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Sent: Friday, November 16, 2018 4:14 PM
To: Engages-Mobilisation (WD/DEO) <wd.engages-mobilisation.deo@canada.ca>
Subject: Western Canada Growth Strategy

Please accept WestGrid's attached submission to WD's consultation "Towards a Western Canada Growth Strategy".

Unfortunately we were unaware of this consultation until just prior to the deadline, so we were unable to participate in the roundtable sessions or the online discussion forum.

We'd be happy to provide further details on our role in positioning western Canada for a prosperous future and/or to elaborate on the responses in our submission. Feel free to contact me if you'd like to discuss further.

Thanks,
Lindsay

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WestGrid is a not-for-profit organization that works with the other regions within Compute Canada to provide the Advanced Research Computing (ARC) tools researchers need – from powerful computers and storage resources to specialized software and data management tools – combining them with a service layer of technical expertise, support personnel, and training.

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As one of Compute Canada's largest regional organizations, WestGrid, like the Western Economic Diversification Canada, works collaboratively with our researchers, member institutions, and funding partners across British Columbia, Alberta, Saskatchewan, and Manitoba.

1. What does a stronger western Canadian economy look like 10 years from now?

A stronger economy would be one that has the West working together to produce the highest collective per capita GDP values in the country. It would be an economy full of jobs and successful recruiting of top talent, specifically researchers and technologists, that have affordable homes, and that can contribute to bettering the lives of Western Canadians.

This means that western Canada needs to be prepared for the digital transformation that is reshaping the way we live. New technologies including artificial intelligence and machine learning will mean that in the next decade up to [50 per cent](#) of our current jobs will be disrupted. Western Canada needs to work together to ensure that our provinces are prepared for this with investments in research, equitable access to technology, and a revised framework for the education and skill development to use the new technologies and create the next new technology.

2. What are the best ways to spur new growth in western Canada?

Job creation is key to a strong economy and new growth. The jobs of the future, e.g. in 10 years, will be heavily focused on technology. As such, we need to start the training and education now to ensure there are enough skilled workers when the time comes. This growth is a pipeline and efforts have to be made near the start of the pipeline to yield the best results. For example, children need to learn coding and get exposed to and excited about technology from a

young age. We need to teach youth to use technology effectively and how to adapt to change more quickly. We also need to help them develop leadership, communication and collaboration skills, which a 2018 LinkedIn Workplace Learning Report found are the top priorities for talent-development teams, and ones which likely can't be replicated by technology.

Diversity will also be essential to spur growth, not only to ensure innovation but to meet the labour shortage affecting all provinces. **Research has proven that diverse teams are more productive and effective. The workforce needs to grow, while being mindful of diversity, in order to spur maximum new growth.** Nearly 40% of entrepreneurs in Canada report labour shortage as one of their primary challenges. This negatively affects our industrial growth, quality and competitiveness. We need to develop our workforce by investing in Canadian workers while also recognizing that international labourers can help fill these gaps now. Having diversity and inclusion policies and strategies for companies and our provinces are no longer only politically correct but a necessity for our future growth.

Diversity not only important in the workforce but also in the ARC ecosystem and technology planning, and is a positive feature which is recognized world-wide. The recent US Department of Energy¹ OE CORAL-2 procurement, for example, required “diverse” systems and specifically evaluated “how much the proposed system(s) promotes a competition of ideas and technologies; how much the proposed system(s) reduces risk that may be caused by delays or failure of a particular technology or shifts in vendor business focus, staff, or financial health; and how much the proposed system(s) diversity promotes a rich and healthy HPC ecosystem.”

3. What will help the Indigenous economy continue to grow?

Education, training, and equal opportunity. For example, having more programs such as UBC's Admission for Canadian Aboriginal students.

The [First National Technology Council](#) is making incredible progress in their work towards the resurgence of Indigenous peoples' sovereignty through innovation, partnership and equal access to high-speed connectivity, recognizing these as the missing link to reconciliation in the digital age. The council notes that the 2016 BC TechTalent Report expects the the BC tech sector to grow by an additional 47,000 jobs by 2021. However gaps in skills and labour will result in over 30,000 job vacancies. The Council is working to ensure that the youngest and fastest growing demographic in Canada is being equipped with the skills and connectivity required to fill this gap. Their goal is to empower “Indigenous people with the tools and certifications they need to launch successful careers and build sustainable economies that fit the needs of their nations.”

¹ <https://asc.llnl.gov/coral-info>

4. How can we improve economic participation in the west of underrepresented groups, including women, youth and new immigrants?

Having government funded training programs to teach technology and computation, setting underrepresented groups up for the jobs of the future could improve participation. Women, for example, tend to prefer careers where they are helping people and society. There are many jobs in technology that fulfill this goal and better promotion and education is required to spur this participation.

Particularly in ARC, but also across the entire academic landscape, new users, those from non-traditional disciplines, those at smaller institutions, and early career researchers are the most at risk, often struggling to compete for resources and achieve their research goals. Developing special competitions to help these groups succeed would improve their economic participation and research outputs.

Investing in more programs for women during their childbearing years could improve their economic participation. For example, envision a centre that has affordable (or free) daycare for women while they enrolled in some sort of training or education program. Or, given them opportunities to do some work while on maternity leave without having their EI premiums clawed back, to keep their skills fresh.

5. How can governments, industry and western Canadians work together to grow the regional economy?

Advanced research computing (ARC) and High Performance Computing (HPC) are transforming research, and economies, around the world. The United States and European Union have identified big data analytics and ARC / HPC as essential economic enablers. International Data Corporation conducted a study² that reports that **one dollar invested in HPC will result in an economic return of US\$356 in less than two years.**

According to a Hyperion Research estimate, every dollar invested in HPC technology is associated with an average **\$551 in additional revenue** and **\$52 in added profit** for private-sector firms³.

In 2016, Compute Canada conducted a bibliometric analysis of 18,000 unique scientific journal articles enabled by ARC resources, which showed that, on a field-weighted basis, **citation indices (of ARC enabled research) were generally twice the global average** and well above the Canadian average across a broad range of disciplines.

² Special Study Creating Economic Models Showing Relationship Between Investments in HPC and the Resulting Financial ROI and Innovation and How it Can Impact a Nation's Competitiveness and Innovation Study

³ Hyperion Research: Study of HPC ROI, June 2017

Commercial Impact

Fusion Genomics, a BC based lab-to-market start-up, was able to develop their diagnostic tool for the detection of early childhood cancers by having access to advanced research computing resources. However, many Canadian industrial R&D pursuits and SMEs do not have this access to the resources they need. While this is an important part of the mandate of ARC programs in the US and Europe, Canada has not funded the national platform to meet this need. ***Our provinces need to ensure similar projects have access to computational power and expertise at key moments in the development pipeline to accelerate discovery and help foster growth in the commercialization of research.***

Future Growth Needs

Based on Compute Canada's most recent needs analysis for 2017–2022, use of ***computing infrastructure is expected to grow seven-fold*** (48% annual growth) and the use of active ***storage is expected to grow fifteen-fold*** (72% annual growth).

Investment in ARC and HPC resources in Canada has not kept pace with this increased demand. In 2018, ***Compute Canada met only 52% of the compute requests*** from federally funded academic researchers received in that year's competition (down from 84% in 2012).

With the current federal funding Canada is ranked lower than the Czech Republic in terms of available gigaflops per researcher.

Following the Federal government's announcement as part of budget 2018 to invest \$572.5M *"to give researchers open and equitable access to advance computing and big data resources (a field in which Canada is a world leader)"*, WestGrid formed an advisory committee of ARC stakeholders in western Canada to develop a coherent regional strategy within the west to participate in the national digital research infrastructure (DRI) planning and development process. This committee included the Vice Presidents (Research) for the seven major post-secondary institutions in western Canada and engaged the provincial governments responsible for research and innovation funding in the four provinces.

The Leadership Council on Digital Research Infrastructure (LCDRI) Coordination Report to ISED defined DRI as:

a specialized type of essential infrastructure (both physical and human) that supports the data- and computation-intensive research that is required for knowledge creation in the digital age. The DRI ecosystem has five core components: network, advanced research computing, data management, storage, and advanced research software.

The use of specialized, essential infrastructure is leading to an information explosion. The West should leverage this new natural resource: data. Recruiting more data scientists could exploit this commodity to grow the regional economy. For example, at a recent event held in Calgary hosted by PIMS, teams participated in a [Datathon](#), using the City of Calgary's Open Data Portal

to use a data analysis approach to finding solutions to infrastructure challenges in the areas of health, green and safety.

We are encouraged by this initiative to develop a Western Canada Growth Strategy and feel strongly that such a strategy should include top talent, ARC/HPC infrastructure, DRI services, and data management tools required, across all sectors, to enable global leadership by Western Canadian researchers in science, research, and innovation.