

Written Submission for the Pre-Budget
Consultations in Advance of the 2019 Budget
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Recommendation: 1

That the government provide funding in the amount of \$30,000,000,000 for the purpose of building a Hyperloop transportation system that spans from Vancouver, British Columbia to Quebec City, Quebec.

Recommendation: 2

That the government provide funding in the amount of \$35,000,000,000 for the purpose of developing and implementing a New Canadian Intellectual Agency (NCIA).

Recommendation: 3

That the government provide funding in the amount of \$20,000,000,000 per-year for the purpose of funding the NCIA's operational and personnel budgets

Recommendation: 4

That the government provide funding in the amount of \$15,000,000,000 for the purpose of designing and building four intellectual HUBs at different locations within Canada.

Recommendation: 5

That the government provide funding in the amount of \$100,000,000 per-year for the purpose of providing funding to operate and maintain four intellectual HUBs at different locations within Canada.

Ensuring Canada's Competitiveness.
August 3, 2018

Connectivity is the key to ensuring Canada's competitiveness. Canada must build a synergistic relationship between government agencies, Canadian businesses, and Canadian universities: each part adding itself to the whole so that it becomes greater than the sum of its parts.

The creation of the New Canadian Intellectual Agency (NCIA) will aid Canadians and Canadian business as they endeavor to be leaders within the global economy.

The NCIA's mission statement:

To partner with Canadian higher education and Canadian business for the purpose of researching, developing and implementing leading innovation, automation and different areas of technologies for the sole purpose of supplying Canadians and Canadian businesses with the ability to use the latest scientific advancements to further Canadian global competitiveness.

The NCIA will gather professionals and leaders in research, innovation, automation and other different areas of technologies from Canada and around the globe. The purpose of gathering the previously mentioned professionals and leaders will be to have them develop advancements in multiple disciplines to complete the NCIA's mission statement. The days of researchers being tucked away in a R&D department of a company have disappeared. Today advancements develop due to cooperation between multiple disciplines and players. For example, "scientists of the German Fraunhofer Institute have harnessed a natural phenomenon to store heat indefinitely and without energy loss."¹ If that had been the NCIA's breakthrough a Canadian business could have taken the advancement and used it to create an advanced energy efficient water heater that could be used in new building construction. Also "in 2018, Moley Robotics will launch the world's first fully-automated and integrated intelligent cooking robot—a robotic kitchen that has unlimited access to chefs and their recipes worldwide."² Again if this was the NCIA's breakthrough, a Canadian business could have decided where the robotic hands were manufactured. However, the NCIA could also have designed the robotic hands to do construction and/or manufacturing.

1 <https://www.elektormagazine.com/articles/zeolite-stores-thermal-energy-for-unlimited-amount-of-time>

2 <https://www.forbes.com/sites/eustaciahuen/2016/10/31/the-worlds-first-home-robotic-chef-can-cook-over-100-meals/#67e4d6b57228>

The NCIA will be for some Canadian businesses their sole R&D department. For other Canadian businesses the NCIA will be a furtherance of their own R&D department. The NCIA will be able to patent the new innovations they create. This means the NCIA will be able to control the information within the patents for the next twenty years. With this control the NCIA will be able interact with foreign businesses, who also want to use the innovations the NCIA developed, for the betterment of Canada and its citizens. For example the NCIA could stipulate that a foreign corporation must manufacture a certain percentage of the product that uses the innovation within Canada. Doing the previous would decrease the unemployment rate. Regardless of how the NCIA interacts with foreign businesses all Canadians and Canadian business will have, free of cost, total access to all NCIA's patents.

Cost

The reason this brief is recommending \$35,000,000,000 be used to create the NCIA and \$20,000,000,000 be supplied, every year, as the operational budget is past advancements have shown to require an equivalent size of capital. The Avro Arrow in 1958 cost \$300,000,000,³ which would be \$2,650,331,125.83 in 2018.⁴ In 1981 the "original Canadarm [...] cost \$108 million to develop from scratch, as well as four other robotic arms." \$108,000,000 in 1981 would be \$295,835,728.95 in 2018.⁵ Using the above two projects, it can be seen that \$20,000,000,000 will allow the NCIA to create between 7- 67 innovations a year.

It would be advantageous to allow any funds not spent in one fiscal year to be transferred to the following fiscal year without a reduction in the budget for the up coming fiscal year. Instead of punishing fiscal prudence, fiscal prudence, creativity and innovation should be rewarded.

There are other areas of research that can be developed;

1. Advancements in CPUs
2. Medical hardware
3. Bio-tech
4. Data analysis
5. Mining equipment
6. Advanced automation

3 <http://scaa.usask.ca/gallery/arrow/flight.htm>

4 <https://www.bankofcanada.ca/rates/related/inflation-calculator/>

5 Ibid.

7. Power storage
8. Automated construction
9. Automated manufacturing
10. Desalination technology
11. Alternatives to Hydrocarbon⁶
12. Alternatives to natural pollination
13. Clean energy development

The list of advancement that could be developed by the NCIA is massive, as are the rewards Canadians and Canada businesses could enjoy. This undertaking is the best way to ensure Canada's competitiveness.

The NCIA would be placed at four locations across Canada within the HUBs. The HUB would consist of three layers.

1. Center layer
 1. Different Canadian universities would share this layer.
2. Middle layer
 1. Multiple Canadian businesses would share this layer.
3. Outer layer
 1. This layer would be for the NCIA.

Center layer

This layer would allow universities/institutes, for example, from the west coast like BCIT, UBC, TWU, and SFU too co-exist in one location as the students strive to learn the next level of their chosen scientific and technological fields. Being in direct proximity to the other layers would increase the probability of the students being hired after graduation and/or being exposed to the latest breakthroughs. In addition the interaction between all the students in a centralized location would allow students to share and learn from each other.

⁶ <https://www.forbes.com/sites/energysource/2012/10/13/plastics-without-oil-heres-how/#28334143d91e>

Middle layer

This layer would allow multiple Canadian businesses to exist in a location that had access to both governmental resources and the next generation of innovators. For example, MDA, Clearpath Robotics, Robotiq, Kinova inc., Buddybuild, Deep Genomics, Element AI and Thinkific could all share this layer and have direct and immediate access to the NCIA and students attending universities/institutes.

The outside layer would be for the NCIA. The NCIA as was stated above is driven to devolving innovation that can be accessed by Canadians and Canadian businesses. The NCIA being located at a HUB that also houses Canadian universities, students, professionals and businesses is the perfect way to enhance an environment that will produce advancements in scientific research, innovation, automation and other areas of technologies.

Hyperloop

Each HUB will allow the NCIA, Canadian businesses, and Canadian universities/institutes to connect in a synergistic way. The Hyperloop will allow the personnel, who work at the NCIA, Canadian businesses, and Canadian universities located at one HUB, to travel to different HUBs and interact in person with one another. The personnel will be able to leave one HUB that is located across Canada and arrive at another HUB within hours. The speed of the Hyperloop will allow personnel from different HUBs to interact with one another as if they were to walk down a hallway to a different room.

The other benefit of the Hyperloop is that it is able to transport people, and cargo, even oil. Cargo could be shipped from Vancouver, British Columbia to Ottawa, Ontario and arrive the same day. Oil could be transported in rupture resistant containers without concern of spillage. People could live in one province and work in another.

In addition educational inequality could be addressed. Resources within different schools could be consolidated as students who lived in rural areas would be able to travel and attend better funded and equipped schools located in a different part of the province. Also health-care needs would be better addressed as more people would have more access to better health-care.

What is the Hyperloop?

The “hyperloop would propel people or cargo-filled pods over long distances through steel tubes. Magnetic levitation and big vacuum pumps would do away with pesky friction and air resistance, letting those bus-sized vehicles zip along.”⁷

How does the motor and propulsion system work?

“Virgin Hyperloop One vehicles are propelled using a linear electric motor, which is a straightened-out version of a conventional rotary motor. A conventional electric motor has two primary parts: a stator (the part that stays still) and a rotor (the part that moves or rotates). When voltage is applied to the stator it makes the rotor spin and do the work of, say, spinning a power drill. A proprietary linear electric motor has the same two main parts, however, the rotor doesn’t rotate but instead moves in a straight line along the length of the stator. In the Virgin Hyperloop One system, the stators are mounted to the tube, the rotor is mounted to the pod, and the pod straddles the stators as it accelerates down the tube.”⁸

Speed of the hyperloop?

“We estimate that the top speed for a passenger vehicle or light cargo will be 670 miles per hour or 1080 kilometers per hour. That is 2-3 times faster than high-speed rail and magnetic levitation trains, and 10-15 times faster than traditional rail. The average speed vehicles will travel will vary based on the route and customer requirements.”⁹

Power requirements?

“We’re energy-agnostic. Our system can draw power from whichever energy sources are available along the route. If that means solar and wind, then the entire system is 100% carbon free.”¹⁰

Cost to build and operate?

“Capital and operating costs will range widely based on route and application (passenger, cargo) but third parties have concluded that the capital and operational costs of a hyperloop system could be two-

7 <https://www.wired.com/story/guide-hyperloop/>

8 <https://hyperloop-one.com/facts-frequently-asked-questions>

9 Ibid.

10 Ibid.

thirds that of high-speed rail.”¹¹ Some sources have said that it will cost around \$6,469,750.00CAN or 5,000,000USD per-1.6KM or per-mile.

The reason this brief is recommending that the government use \$30,000,000,000 to build the Hyperloop even though it will not cost \$30,000,000,000 is while the base price is estimated at being around \$18,781,618,338.49 (\$14,218,750,000us), other expenses will need to be covered, such as tunnels, and bridges.

In comparison the Trans-Canada Highway in 1950 cost \$825,000,000,¹² which would be \$8,947,560,975.61 in 2018.¹³ However, the Trans-Canada Highway is incapable of transporting oil, cargo, and people a distance of 4,550km¹⁴ in around 4.25hours. Also a lot of the funds that will be supplied to build the Hyperloop will be collected through taxes. Plus it would be an injection of funds into the Canadian economy as workers who construct the Hyperloop spend money in different Canadian communities.

As stated previously connectivity is the key to ensuring Canada’s competitiveness. Canada must build a synergistic relationships between the NCIA, Canadian businesses, and Canadian universities. Each part adding itself to the whole so that it becomes greater than the sum of its parts. The proposed interconnectivity that will enable Canadians to remove the barrier of distance, and integrate ideas, and vision will ensure Canada’s competitiveness now and into the next millennium.

11 Ibid.

12 <http://www.thecanadianencyclopedia.ca/en/article/trans-canada-highway/>

13 <https://www.bankofcanada.ca/rates/related/inflation-calculator/>

14 <https://goo.gl/maps/CBQtdnZnTHk>