

Fact Sheet

CAAIN Announces 2020-21 Open Competition Recipients

About CAAIN

- The Government of Canada’s [Strategic Innovation Fund](#) (SIF) is managed by [Innovation, Science and Economic Development Canada](#).
- The [Canadian Agri-Food Automation and Intelligence Network](#) (CAAIN) was announced in July 2019 as one of the winners of SIF’s Stream 4 “Automation and Digital Technologies in Canada’s Agriculture and Agri-food Sector” competition.
- CAAIN was created by eight founding partners across five provinces—British Columbia, Alberta, Saskatchewan, Ontario, and Quebec:
 - [Alberta Innovates](#)
 - [DOT Technology Corp \(now Raven Industries\)](#)
 - [Lakeland College](#)
 - [Linamar Corp.](#)
 - [MDA](#)
 - [Olds College](#)
 - [TrustBIX](#)
 - [Vineland Research and Innovation Centre](#)
- CAAIN is a not-for-profit company launched in July 2019 with a \$49.5-million SIF contribution and a mission to create technological solutions for the most challenging problems facing Canada’s agri-food sector.
- To date, CAAIN has announced \$17 million in funding for 16 projects through a closed competition, restricted to submissions involving at least one of the eight founding partners, and a pan-Canadian open competition launched in October of 2020.
- Later this year, CAAIN will announce the recipients of a second Canada-wide open competition launched in October of 2021.
- Each team applying for CAAIN funding must include at least two small or medium enterprises (SMEs), and all project participants must be Canadian entities operating in Canada. SMEs are defined as businesses with 499 or fewer employees. Collaboration with academia and research organisations is encouraged but not required.
- Funded projects will fit into one or more of three areas of focus:
 - Automation and robotics
 - Data-driven decision-making, and
 - Smart farms
- The intellectual property (IP) and research data resulting from CAAIN-supported project remain with the applicants.

- CAAIN funding takes the form of reimbursement for clearly defined eligible expenditures and range from 20 per cent to 40 percent of a project’s cost, depending on various factors, including:
 - Optional inclusion in CAAIN’s high-level IP catalogue, accessible by CAAIN members
 - Agreeing to have project data sets referenced in the CAAIN data catalogue, accessible by CAAIN members
 - Potential economic, social, and/or environmental benefit to Canada
- Interested parties are invited to visit the CAAIN website, caain.ca for more information or to download the Program Guide. If you don’t find what you’re looking for, email your query to info@caain.ca.

Summaries of the Newly Announced Projects

Project Name:	GeoAI Platform for Automating Manual Observation Associated with Wheat Production
Summary:	<p>Canada’s grain sector is a key economic driver, contributing over \$20 billion in wheat export sales annually. Product quality is critical component of the grain value chain, impacting everyone from producer to consumer. Evaluation is the responsibility of grain inspectors, who must manually identify, separate, and analyse degrading kernels to determine a sample’s quality and grade. These subjective results can be unreliable, inaccurate, and may result in conflict between the buyer and seller, damaging important commercial relationships. For many years, the industry has sought an affordable solution capable of delivering a quick and accurate end-use quality assessment based on representative samples.</p> <p>This project team of agri-food companies and academic institutions will employ diverse technologies to develop a novel geospatial artificial intelligence (GeoAI) platform proof-of-concept that automates manual wheat-production observations. The GeoAI team will leverage geospatial, deep learning, machine vision, and high-performance computing technology to evaluate three representative primary objective characteristics and one subjective characteristic in Canada Western Red Spring Wheat kernels.</p> <p>Following the initial 15-month CAAIN investment period, R&D will continue, leading to eventual commercialisation and product adoption. The goal is to create and market a scaled-up, all-in-one GeoAI-driven cloud platform that automates numerous agricultural tasks, with a focus on grain grading. This will reduce manual observation requirements, increasing productivity, profitability, sustainability, and competitiveness for Canadian grain producers.</p>
CAAIN Contribution:	\$372,074
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Project Name: Automation and Scalability of SWAT MAPS to Advance Canadian Agriculture

Summary:

Croptimistic Technology Inc., a Canadian AgTech company, has assembled an impressive partnership to achieve its project goal. This initiative will see academic and on-farm researchers, industry players, and smart farm staff collaborate to develop and demonstrate new soil technologies, and then validate them with agricultural producers.

Farmers spend most of their budget on soil-applied inputs—think fertilizer, seed, and herbicides. They need precise soil, water, and topography (SWAT) data when planning optimal site-specific applications. “Crop potential” technology such as satellite imagery of biomass and growth is relatively common. Far more difficult to source is accurate, automated, artificial intelligence-ready “soil potential” information generated by soil-based hardware and software—information of vital importance to farmers planning optimal input application. Already used for soil sampling and variable-rate fertilizer on millions of acres, SWAT MAPS is a patented process that uses multiple layers of data to build that needed single soil map.

This project will expand SWAT MAPS’s capacity, eventually allowing it to answer questions such as, "Which seed varieties grow best in dry zones, wet zones, or saline areas?" SWAT CAM, an affordable, automated, high-resolution image-capture system, will apply machine learning analysis to understand crop establishment and map weed pressure across entire farms, supporting variable-rate seed prescriptions. SWAT MAPS research will be applied in potato growing-areas to inform agronomic improvements. Remote sensing artificial intelligence (AI) will support on-farm trial evaluation, allowing measurement throughout the growing season.

By collaborating with commercial and smart farms across the country, SWAT MAPS will develop scalable analytics and agronomic validation solutions supporting the widespread adoption of precision agriculture. This, in turn, will improve producer profitability and environmental sustainability. From soil-based AI to scalable field execution, this project will lead the way as Canada's premiere soil technology collaboration.

CAAIN

Contribution: \$1,100,000

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Project Name: Digitizing Fomite Contact Tracing to Mitigate Pathogen Spread in Agriculture

Summary:

“fomite”

noun

fo·mite | \ 'fō-,mīt \
plural fomites \ 'fō-,mīts ; 'fä-mə-,tēz , 'fō- \
Definition:

an object (such as a dish, doorknob, or article of clothing) that may be contaminated with infectious agents (such as bacteria or viruses) and serve in their transmission
([Merriam-Webster Online Dictionary](#))

The impact of disease transmission on the viability of Canada’s livestock and poultry sectors cannot be overstated. This segment of our nation’s agriculture industry is a major economic contributor, and any interruption of the supply chain results in significant costs, whether to consumers through higher food prices, or to taxpayers in the form of government compensation for catastrophic losses.

Transport systems link livestock and poultry farms production sites and processing plants. This network spreads pathogens, first by animal-to-animal contact, followed by people and vehicles (a.k.a. “fomites”—now you know why we included a definition). Appropriate contact tracing is an important but poorly used industry tool. A high-tech, real-time track-and-trace process could vastly improve outbreak response times, use analytics to predict disease spread, and significantly reduce associated costs. Existing monitoring systems are neither current nor centralised. Furthermore, efforts to organise and validate on-farm information are largely wasted as a result of inadequate compliance with biosecurity standards.

This project seeks to identify a cost-effective sector-wide technological solution capable of generating real-time track-and-trace data to mitigate the effects of disease outbreaks in the livestock and poultry industries. Ideally, the platform will be implemented regionally, then provincially, and eventually across Canada. The research team will compare features and capabilities of existing technologies, evaluating how each produces, analyses, and displays data to be accessed and used in an emergent situation by regulators and disease management professionals. Criteria will include the ability to integrate artificial intelligence to combine and convert models and real-time data into disease spread predictions.

CAAIN

Contribution: \$50,757

Contact: Rob Hannam
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Project Name: Precision Ranching for Improved Reproductive and Grazing Efficiencies

Summary: The famous question, “Where’s the beef.” is easy to answer. A far tougher nut to crack is determining how fertile a cow is and what quality offspring she will produce. This is a critical factor in determining ranch profitability—reproductive issues are the main reason for culling females. While commercial beef bulls undergo detailed reproductive evaluations, cows are often assessed only visually. This apparent disparity is understandable, given that males are viewed as having the greater impact on genetic (i.e., economic) herd improvement. However, it is also true that cows have a larger economic influence on costs, given their year-round feed expenses and their need to produce a marketable calf every year. Adding to this challenge are chronic agricultural labour shortages. All these factors combined make it imperative to introduce affordable automation solutions to ranching activities.

By using remote sensing technology on individual animals, this project team will seek to identify and evaluate location, activity, temperature, and behaviours that determine:

- Age at puberty;

- Estrus;
- Libido; and,
- A bull's ability to service cows.

Defining these and other predictive aspects of reproductive efficiency could help avoid allocating costly labour, feed, facility, and land resources to unproductive cattle. The project will evaluate various promising technologies to create alerts warning operators of breeding activity, stress events and pasture use. Digital automation tools and data sets will be merged, creating technology packages that will allow ranchers to make informed decisions on the fertility of cows and heifers, thereby improving productivity, profitability, and sustainability.

CAAIN

Contribution: \$142,765

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Project Name: Development of Automated Smart Device for Pork Marbling Assessment

Name:

Summary:

Marbling in red meat is so named because the streaks of fat resemble a marble pattern. It adds flavour and, therefore, is one of the main criteria for judging meat quality. Typically, the more marbling, the better the cut. Canada Pork International, the export promotion agency of our nation's pork industry, has developed a quality-based classification system that confirms the importance of marbling in determining meat quality. Unfortunately, existing assessments tend to rely on visual inspection, which in turn requires that the loin be cut, a difficult, unreliable process that devalues the meat in question. In an effort to standardise pork grading, MatrixSpec has developed and validated in research-scale testing Marbling Meter, an automated loin chop marbling assessment tool.

The proposed project will develop an upgraded prototype appropriate for industrial use, expanding capacity so that it can assess marbling on the entire loin from the outer surface without any cutting. MatrixSpec will test and validate the system in a pork processing plant. This project will also deploy big data analytics on a pork quality evaluation database to investigate factors influencing marbling including, among others, management practices and breed. The goal of this aspect of the initiative is to build an intelligent platform capable of predicting marbling based on appropriate management information. Marbling Meter will be used to verify those findings.

The upgraded system will apply artificial intelligence, image processing, and pattern recognition to automate marbling assessment in varying sizes and scales of pork processing plants. The end result will be to improve the Canadian pork industry's operational efficiency, productivity, competitiveness, and profitability. Furthermore,

by adopting these technological innovations, processors will create new and better positions, allowing employers to re-train their top employees and attract and retain highly skilled workers.

CAAIN
Contribution: \$301,428
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Project Name: The Utilisation of 3-D Real-Time Multispectral Cameras to Identify the Liveweight, Optimal Slaughter Weight, and Carcass Weight in Pre-Slaughter Cattle

Summary: This project will validate the use of exciting new technologies (sensors, multispectral imaging, and conception-to-consumption traceability software) to provide accurate, real-time assessment of cattle growth, body fat, and carcass composition, as well as beef industry-specific information on the health and wellbeing of cattle.

The intelligent automated collection and use of such data are keys to understanding what is produced and what is thrown away. This will allow players along the supply chain to reduce waste, cost, and carbon emissions, thereby improving the competitiveness and sustainability of Canada's beef sector. The resulting improved social licence and profitability will benefit the entire industry—consider that a 1% increase in beef feed efficiency at the pasture level would return \$11 million to the sector.

The project will also support some of the goals identified in the *2020-2024 National Beef Strategy's* four pillars of beef production.

Pillar	Supported Goal(s)
Demand	Improve AAA cutout ¹ by 2 percentage points
Competitiveness	N/A
Productivity	Improve calf crop by 2 percentage points & Reduce average calf death losses to 5%
Connectivity	N/A

This initiative will advance the development, value, and use of automation, blockchain, and artificial intelligence within Canada's beef industry. This will, in turn, increase and improve sector-wide data collection and sharing, the net result of which will be to optimise production and minimise waste and loss.

CAAIN
Contribution: \$354,647
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¹ Beef cutout represents the value of a carcass based on the value of individual cuts.

Project Name: **Field to Glass - The Next Generation of Barley Traceability**

Summary: The Next Generation of Barley Traceability consortium will build an end-to-end digital system that uses distributed ledger (a.k.a., blockchain) technology to trace Canadian-grown malt barley through every stage of the value chain—hence, “Field to Glass.”

By collaborating with diverse supply chain partners such as seed companies, farmers, malt houses, breweries, and certifiers, this secure platform will connect previously disparate data systems. This, in turn, will connect the players by means of a new and invaluable digital feedback loop.

What’s more, a subset of the data can be shared using a public-facing digital passport to highlight the end product’s origin story, available to interested consumers by the simple expedient of scanning a QR code on the label. In addition to meeting Canadian Food Inspection Agency requirements for food traceability and transparency, the information provided will increase public awareness and trust by educating shoppers on the agricultural supply chain.

Blockchain is ideal for the project, as it provides a single, secure, digital, and provable production pathway. Using this technology will also offer consortium members insight into how the agri-food sector as a whole can benefit from blockchain’s growing popularity by applying it to areas such regenerative agriculture and the reduction of carbon footprints.

In short, “Field to Glass” will allow the Canadian barley and brewing industry and its farmers to differentiate their products by proactively answering consumer questions through the sharing of verifiable food origin stories, thereby adding value and creating global brand recognition.

CAAIN

Contribution: \$478,888

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