Treasury Board of Canada Secretariat

Data Development, Impact Analysis, and Capacity Building

Presentation to the **Strategic Research Network**

Data Science, Research and Development

June 8th, 2023

Data Development

- Every year, DSRD launches its **Program Information Form (PIF)** data collection exercise for the previous fiscal year. The PIF exercise updates the inventory of federal business innovation and growth support (BIGS) programs and is the foundation for a subsequent collection of program administrative data led by Statistics Canada.

- The **program administrative data** collected by Statistics Canada, linked to other business microdata, enables the development of statistical products that will inform horizontal analysis of program reach and performance.

- PIF data is collected using Excel spreadsheets to gather information on **existing program streams**, **new program streams**, and **intermediaries**.

Beginning with the collection of fiscal year 2021-22 program data, we opted to **pre-populate** the **PIF forms** for each department to reduce administrative burden.

Timeline

1

Jan Feb

PREPARE

Consider any new questions to add to the forms

Confirm the most current contact information for each department

Update the Guide to include instructions on any new questions on the form

2

Mar Apr

FINALIZE

Update the PIF form with the finalized list of questions.

Gather the most current data about Program Streams and Intermediaries and enter on each form.

3

May Jun Jul

COLLECT

Send the prepopulated forms to departments to complete blank fields and make necessary changes.

Departments add new programs to the list.

Respond to questions from departments.

Receive the completed forms.

4

Aug

VALIDATE

Compare any new data on the forms with other information that can be found online or in other databases to ensure everything is accurate.

Enter all the information into StatCan's templates for BIGS and send to StatCan

New in 2023

Stages of Innovation: We have included a section to the PIF asking departments to identify what stages of innovation their Program Stream is in; Fundamental Research, Research and Development, Pilot and Demonstration, and/or Early Adoption. We used available data on Technology Readiness Levels (TRLs) from ISED to categorize them into one or more of the four development stages.

Horizontal Initiatives: When two or more departments work together to achieve Government objectives, these Program Streams may be formally designated as a Horizontal Initiative. It is important to know which departments are collaborating with another department on their Program Streams.

Quality of Life: Quality of life (well-being) refers to the wealth and comfort of individuals, communities and society based on both material and non-material factors that are important to people's lives, such as health and social connections. To know more about the involvement of Program Streams in Quality of Life, we have added the 8 QoL domains for departments to identify if their Program Streams fall under these domains.

LUNA

- LUNA is an **online cloud-based data exchange application** that is currently being developed to replace the manual data collection process of PIF and BIGS.
- It will greatly reduce the cost and **administrative burden** on TBS, StatCan, and other government departments in reporting PIF and BIGS data each year.
- It will also provide **greater accessibility** of data to analysts and researchers, and improve the quality of data.
- The development of LUNA is in **Stage 2** of the 5 stages of IMTD's Project Governance Pathway.

Impact Analysis

In 2020-21, **19** federal organizations delivered roughly **130** BIGS programs. The BIGS program universe is heterogeneous with respect to delivery mechanisms, funding parameters, and the **priorities** and **populations** they target:

Research & Development

Commercialization & Market Entry

Environment & CleanTech

Regional Development

Small & Medium-sized **Businesses**

Export Development

BIGS Priorities

Several BIGS programs aim to address **societal challenges**:

- Clean Energy — **11 programs**
- Skills Development — **62 programs**
- Climate Change — **47 programs**
- Food Security — **5 programs**
- Gender Balance and Inclusiveness — **24 programs**

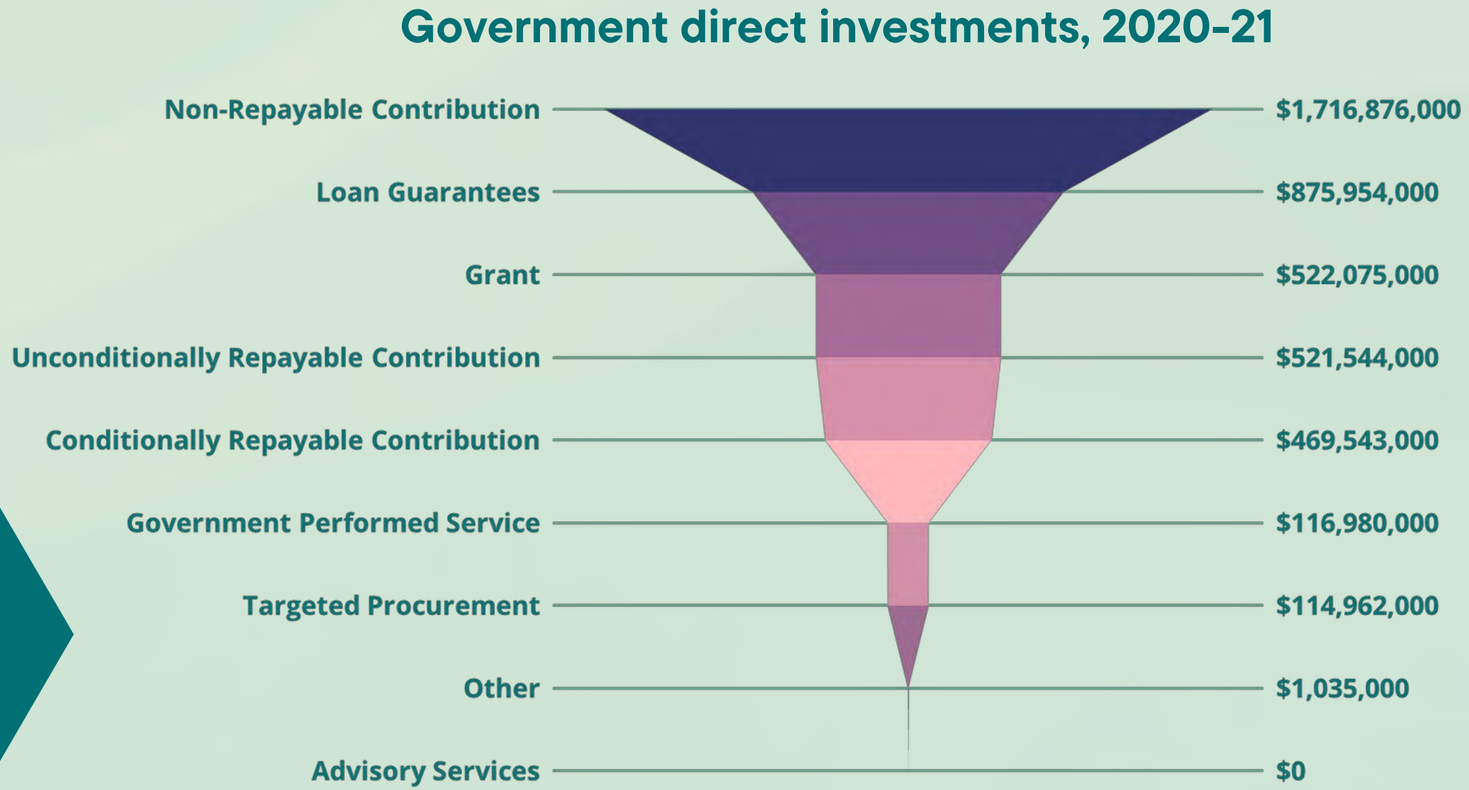
Delivery Mechanisms

Direct support through federal innovation programs:

- **Grants & Contributions (74%)**
- **Loan** guarantees **(20%)**
- **Procurement** & Government performed services **(5%)**
- **Advisory services**

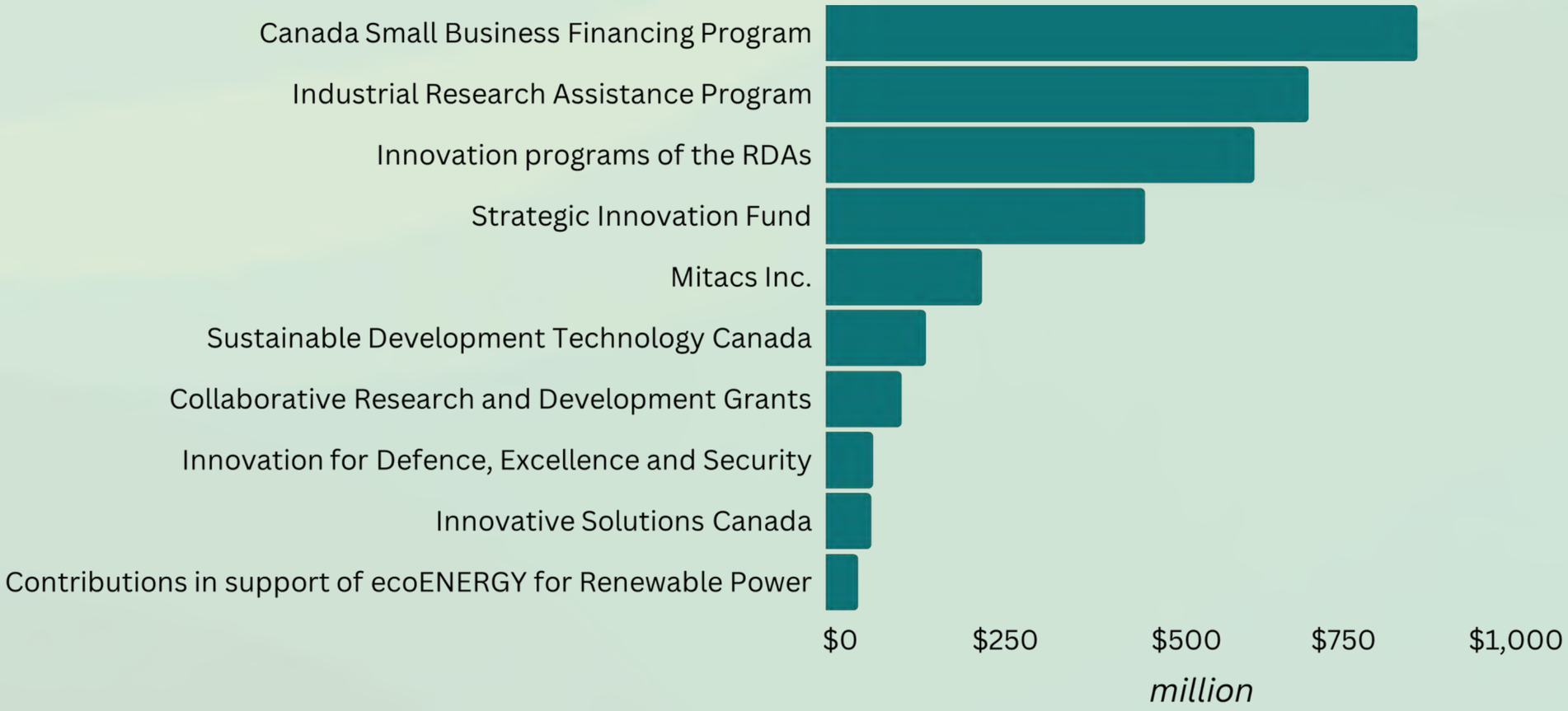
Intermediaries are also used to deliver financial support and services.

SR&ED is an indirect approach to encourage businesses to conduct R&D.



Largest BIGS Programs

The **10 Largest BIGS Programs**, by total value of subsidies:



Export Programs

Innovators from Canadian organizations may access financial assistance or advisory service to develop export opportunities for products and services in international markets.

In FY 2020-21, about **$27 million** was delivered to **1,010 enterprises** through CanExport SMEs and CanExport Innovation.

The Trade Commissioner Service provided **advisory services** related to export to about **8,800 enterprises**.

CleanTech Programs

15 programs **$394** million **79%** non-repayable contribution **1300+** beneficiaries

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Beneficiaries

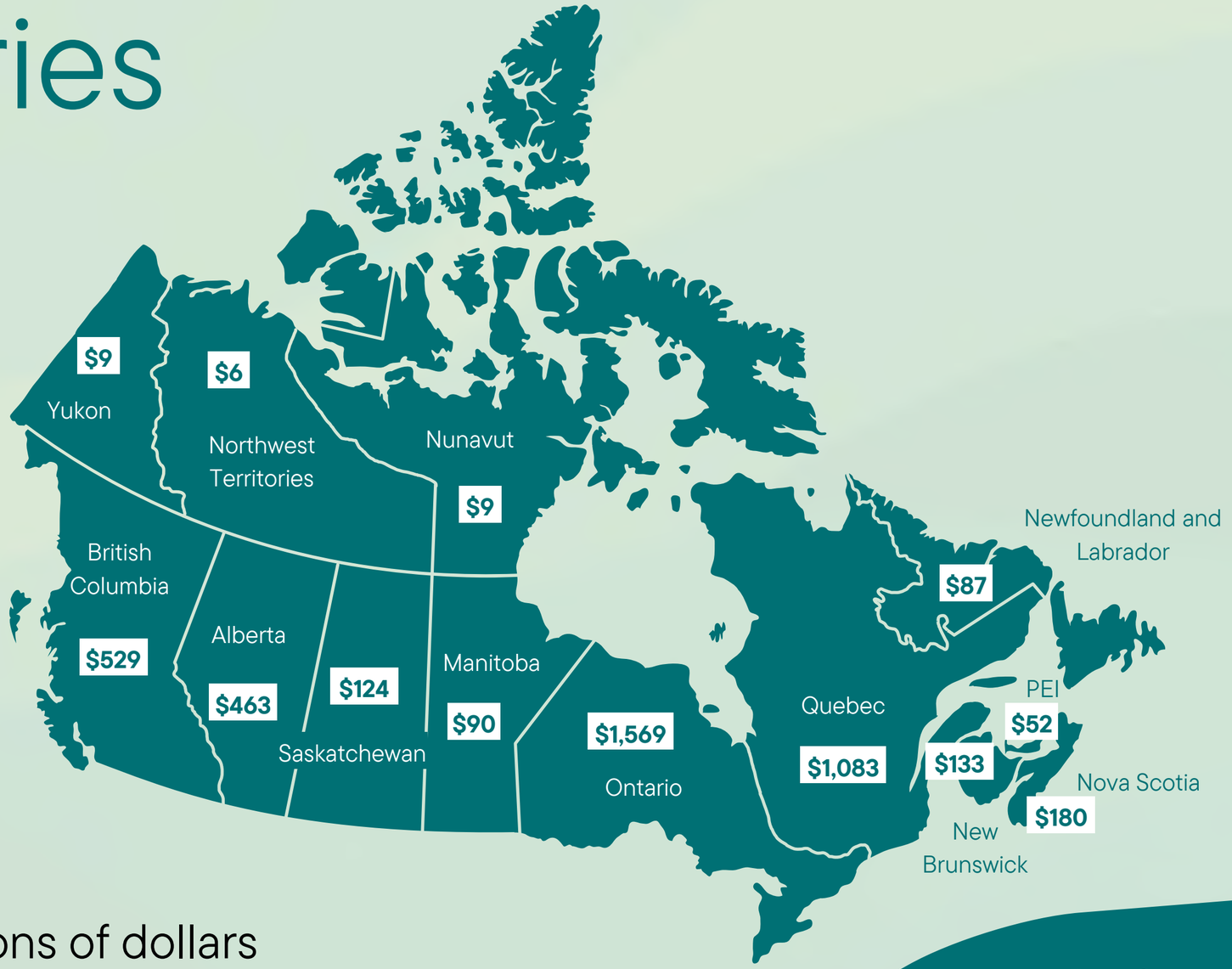
In 2020-21, total investment through federal BIGS programs was **$4.3 billion**

Among ultimate beneficiary enterprises:

- **96%** SMEs
- **89%** for-profit
- **25%** with positive R&D expenditures
- **23%** accessing multiple programs
- **5%** high-growth by revenue
- **4%** foreign country controlled

Beneficiaries

The value of support provided to BIGS program beneficiaries, by **province:**



Values are provided in millions of dollars

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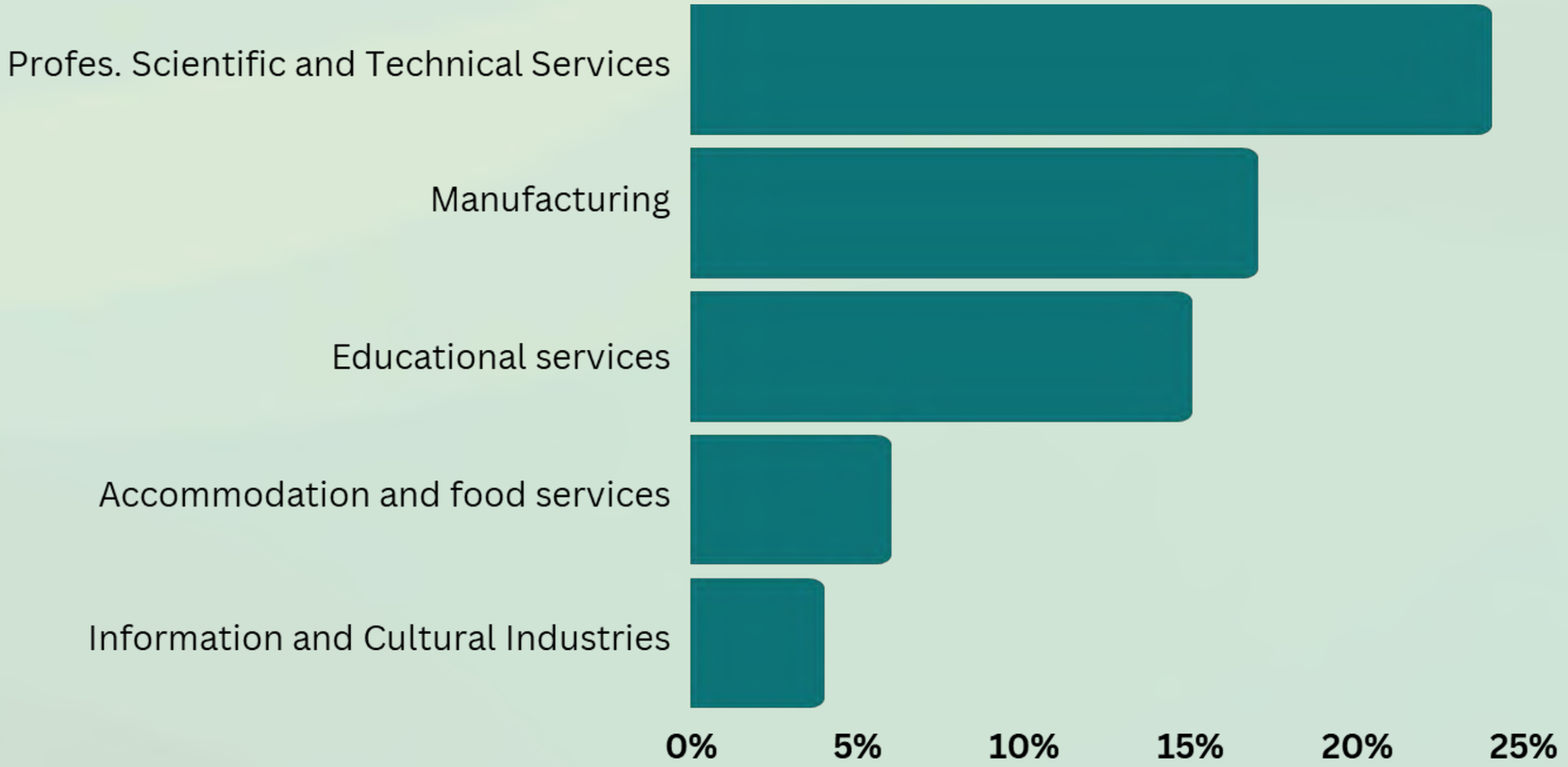
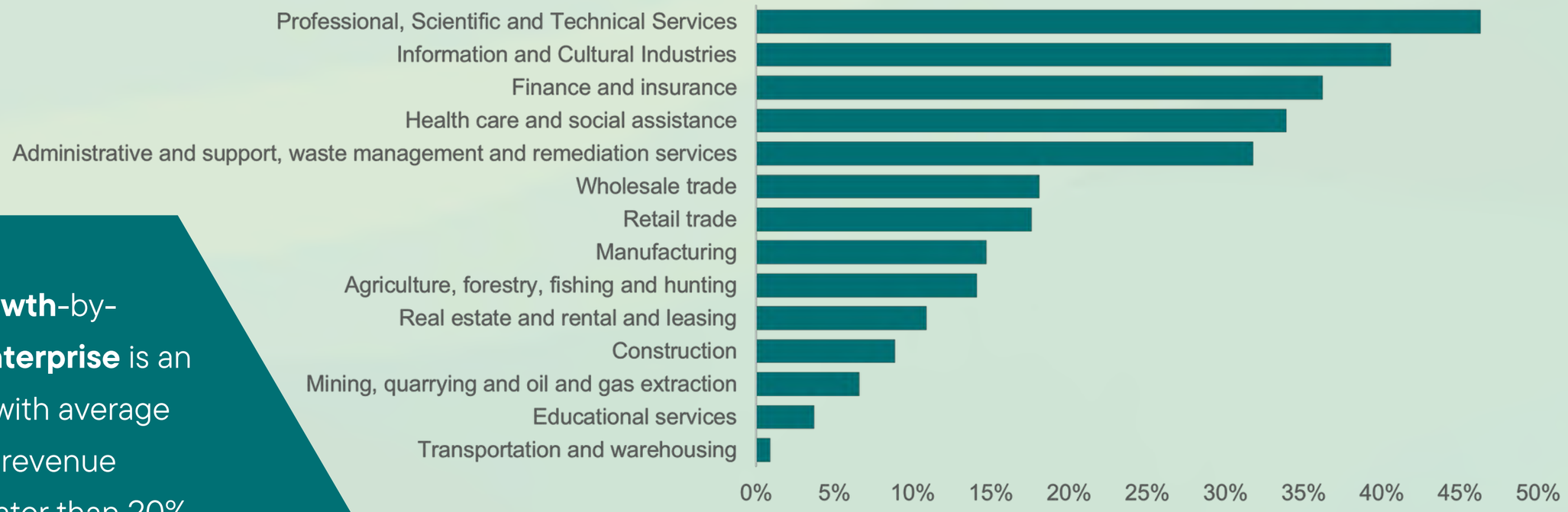
Beneficiaries

The value of support provided to BIGS program beneficiaries, by **industrial sector:**



Beneficiaries

Percentage of total subsidies provided to high-growth enterprises, by **industrial sector:**



A **high-growth**-by-revenue **enterprise** is an enterprise with average annualized revenue growth greater than 20% per annum over a three-year period.

Beneficiaries

Research & Development in 2020-21:

- **43%** of all R&D spenders in Canada received support from the federal innovation programs.

- The BIGS beneficiaries' R&D expenditure (i.e. $16 billion) accounted for **3/4** of the total R&D expenditure in Canada.

The population of all R&D spenders is defined by all businesses on the **LFE-RDCI dataset**.

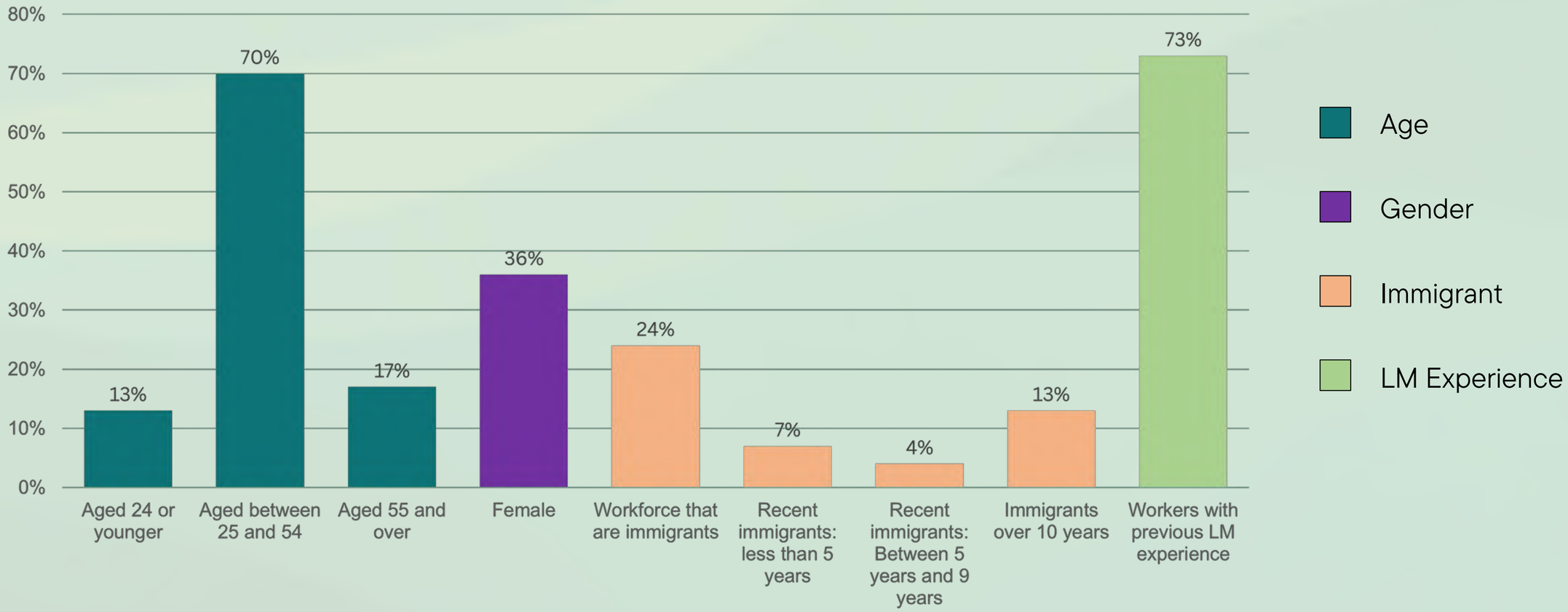
Beneficiaries

Diversity of ownership in BIGS beneficiary enterprises:

- **11%** majority women-owned
- **14%** majority immigrant-owned
- **35%** majority younger than 50 years old
- **36%** majority without previous labour market (LM) experience

Beneficiaries

Diversity of employees in BIGS beneficiary enterprises:



Impact

- BIGS has a **positive and statistically significant** impact on beneficiaries' economic performance (e.g., employment, revenue, productivity).
- BIGS has a larger impact on the revenue and employment of **non-exporters than exporters**.
- The impact of "**grants and non-repayable contribution**" is positive and statistically significant.
- The reception of **advisory services**, without financial support in place, does not have a positive effect on input (R&D intensity and expenditures) or output (employment, revenue, profit, etc.) additionality.
- The vast majority of beneficiaries were **small and medium-sized enterprises** (SMEs). Empirical research results suggest that federal support had a significant and positive impact on SMEs innovation performance.
- The **manufacturing sector** received the most BIGS support. The analysis suggests that manufacturing enterprises supported by BIGS programs experienced stronger employment and revenue growth relative to non-beneficiary enterprises.

Impact

- Firms that have a higher set of initial capabilities, and have better financial standing, more effectively use government support to create additional knowledge and additional jobs.
- Results indicate an importance of providing **continuous government support**, in order to allow small firms to sustain the building of technological and innovation capabilities.
- **Complementarity** between programs is important.
- Government support for innovation targeted technology-intensive sectors which had relatively fewer entrepreneurs from **designated groups** (i.e., women, visible minorities, indigenous people, and people with disabilities).
    - High-growth SMEs owned by women who received the BIGS had a higher employment or revenue growth than those who did not receive support.
- Most **scale-ups** do not receive BIGS or SR&ED support, but more innovative scale-ups (i.e., R&D spenders or patenting firms) tend to get government support.
- Preliminary results suggest positive impacts on supported **scalers** and continuous scaling.

Capacity Building

DSRD is engaged with various activities that aim to build and support the program evaluation capacity of the BIGS community:

- Development and facilitation of **learning opportunities**
- Dissemination of **information** to the BIGS program community
- Coordination of a **central research agenda** in collaboration with BIGS departments

Learning & Training

October 2022

Workshop on industry-university collaboration

An international workshop on the impact of industry-university collaboration on regional innovation ecosystems in partnership with the OECD's EECOLE network. The event presented preliminary results to **60** participants from business associations, RDAs, provincial and federal entities, international organizations, and universities.

November 2022

Workshop on quantitative impact assessment

A two-day hybrid workshop on Quantitative Impact Assessment (QIA) in partnership with StatCan. **350** participants worked through a curriculum of lectures, case studies, and breakout sessions which covered the fundamentals of QIA, regression analysis, business microdata, and advanced QIA methods.

Planned:

September 2023

Workshop on innovation support and scale-up firms

November 2023

Workshop on building entrepreneurial ecosystems

2024

Workshop on quantitative impact assessment

Information Sharing

Platforms

DSRD is leveraging and developing **platforms** for improved information dissemination

- canada.ca
- GCXchange
- Partner websites
- YouTube

Fora

DSRD is using conferences, panels, and other **fora** to share research insights

- CEA Annual Conference
- OECD STI systems in transitions panel
- NACLICS PhD Academy
- UN BigData Hackathon

Research

In 2022-23, significant progress was made on the SRN research agenda:

BIGS Program Universe

These projects expanded our understanding of BIGS programming including program information, beneficiaries, and outcomes.

- BIGS Program Profiles
- BIGS Beneficiaries
- Diversity & Skills Database

BIGS Program Impact Analysis

These projects assessed the impact of BIGS programming by exploring various types of firms, metrics, interventions, and activities.

- SMEs Innovation Outcomes
- BIGS Impacts with CDM Model
- Impacts on Manufacturing Firms
- Crowding-in or crowding-out?
- Net Present Value of Funding

Specific Research Topics

These projects explored specific topics which are particularly relevant to today's BIGS landscape.

- Scale-ups and Innovation
- Corporate Innovation Inequality
- Employment Equity Act Groups

Thank you!

Contact information:

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