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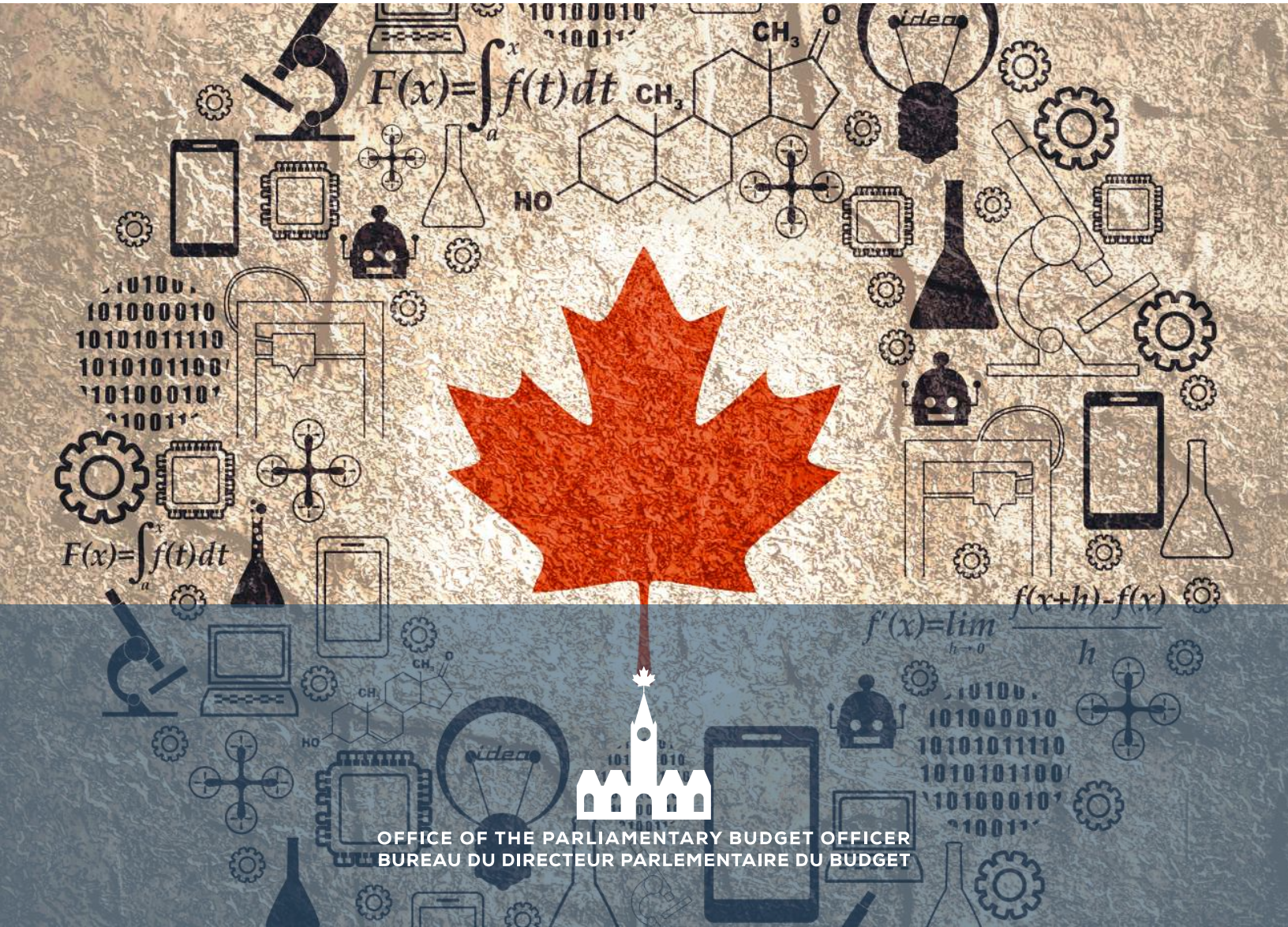
# THE INNOVATION SUPERCLUSTERS INITIATIVE – A PRELIMINARY ANALYSIS



The Parliamentary Budget Officer (PBO) supports Parliament by providing economic and financial analysis for the purposes of raising the quality of parliamentary debate and promoting greater budget transparency and accountability.

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# Executive Summary

Budget 2017 earmarked $918 million over five years for the Innovation Superclusters Initiative (ISI). The federal money will assist with the creation of five "superclusters" across Canada, where the public and private sectors will undertake collaborative research. The Government projects that this initiative will lead to the creation of 50,000 jobs, increase GDP by $50 billion over 10 years, and accelerate innovation.

Federal funding is expected to be matched by contributions from non-federal entities, including the private sector, universities and other levels of government. Non-federal partners have announced $1,087 million over the same five-year period.

Data shared by the Government as of March 6, 2020 indicate that actual spending is lagging the original budget. As presented in Table Summary 1, the Government originally anticipated that it would have spent $104 million (or 11% of its total budget) by that point. In comparison, only $30 million was spent (29% of the original projection).

**Table Summary** — **ISED's projected and actual expenditures (in $million)**

| | 2019-20* | 2020-21 | 2021-22 | 2022-23 | Total |
|---|---|---|---|---|---|
| **Projected Spending** | $104** | $259 | $354 | $201 | $918 |
| **Actual Spending** | **$30** | **-** | **-** | **-** | **-** |
| *On project costs*<br>*On O&A costs* | *$12*<br>*$18* | - | - | - | - |
| **Actual spending as a percentage of projected spending** | 29% | - | - | - | - |

Sources: ISED and Parliamentary Budget Officer.

Notes: * As of March 6th, 2020.

** Includes spending of $5.6 million in 2018-19 on operational and administrative costs.

Most of the federal spending to date relates to administrative and operating costs (59%), with the remaining distributed over 45 specific research projects (41%). In addition, some $97 million has been committed, but not necessarily spent, on the 45 announced projects[1]. PBO estimates that, based on the average committed expenditure per project, an additional 355 projects would need to be selected to meet the spending targets. As such, the rate of project selection and implementation will need to materially increase to achieve planned timelines.

PBO estimates that if supercluster partners spend all the money that has been announced, roughly 27 thousand direct jobs would be created as a result. However, the nature of these jobs, whether they will be full-time, part-time, permanent or temporary, is unknown at this point. Based on a review of the literature and the experience of other jurisdictions, PBO finds it unlikely that the objective of increasing GDP by $50 billion over 10 years will be met.

PBO requested the quantifiable performance indicators used by the federal department administering the ISI (Innovation, Science and Economic Development) to measure the innovation impact. However, none were provided. As such, the absence of quantifiable objectives prevents PBO from drawing conclusions about the impact of this initiative on innovation.

It is important to note that the data and the analysis in this report were based on information collected *before* the COVID-19 pandemic. Parliamentarians may wish to assess effect of the pandemic on the implementation of this initiative, especially if projects are being canceled or delayed, and if non-federal funding is being disrupted.

# 1. Context

In February 2018, the Government of Canada officially announced the Innovation Superclusters Initiative (ISI)[2]. This initiative, to be administered by the Department of Innovation, Science and Economic Development (ISED), seeks to spend $918 million over 5 years in 5 different superclusters: the Digital Technology Supercluster in British-Columbia, the Protein Industry Supercluster in the Prairies, the Next Generation Manufacturing Supercluster in Ontario, the AI Supercluster in Montreal and the Ocean Supercluster in the Atlantic provinces.

The government expenditures in the superclusters were expected to be matched by external partners to further spur innovation and economic growth in Canada.

According to the documents from ISED obtained by PBO, the program has 4 objectives: to foster partnerships and collaboration, to accelerate innovation, to develop innovation ecosystems, and to promote global ambition. ISED also projected that the initiative would increase Canadian GDP by $50 billion over 10 years, while creating 50,000 new jobs.

To measure the attainment of these objectives, ISED requested data reports for every project that has received federal funding. PBO analysed these reports and will discuss several metrics that can shed light on the current status of the program and its estimated future outcomes.

The next section provides a breakdown of the expenditures made thus far by ISED and by non-federal partners. PBO then presents a preliminary assessment of the economic impacts of the initiative in terms of job creation and effects on GDP and innovation.

It is important to note that the data and the analysis in this report were based on information collected *before* the COVID-19 pandemic. Parliamentarians may wish to assess the effect of the pandemic on the implementation of this initiative, especially if projects are being canceled or delayed, and if non-federal funding is being disrupted.

# 2. Expenditures

For this initiative, the Government announced, through ISED, expenditures totalling $918 million over 5 years (between 2018-19 and 2022-23). As Table 2-1 shows, $104 million were projected to be spent by March 31, 2020. ISED's internal documents show that, as of March 6, 2020, $30 million, or 29% of the projected amount, has been spent. Of the $30 million, $12 million were project costs and $18 million were operational and administrative costs (O&As).

**Table 2-1 ISED's projected and actual expenditures (in $million)**

| | 2019-20* | 2020-21 | 2021-22 | 2022-23 | Total |
|---|---|---|---|---|---|
| **Projected Spending** | $104** | $259 | $354 | $201 | $918 |
| **Actual Spending** | **$30** | **-** | **-** | **-** | **-** |
| *On project costs*<br>*On O&A costs* | *$12*<br>*$18* | - | - | - | - |
| **Actual spending as a percentage of projected spending** | 29% | - | - | - | - |

Sources: ISED and Parliamentary Budget Officer.

Notes: * As of March 6, 2020.

** Includes spending of $5.6 million in 2018-19 on operational and administrative costs.

Non-federal partners are expected to spend $1,087 million over the same 5 years. Table 2-2 provides additional information on the combined expenditures of ISED and non-federal partners. It features the total projected spending as well as actual and committed spending on the projects that have been announced as of March 6, 2020.

To date, ISED funded 45 specific research projects. It committed to spend $97 million on these projects, for an average funding per project of $2.1 million. Most projects started in late 2019 and early 2020 and were still in their early stages when the data was received. This partly explains why the spending on project costs remains relatively low compared to O&As.

If annual O&As remain at the 2019-20 level for the duration of the program, PBO estimates that total program O&As will reach $53 million. Assuming average project funding remains at $2.1 million, PBO estimates that 355 additional projects would need to be completed for ISED to meet its spending objective of $918 million.

Non-federal partners have committed $180 million on projects[3] as of March 6, 2020, as opposed to $97 million by ISED. Using the same assumption and calculation as above, they would need to fund additional 223 projects in order to meet their spending objective.

Table 2-2

## Combined Expenditures of ISED and non-federal partners over 5 years (in $million)

| | ISED | Non-federal partners | Total |
|---|---|---|---|
| **Total Projected Spending** | **$918** | **$1,087** | **$2,005** |
| **Actual and committed spending on announced projects*** | **$97** | **$180** | **$277** |
| **Actual and projected spending on O&A costs**** | **$53** | **$18***** | **$71** |

Sources: ISED and Parliamentary Budget Officer.

Notes: * As of March 6 2020.

** PBO assumed that, between 2020-21 and 2022-23, annual O&A costs will remain at the same level as that in 2019-20.

*** To estimate this number, PBO assumed that non-federal partners will fund 25% of the O&As, with the remaining 75% being funded by ISED[4].

# 3. Economic Impacts

ISED projected that the ISI would help create 50,000 jobs and increase GDP by $50 billion over 10 years. Furthermore, it was expected that the initiative would help spur innovation. In this section, PBO will discuss the likelihood of meeting these objectives.

## 3.1. Impact on Jobs

The data reports submitted by funded projects contain anticipated outcomes of those projects in terms of job creation. The data from 24 of the 45 currently announced projects reveal that 2,594 jobs are expected to be created. This amounts to around 14 jobs per $1 million of combined expenditure by both ISED and non-federal partners. By extrapolation, PBO estimates that undertaking these 45 projects could lead to the creation of 3,916 jobs, as shown in Table 3-1[5].

Assuming the same job creation rate and that ISED and non-federal partners will meet their spending objectives, PBO estimates that the ISI will create 27,341 direct jobs over the 5 years of the program[6]. Unfortunately, the available information at this point does not permit PBO to distinguish the nature of these jobs; whether they are full-time, part-time, permanent, or temporary.

The analysis does not account for indirect jobs which could be created as firms grow in the Superclusters. Some Superclusters are also funding projects whose objective is to train workers. Although this does not lead to direct job creation, it could positively affect the labour market as workers gain new skills and, therefore, potentially become more productive. So far, 3,109 workers are expected to receive training (Table 3-1).

## Table 3-1 Committed spending and expected job creation per Superculster, as of March, 2020

| | Actual and committed spending on projects ($million)* | Actual spending on operational and administrative costs ($million)** | Number of projects announced and funded by ISED | Expected number of jobs created*** | Expected number of workers trained |
|---|---|---|---|---|---|
| **Digital Supercluster** | $69 | $5 | 22 | 938 | - |
| **Protein Supercluster** | $68 | $5 | 4 | 757 | - |
| **Manufacturing Supercluster** | $31 | $8 | 6 | 1163 | 352 |
| **AI Supercluster** | $83 | $2 | 11 | 970 | 2757 |
| **Ocean Supercluster** | $26 | $2 | 2 | 88 | - |
| **Total** | **$277** | **$23** | **45** | **3,916** | **3,109** |

Sources: ISED and Parliamentary Budget Officer.

Notes: * Includes combined expenditures by both ISED and non-federal partners.

** Includes combined expenditures by both ISED and non-federal partners. PBO assumed that non-federal partners will fund 25% of the O&A costs.

*** Data on job creation was available for 24 of the 45 projects. PBO extrapolated to estimate the expected number of job created[7].

## 3.2. Impact on GDP

ISED projected that the ISI would lead to an increase in GDP of $50 billion over 10 years. ISED's projected expenditure of $918 million combined with non-federal partners projected expenditure of $1,087 million amounts to about $2 billion (Table 2-2). For this initial spending to lead to an increase in GDP of $50 billion implies a multiplier effect of 25[8].

PBO conducted a literature review on the impacts of investments in research and development (R&D) on economic growth. Based on the impacts of similar projects in other jurisdictions, the multiplier effect on GDP of investments in R&D is somewhere between 3 and 8 (Georghiou, 2015)[9]. At the higher end of that range was a multiplier of 8.82, based on US data (Deleidi et al. 2019)[10].

It should be noted that the multiplier will vary depending on the type of research, as well as the initial level of R&D spending in a given jurisdiction. Some specific projects or specific clusters can be incredibly successful, while others not at all. There are a great many factors that will have an impact on how successful the ISI turns out to be, many of them not foreseeable.

Nevertheless, based on the evidence found in the literature, it seems highly unlikely that the Government will meet its objective of increasing GDP by $50 billion over 10 years. For instance, a multiplier effect of 8.82, which would itself be optimistic, would lead to an increase in GDP of around $18 billion.

## 3.3. Impact on Innovation

Measuring innovation can be challenging. There is not one widely used metric that tells a complete story; instead there are many that can each provide valuable insights.

In a response to PBO's information request, ISED listed several metrics that they will monitor to measure innovation, such as increase in productivity or the development of new products and processes. To PBO's knowledge, ISED does not have quantifiable objectives for any of these metrics, and the data reports did not contain information that would have allowed PBO to measure these metrics. As such, PBO cannot draw conclusions about whether the ISI is, or will be, succeeding in accelerating innovation.

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# Notes

1. Each of the 45 projects has a different timeline. Most of the projects started in late 2019 or early 2020 and are usually supposed to take between 1 and 3 years to complete.
2. For more information on the initiative, please refer to this website: http://www.ic.gc.ca/eic/site/093.nsf/eng/home. Moreover, you can find the program guide here.
3. 96% of which is in cash; the rest is in kind.
4. This assumption is based on the program guide (see note 2). Indeed, on page 11, in the section about funded eligible costs, it is stated that "(ISED) will contribute up to 75% of the eligible Administration and Operating Costs incurred by the (Supercluster) in support of its agreement objectives".
5. As it was mentioned in the text, PBO has job data for 24 of the 45 projects; the other 21 did not report data on job creation. The 24 projects that reported data on job creation received investments from ISED and non-federal partners totalling $183 million, or 66% of the committed spending on announced projects. A simple calculation shows that every $1 million of investment is associated with around 14 jobs created. By extrapolating this number to the remaining 34% committed spending on announced projects, it can be estimated that the 45 projects announced so far could lead to the creation of 3,916 jobs.
6. As per note 5, by extrapolating the 14 jobs created for each $1 million of investment to the remaining amount that needs to be spent for ISED and non-federal partners to spend to their objectives (that is, $1,657 million), it can be estimated that 23,424 additional could be created. By adding 3,916 jobs to this number (see note 5), we get an estimate of 27,341 new jobs created by this initiative.
7. See note 5.
8. A multiplier effect is a proportionality factor by which we can measure how much an endogenous variable changes as a result of a change in an exogenous variable. In this case, the exogenous variable is ISED and non-federal partners spending on innovative projects. The endogenous variable is GDP.
9. Many of the papers surveyed in this literature review focus on private and public investments on medical and biomedical research. Since the Supercluster Initiative does not specifically target research in these areas, one needs to be careful before drawing parallels. However, it does indicate that a multiplier of 25 is relatively high.
10. This paper looks at different types of government spending in the US and their long-term impacts on GDP over multiple decades. The highest multiplier, 8.82, was found for military R&D, which they use as a proxy for "mission-based" investments; that is, investments that are targeted for a specific sector. Similarities can be drawn between such investments and the

Supercluster Initiative, which targets specific areas of research. The multiplier effect of government spending on non-military R&D was 7.76, while it was 2.21 for the much broader category of government investments (including R&D).