

# EMILI – Pre-Budget Consultation Submission

## Executive Summary

Canada will have the **most advanced agricultural economy** in the world if it:

1. *Facilitates the commercialization* of our global industrial strength in machine learning and artificial intelligence technology across the agfood sector;
2. *Supports market actors* across our technology, agricultural and venture sectors to scale Canadian Ag-AI companies to export new products and services to global markets (and develops and protects high value Intellectual Property).
3. *Provides opportunity for workers* to be trained and re-trained for the data driven agfood and technology jobs of the future; and
4. *Supports new opportunities for investment* into the sector and Canada in general.

Led by CEOs, the Enterprise Machine Intelligence and Learning Initiative (EMILI) has rallied the technology and agfood sectors around 18 initial Ag-AI projects across Canada's agfood economy (e.g. crop/animal production and optimization, hemp and protein processing, Indigenous peoples food production and health, pest surveillance, plant/animal health, equipment manufacturing). It has a co-investment plan to drive \$521M+ including private sector investments, to transform the sector and create wealth and jobs for the future.

## Recommendation

**EMILI is recommending a federal investment of \$155 million to serve as an accelerator and convener for Ag-AI innovation.** The combination of the very best of our technology companies with our agricultural expertise and assets will help to achieve:

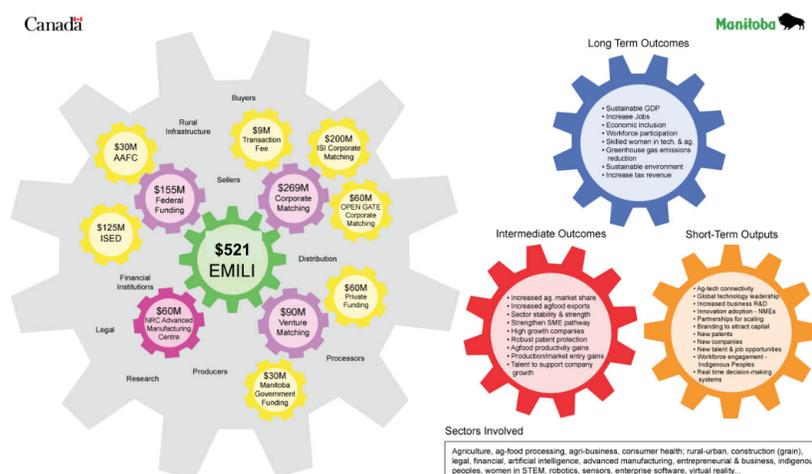
1. *Innovation for Canada* - retain talent, scale companies, improve access to capital, and increase middle class jobs, improve intellectual property development and retention;
2. *Increase agfood exports* - both traditional agfood products as well as new high value Ag-AI companies.

This investment will help to derisk the economy from the impending threat of automation, and support the creation of wealth and middle class jobs for a data-driven world. EMILI will pull smaller companies through to commercialization and create synergies with large companies to adopt innovation and become global leaders in agfood. This will also position Canada as a leader in the production of products and services for the developing world, assisting with greater gender parity.

## Introduction

Recognizing Canada has the opportunity to generate economic benefits for Canadians by building on its natural competitive advantages in artificial intelligence and machine learning and agfood (as well as across other industrial sectors) the Enterprise Machine Intelligence and Learning Initiative (EMILI) was formed in 2015. In 2016, it narrowed its focus on the agfood sector - a high growth, low productivity sector, with many Canadian companies right in the bulls-eye of new disruptive technology being developed around the globe. EMILI has a plan to drive \$521M+ to transform the sector, derisk the economy, and create wealth and jobs for the future.

### Co-Investment & Network Acceleration Model: Ag + AI + Data = New Industries, Exports



Consistent with the Advisory Council on Economic Growth (ACEG) Report, EMILI has a bold vision. It is to leverage Canada's industrial strengths in AI and agriculture to develop the most advanced agricultural economy in the world through:

1. *Transforming the legacy agfood sectors with new AI embedded (self-learning) technologies,*
2. *Development of a new industry around Ag-AI technology (in which the ownership of IP and the means of productivity is a key industrial asset) and*
3. *Supporting the training (and retraining) of the middle class to capture the new data-driven jobs of the 21st century.*

Building upon its historically and economically important agricultural equipment-manufacturing sector (\$4.5B annual revenues), Canada has the opportunity to be **the producer of Ag-AI automation** for the world rather than the purchaser. Canada also has the necessary key talent strengths across the country in high-tech transportation maintenance and servicing (e.g. Winnipeg aerospace) suitable for the growth of Canada as the AI maintenance and servicing centre in North America. AI will lower the cost of agricultural processing and improve productivity and environmental sustainability. It creates cost-effective means of production - the key reason behind why a Toronto consortium plans to

build an automated hemp processing plant in Manitoba, manufacturing environmentally sustainable materials for the building industry.

## Strategic Need for EMILI

As the ACEG identified, **the agri-food market has a massive economic, social and environmental global footprint**, and is poised for growth. Global agribusiness and food sales amount to \$13 trillion across the value chain. Employment in agriculture is 40 per cent of worldwide employment, rising to 80 per cent in undernourished, rural populations. GHGs tied to agriculture make up 30 per cent of total global emissions. Food production is one of the world's most pressing needs. Global food demand is being driven by population growth. Caloric intake is increasing as incomes and the middle class grow, while rising obesity rates demand food systems solutions that are intelligent enough to solve nutrient security as well as food security issues (ACEG, 2017).

**At the same time, the world is entering the age of AI/ML - the fourth industrial revolution.** This general-purpose technology is the biggest game changer in global industrial operations, intellectual property and jobs since the Internet. It is contributing to record-breaking accuracy across industrial sectors. In 2015, the AI industry was a USD 5 billion marketplace; anticipated to rise to a USD 12.5 billion industry and market cap of USD 120-180 billion by 2020 (UBS, 2016). More than 2,500 start-ups globally now have AI as a core part of their business models. Canada has been a leader in AI through the development of deep learning and reinforcement algorithms at Canadian universities. This head start is at risk - other jurisdictions are recruiting our top talent and capturing intangible assets, such as IP. Other countries are on the move, upending legacy production, processing and consumer services.

### *AgFood Sector Imperative*

The agriculture and agri-food sector is one of the foundations of the Canadian economy. It is a key driver for economic growth and job creation, generating over \$108 billion for the Canadian economy annually and close to seven per cent of our GDP. One in eight jobs come from agfood sector, employing 2.2 million people. Employment is dispersed across rural and urban areas. These jobs are a strong force for economic and social inclusion. The food and beverage processing industry is the largest of all manufacturing industries in the country, accounting for over 17 per cent of manufacturing jobs. Success is built into the country's extensive and strong agriculture research base, and government supports for the sector. Demand for Canadian meat and dairy products will rise, as milk and meat consumption increase with a growing global middle class.

### *The Canadian Imperative: Avoiding Missing Out on Innovation Opportunities*

Improving the productivity/competitiveness of the Canadian agfood sector will be propelled by a targeted application of new technologies and IP capture. **Embedding AI into the DNA of our agfood and innovation ecosystem is the Canadian imperative to avoid innovation deficits and harvest Canada's massive agricultural datascape**, one of our natural resources.

Despite more than a decade of *innovation agendas* and *prosperity reports* Canada remains near the bottom of its peer group of countries on innovation. Canada is on a path to poor long term economic growth. The ACEG report estimated a drop in GDP growth by 53 per cent (decrease from 3.1 per cent to 1.5 per cent annually) and a drop in employment growth by 85 per cent (from two per cent to 0.3 per cent annually) over the next 50 years. The problem further shows itself in declining incomes per capita and quality of social programs. The

primary reason for this is that Canadian companies have been slow to adopt leading edge technologies. Companies are under investing in innovation-related technologies, especially as compared with their US counterparts (Conference Board 2015, ACEG 2017). The reasons for this include low connectivity between technology innovation and anchor companies in the sector and lack of cost-competitive technology talent.

### **Intellectual Property Problem**

Canada has for decades attempted to build an innovation and commercialization strategy in agriculture through research networks and centres. Academic and collaborative partnerships have flourished under the above model, with scientific publications as the primary output. Valuable patents get developed in the first 10 years of the commercial wave. While the rest of the world has increased patent filings by 23 per cent annually in the last five years, Canada's filing rate has dropped by 13 per cent. In agriculture, Canadian scientific activity comprises four per cent of all scientific publications. Yet despite this, Canada has a weak patent filing of less than 0.1 per cent of global agricultural patents. Equally, the top 15 Canadian academic players have a weak patent filing, with nine out of the 15 U15 Universities in Canada having no patent filings in agriculture since 2000. Chinese universities have been assigned 314 patents since 2000. Further, foreign agriculture companies feature (10 out of 15) among the top 15 industrial patents assignees in Canada. The best Canadian performer is Manitoba's MacDon.

Canada is missing out on the US \$280 billion patent licensing and royalties paid annually.

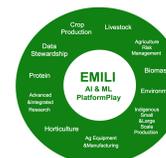
### **Further Details on EMILI**

EMILI is a CEO-led not-for-profit, headquartered in Winnipeg, MB. It's regional focus is western Canada, with pan-Canadian impact. AI technologies and tools developed in one corner of the agricultural economy will have application for accelerating productivity and competitiveness in other areas. EMILI is a broad sector initiative. EMILI's membership structure is as follows:

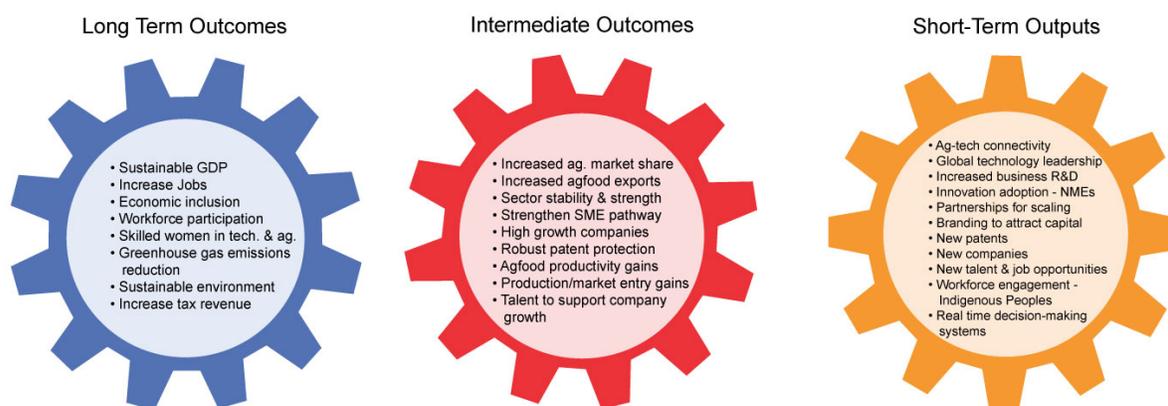
1. **EMILI Board Governance** - CEO-led, Senior Training/Academic Leaders
2. **EMILI Founding Members** - provided seed funding to support supercluster formation
3. **EMILI Investor Member (Matching Contribution)**; Financial contribution, 50% matching from EMILI. Projects must integrate some form of AI/ML, have 1-4 Canadian industry/technology partners
4. **EMILI Cluster Member** 500+ employees: \$10,000 (\$2,000/year). 100-499 employees: \$5,000 (\$1,000/year). 1-99 employees: \$2,500 (\$500/year).
5. **EMILI Affiliate Groups: No Charge.** Research, Academia. Talent Development, Associations, Incubators, Accelerators, Government, International Development.

EMILI's core business activities include:

1. **Commercialization & co-investment model** - EMILI will match private sector investments (up to 50 cents on the dollar) to accelerate AI innovation adoption, productivity, competitiveness and new market;
2. **Access to venture capital for growth for Canadian firms** - EMILI has developed a \$90M direct investment venture fund to accelerate global market entry and adoption of Canadian AI products and services (Bison Fund);
3. **IP Protection** - EMILI has partnered with Waterloo-Toronto based AiX, to provide access to intellectual property experts to build a robust patent Ag-AI portfolio for Canada. Members will get access to experts on litigation strategy. AiX will build a prior-art library to assess members with defences and provide advice on IP exposure reduction and licensing;
4. **Skills development and capacity building** - EMILI will develop innovative approaches to AI skills development and broadening workforce participation, working with the training and skills development sector across Canada and with a focus on Indigenous peoples, women, and middle class jobs;
5. **Sector Convenor** - EMILI will leverage its CEO network to rally technology, agriculture, high net worth individuals and capital markets sectors to work together to achieve company growth objectives, expand on current engagement momentum. This includes specially-design **AI convening and knowledge exchange platform** in which members can interact directly with EMILI.



EMILI's ultimate goal is sustainable GDP growth. Aligned with the federal government's innovation objectives, our long-term goals, intermediate outcomes and short term outputs and production goals are detailed below.



## Conclusion

The leveraging of resources across EMILI's membership base (agriculture, technology, financial, legal, academic and not-for-profit) and the size of both the agfood and AI market create an **endless list of immediate tangible opportunities** for new revenues streams and exports for Canadian SMEs and large firms.

EMILI will fast-track new products to market. By focusing on IP protection and an area of value to "Silicon Valley", EMILI will drive much needed capital to Canada's agriculture sector and in turn foster further business opportunities. Network/food transportation, food processing, and field systems will be immeasurably improved through intelligent AI systems.

There exists a unique opportunity through EMILI for Canadian businesses to play a more prominent role in **international development**. There is no larger intersection between economics, environment, and humanity, than that of agriculture.