Singularity may not end well for humanity. He believes that the moment the machines have just 1% faster processing capacity than our own brain

the opportunity to govern the machines will be past us. That is a profound thought.

The problem with digitization in its current form is that we are not replacing the lost jobs fast enough since we are not organized to retrain our human employees on the scale and the speed required. We need to think about that more deeply while we still have time. You may say to yourself that this has happened before. So what is new here? The machines are getting better – much better – and our rationale for keeping ahead of them through education, training and our innate creativity may not be working as well as it did when we started automating blue collar jobs in manufacturing 25 years ago. The next 10 years and it might even be the next 5 years may see enormous -upheaval in white-collar jobs due to the automation of analytics alone. The so called Big Data Analytics trend. Yes, it is great for business and government but it may not end so well for people that

went to university on the promise of earning a life long career as a professional in accounting, finance or the law. Or even education or medicine. Anything that requires deductive reasoning, a machine can do better.

For context, it is worthwhile to note the trend in the automation of humans:

1) First, it was repetitive physical motions that were used to create our mass assembly of things.
2) Second, it is now the analytic capacity to make deductions from data presented and to make decisions.
3) Third, is our ability to create new concepts from data – in other words turn data into meaning.   That might lead machines to be sentient beings.

Our creativity is currently the last vestige for humans contributing to the overall productivity of society. We cannot just be consumers of the goods and services that

machines produce but rather we must also produce something or the virtuous circle first created by Henry Ford as the economic pillar of our modern society will be forever broken. This has profound implications for social order across the world. Our modern economics will require a re-think in terms of the distribution of wealth and the balance and value of work in our consumer society.

INFRASTRUCTURE

Let's consider another major public policy issue. Today, there is a lot of talk about infrastructure and that means better and safer roads, railways, bridges and so on. We need to revitalize this physical infrastructure to move people and goods to market and so on. This is a well known method for building our society and we have a great history at doing this in Canada. But, have we modeled the impact of the sharing economy and the

driverless automobile? This may have a dramatic

reduction on our need for infrastructure as we may take

current road utilization and quadruple it thereby creating a

"holiday" for road building for decades right at the same

time that we seek to build it out. That could result in a

fiscal disaster for the country. You may think that this is

far fetched but it may not be. Software regularly

repurposes hardware to create more efficiencies.

Consider what has happened in the IT world over the past

decade. Computer hardware purchases have plunged over

the past 10 years since software was designed to link all

computers together in a virtual mainframe.   Your email

server is no longer dedicated to just doing email. At night,

it is now used to run batch programs for accounting and so

on. The machine infrastructure has massively increased its

utilization thereby reducing the need to expand it. That is

the digital impact of sharing. So as we use more of uber

and airbnb type things we may find that we have a radical

change in our demand of infrastructure. We should at least think about this before we spend $1 Trillion over the next decade.

Instead, the very best societies may wish to consider the virtual infrastructure that we will need for the Fourth Industrial Revolution. We know for instance that if you have a 3D printer and an internet connection, you don't need to move goods around since this will be on demand and you don't need to have an elaborate warehousing and transportation system. We also know that we may have drones that will effectively fly your product to your door or a self-driven truck will deliver them.

The world will be a different place.

Let's think about the infrastructure that this new digital world would need and look forward and not backward. It's actually very simple. It needs communications with a LOT of bandwidth.

So, let's think about infrastructure, but this time digital infrastructure. Let me give you an example of how another nation state approaches this issue. A few years ago, I was in a meeting between Germany and Canada and we were discussing our approach to digital. The Canadians explained how we had a big country and how we were working diligently to create a 5 MB communications network for the country at the cost of $100 millions of dollars. The Germans politely asked why we had chosen 5 MB as our bandwidth target and we told them that we had calculated that this is what you needed to livestream something from Netflix on a TV. Later in the conversation, we asked the Germans what their target was and they said it was 1 GB and we asked why they would do that and how much money it would cost. They answered right away in terms of budget, which was over $10 B, and schedule which would be five years. They then told us that the reason why they were making such an expenditure is that

they had no choice if they were going to keep up with the rest of the world and stay within the global value chain. You see, a small town in Baden Wurttemberg needs to be able to receive a 3D printing file from an equivalent small town in Japan to remain competitive and that requires the latest in computers, software, and 3D printers. Note the difference in approach here.

Let's put the role of the state into context from previous paradigms. In the old days, a corporation building a manufacturing plant would provide the building itself, the tool and die machines, and the parking lot for the workers. The government would build the roads and the telephone lines and the power lines all coming into the plant. In the same way, we must realize that digital world requires digital roads and that requires major shifts in public policy and that these shifts are broad in their implications.   A few weeks ago, I was at a consumer trends presentation and the speaker noted that Mazlov's Hierarchy of Needs has

been changed for Millennials. Do you remember how the basic necessities of food and shelter formed the base of the pyramid? That is no longer considered the base. Guess what is? WIFI. That's right. Millennials now consider WIFI to be an essential need before anything else.

The Millennials need WIFI for the connection to the other part of their brain: the Internet.

So, communications is at the core of digital infrastructure and if we define our needs solely as consumers, we are then hastening our demise as producers. We must keep up or be rendered non-competitive and thus irrelevant in the global economy.   We need to imagine the future digital world when we plan but the conclusion is simple: low cost high bandwidth is an essential public good for any future society. Consider the impact of electricity rates and the productivity of manufacturers. They are related. So if we draw a parallel with other utilities that we deem public

goods we must recognize that digital infrastructure is a key factor in our future productivity as a nation.

INFORMATION & SECURITY

Let's talk about information now. With 3D printing and Genomics, pretty much everything in the physical world can be reduced to bits and bytes. That is profound. On the one hand, many organizations view data as the new "oil" in which they can use analytics to mine customer and contextual data to create new business models and competitive advantage. Amazon is a great example of the digital disruption that is occurring not just in retail but also in all industries.   On the other hand, as Sony, Google and Facebook and others have experienced, data can also be "asbestos" that creates a crisis of trust with business relationships. The situation with Snowden or the hacking incident with Sony are both examples of data being used for a different purpose than the original intent. Digital

security matters. The bank with the vault full of gold bullion is so passe. It is the computer with the database full of information that is the real value now.   As such, data becomes a new form of "global currency" and finds itself becoming an extension of Intellectual Property law.

The major issue for organizations that engage in data collection is how to walk the fine line between privacy needs and security needs and still generate a compelling and competitive offering that drives value and wealth creation.   This has ramifications for organizations that operate across borders of any type, as most are unprepared for the tangential issues that await them.

It is clear from the various events of the past few years, regulatory bodies and the nation states that they report to are identifying data as a "sovereignty issue". Organizations that pursue an internet data based business model with operations in jurisdictions throughout the

world may find that they need to develop a government policy strategy and a quick reaction capacity alongside their business and IT strategy. Otherwise, they run the risk of reputational damage at minimum and destruction of business models and the collapse of wealth creation at worst. Canada needs to think more deeply about this issue. Our very sovereignty depends on it.

GOVERNANCE & THE MACHINES

Despite the fast pace and dramatic impact of the past few years, one can only foresee that the pace and impact are about to substantially increase and perhaps occur as a step function rather than a geometric progression. This is due to the shift from human intervened data collection and analysis to machine generated collection (Vitality, Apple Watch, Internet of Things) and machine generated analysis (Robo Advisor, high frequency trading). This shift has already happened in other industries. But we are moving

from 5 Billion connected people to 50 Billion connected devices in a few years and then 1 Trillion machines in the next 10 years. That is a stunning number. The world is forever changed.

Many of you in this audience are now faced with leading the first generation of digital natives. They are the kids that grew up with the Internet similar to the way my generation grew up first with the TV. As many parents will tell you, these kids appear to not be able to remember anything and also appear to be doing too many things at once. Guess what? Those observations are correct and they are supported by research that has been done into their brains. In California, researchers have been conducting CAT scans of digital native brains and they have found that all three areas of the brain associated with memory function are greatly diminished while the area of the brain that "networks" between the right and left sphere, the Corpus Callosum is in fact enlarged. So, you

are not imagining these traits, they are real and they are supported by actual physiological changes to the brain in digital natives.

Let's consider this for a minute. It is a substantial fact. After hundreds of thousands of years of brain development over tens of thousands of generations, in one generation we have made a massive impact on brain function. That is an acceleration like we have never seen before.

What is behind this? Well, it's the impact of machines. Smartphones are just personal machines. The brain of a digital native is just efficiently handing over the memory function to a machine and concentrating on the integration of information rather than just the storage of data. This has a huge impact on how we train and lead our next generation as they are not like us. If we force them to

memorize things as we did, they will soon quit and go to somewhere more suited for their abilities.

The innovation of machines also has an impact on governance. Remember the movie Terminator? The Cyberdine Systems machine became self-aware and then destroyed humans in order to protect itself. Sound farfetched? Think about what happened in the financial industry five years ago. It had a "flash crash". This happened one day when the nanosecond trading algorithms on bank computers decided that the market would go to zero and they all started automatically selling. The problem with machines is that they can operate much faster than we can. A nano second trade can make 1 billion trades within one second. We humans are lucky if we can react within one second to a complex situation. Think about that. 1 billion trades for a human is the equivalent of 32 years!! So a group of machines can do 32 years of trading before we humans are even aware of what

they are doing. We have to think long and hard about the governance of that. Think of Afghanistan the amount of machines that we used (drones, robots, etc.) when we entered that war compared to ten years later when we exited. Remember, think about pace. Machine to Machine conflicts will soon be upon us and we as senior leaders need to think about this and how people will lead and interact with machines. In a competitive situation such as a war we do not have much time when it happens so we have to be prepared before. Things can get out of hand very quickly with terrible consequences.

TALENT & EDUCATION

Let's start with a simple comparison: A teenager in Africa with a smartphone and the Internet has more information at their fingertips than the President of the United States did 15 years ago. That is profound. The millennials or digital natives are part of a generation that was born with

an "extended brain" called the Internet. Now we know

why many of them have such difficulty with their

education as the courses they take rely on human memory

without machines. The education system was developed

for our brain and not theirs! How disappointing that must

be for a digital native to realize, as they get older. There

wasn't anything "wrong" with them they were just

different and the system had not anticipated their lack of

capability nor their enhancements. Unfortunately, this

first generation of Digital Natives will just have to endure

this! They are the digital pioneers and set the tone for all

that follow. The Millennials must drive the change in the

education system. As the Millennials go through their

career this will happen again and again to them. The

Millennials are the signpost generation that will change

everything from the past including how we learn. That is

why they are one of the most important generations in the

history of human evolution. Probably on a scale with the

first humans that walked out of Africa.   The "wearable" internet devices will get smaller to the point where they will be implanted into them and their idea of privacy, consciousness and social media will evolve in a way that none of us can predict. It will happen in their lifetime. That will have a profound impact on society and our evolution as human beings.

Time is getting short to react.

This has been a profound discussion about the impact of digital on our society but there is one thing more. It will happen faster than any one of us can imagine sitting here today.

The PACE of Innovation is very deceiving. Most of believe that growth and change occurs in a linear fashion. So what happened in the last 5 years will be about the same as what will happen in the next 5 years and so on.   In fact, it does not. Innovation is not linear.   This is a difficult

concept for all of us since our brains have been formed to understand a linear problem throughout most of our evolution. For hundreds of thousands of years, from caveman to hunters in the wilderness we have been rewarded for solving a linear problem. If we watched an animal running in the forest we timed our arrow or our spear to intercept the animal so that we could bring home food to eat. Those that solved the problem survived and those that didn't starved. Our brains have been trained to think linear.

Studies show that the pace of innovation is geometric. Think Moore's Law.   In other words instead of 1,2,3,4 we are in fact increasing the change in the way we do things as 2,4,8,16, and so on. You get the idea. We don't notice change when it is early such as 1,2,3,4 but what about later when instead of step 8 on the linear scale we are now at 512 on the geometric scale we are about to be surprised

by a 100X more change! This is very difficult to comprehend yet the evidence is all around us.

How many people here know how long we have been using iPads? Any guess? Well, less than 6 years. The same for smartphones and so on. Each wave has an accelerated influence both in terms of adoption time and the impact on society. We are truly standing on the shoulders of those that came before us. Ray Kurzweil wrote about this when he describes the "singularity" and the amazing impact of the pace of change as it rises in this geometric progression towards the asymptote or the singularity.   As a senior leader you MUST NOT underestimate the impact of the PACE.   Leaders must anticipate.

SUMMARY

We started this conversation by asking the questions:

- What are the implications of this brave new DIGITAL world and how can we anticipate this with sound public policy?

- How do we educate and train our young if they have a substantially different brain than the previous 100 generations before?

- How do we employ our people if most of the jobs (blue collar and now white collar) we have educated them for are being done better by a machine?

- How do we govern our nation states and indeed the world if we are reducing everything to a digital byte that is transmitted faster than we can react as humans?

Yet, we as humans have met these challenges before. We must be aware that a machine has had 1 million chances at thinking about something compared to each single chance we have. Our public policy must move from specific rule of

governance to principles that are technology and time invariant.

The principles matter and they do stand the test of time.

Let's consider the biggest impacts of the digital world on our society then let's think about what we can do in public policy to apply our Canadian beliefs and principles in such a fashion that we can lead the world in creating a better place to live.

The Millennial generation has an opportunity to define the way we as human beings interact with digital machines for generations to come. They may also run the risk of being the last generation of human beings that had a choice in this regard. Which one will it be?

CONCLUSION

What are the opportunities for Canada?

Although the digital agenda is daunting, we have many advantages as a country and we can lead the world with a nimble digital strategy for Canada.

If we anticipate the digital disruptions and develop our strategy and implement effectively, we could imagine a Canada that takes advantage of its high education investment and it's multi-culturalism to punch above our weight on the world stage. This can bring both social as well as economic benefits. We really need to think through our investments as a country and shift them from the old paradigms. If we think about what has happened in transportation or in financial services, they are being transformed by computer scientists who are brand new to those sectors. So we should think about education and healthcare in the same way: the next breakthroughs in those areas are probably coming from computer scientists. We need to create an advantage out of our digital

infrastructure and we must align ourselves using "small country" methods. I have spent most of my life outside of Canada yet I have often marveled at the ability of Canadians to collaborate. We are very good at this. We must think as a small country with principle based policies and laws as opposed to large country thinking with rigid rules that are necessary when dealing with hundreds of millions of people. We can afford to harness the "creative chaos" that comes with the digital world to our advantage simply due to our relatively smaller size.

For example, the Business Higher Education Roundtable or BHER, has more than 2/3 of all Canadian GDP and more than 80% of all the Post Secondary Education students represented by the 37 members of the roundtable that regularly meet in a single room. We can rapidly implement training and education policy. We can change faster than others because we are small and nimble.

Despite having a small population less than 1/10th of North American, we actually have the second largest concentration of digital expertise in North America in the Waterloo-Toronto corridor. We are the de facto alternative for Silicon Valley. We have a strong history of creating global technology companies. Our private sector has digital capacity. We know that public sector across Canada have made substantial investments in digital technology. But, are we going fast enough and keeping pace with the changes that are coming? If we do not develop digital capacity, how is government able to govern and remain relevant to society? We have challenges in education, healthcare that no longer exist in the private sector. The public sector is behind.

I would suggest that we do two things as a country:

1. First, we create a digital department of the federal government and encourage the provinces to do the

same – complete with a digital minister (a Millennial would be great) that has a seat at the cabinet table.

2. Second, we should give this department a mandate to review all major pieces of legislation to provide a broad update of how government operates internally and how it provides service delivery to society.

If we had this digital department and we connected it to the Waterloo – Toronto corridor with joint investments and partnerships and we staffed the department with both veterans of government as well as brand new millennials we may find benefit from three areas:

1. Our millennials that are getting frustrated and quitting the public service will have somewhere to go before they quit to help them cope with the deceleration that they experience when they join the public service. Consumer tools are better than internal government tools!

2. The second area of benefit is with our senior public servants at the federal, provincial and municipal levels. They are getting very limited advice since our digital capacity is sub scale in the government. We can accelerate our investments and our digital transformation if we had a critical mass of people dedicated to digital. A dedicated department would attract the best and brightest in digital since they would see a clear mandate and ability to make a difference. Our senior leaders would benefit from this capacity.

3. Third, our citizens will have somewhere to turn when they are dealing with out of date services from our Government. This department would help shape new legislation that would be principles based so that it would not be outdated by technology changes.

Now, this is not a panacea. We know that departments that have been created in the past to focus all of our energies onto a change management agenda have been challenged within the system. But what choice do we have? If we don't overcome these challenges and change for the future what legacy will we leave behind?

So, Canada is winning in the digital race so far but we must continue to pick up our pace if we wish to remain relevant in the digital world. I believe that having a digital minister and a digital department can help prepare us for the enormous changes that are coming. That would give Canada a true competitive advantage for the Fourth Industrial Revolution and the dramatic changes to come.

Thank you for your attention.

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