Created at Guelph

UNIVERSITY of GUELPH

RESEARCH INNOVATION

2017–18 Annual Report

Letter from the Executive Director

The Research Innovation Office (RIO) at the University of Guelph moves knowledge into action. It enables researchers to take their discoveries and mobilize them into real-world applications. Our inventions help create jobs, protect the environment and improve life.

In 2017–18, RIO played an integral role in helping ensure that the incredible research conducted at the University of Guelph made significant impact. Through the Accelerator Guelph program, the RIO provided entrepreneurship training to researchers interested in playing a greater role in the commercialization of their research. Six teams joined our pilot cohort; three of them started new companies in fields spanning aquaculture, the environment and agri-food.

We also launched a new knowledge mobilization program that provides support to research teams to help increase the awareness and uptake of their innovative research.

The University continued to deliver excellent results regarding reports of invention and innovation. An impressive 190 new inventions were reported to RIO, and six new start-up companies were formed. Since 2007, University of Guelph start-ups have raised more than $43 million and created more than 140 direct jobs. RIO also continues to help companies create successful research partnerships on campus, participating in 60 successful partnered research projects over the past two years.

In this report, you will find some of the stories behind these numbers, covering a breadth of achievement including agriculture, food, health, the environment and physics.

We look forward to another stellar year ahead to build on these achievements that amplify the impact of University of Guelph research.

Sherri Cox, Executive Director

Research Innovation amplifies impact.

Create.
Amplifying impact.

- Developing a commercialization or knowledge mobilization strategy.
- Safeguarding intellectual property.
- Providing mentorship and entrepreneurship training.

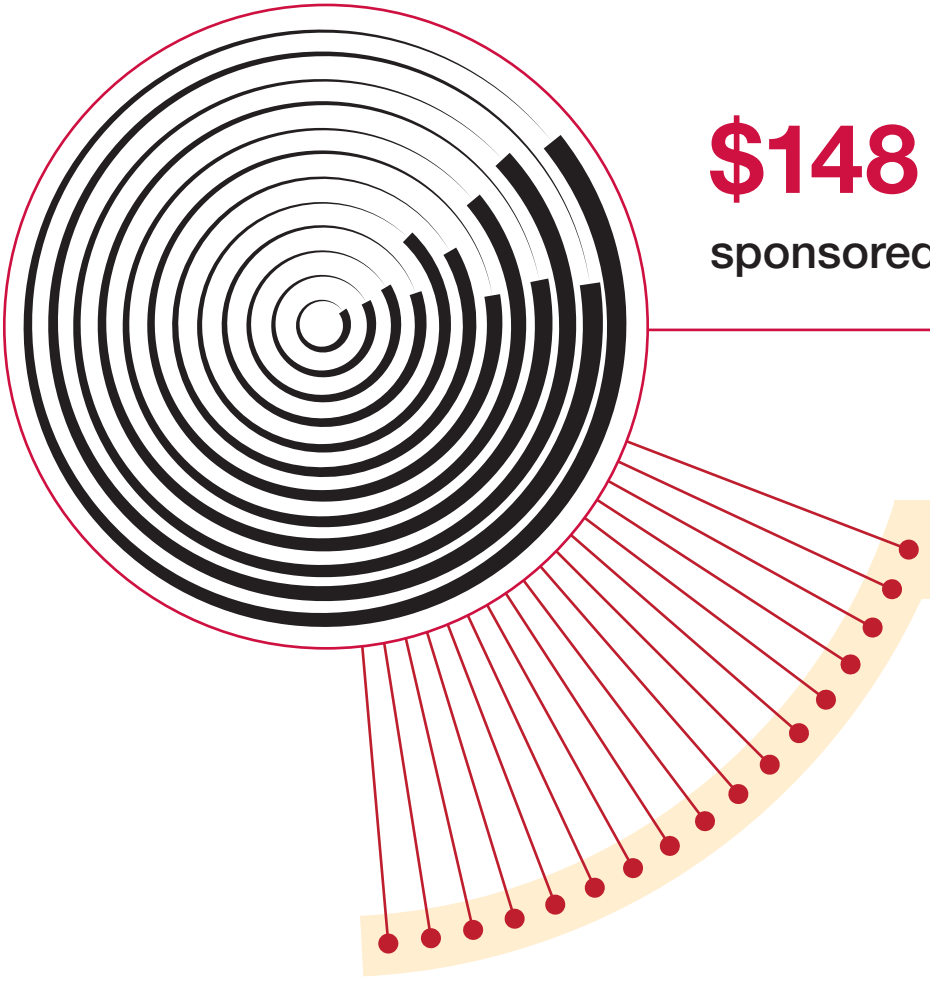
Collaborate.
Expanding reach.

- Developing connections with industry, government and external organizations.
- Giving advice on funding opportunities and partnership agreements.
- Expanding the influence of U of G research.

Commercialize.
Realizing full impact.

- Supporting invention with customized patenting and licensing.
- Starting and scaling businesses based on U of G research.
- Securing funding to create market-ready products.

Measuring Impact in 2017–18



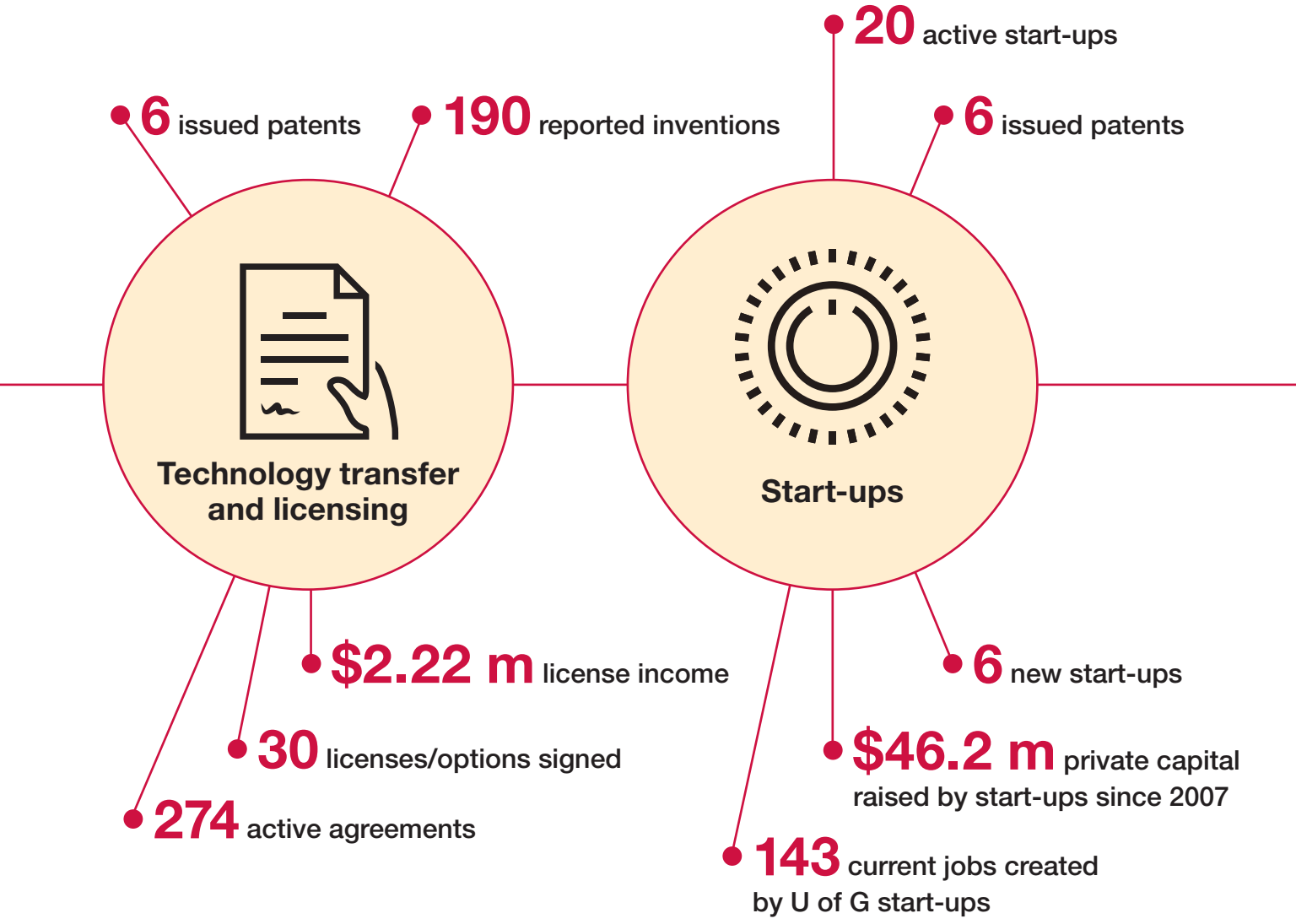
$148 million

sponsored research at U of G

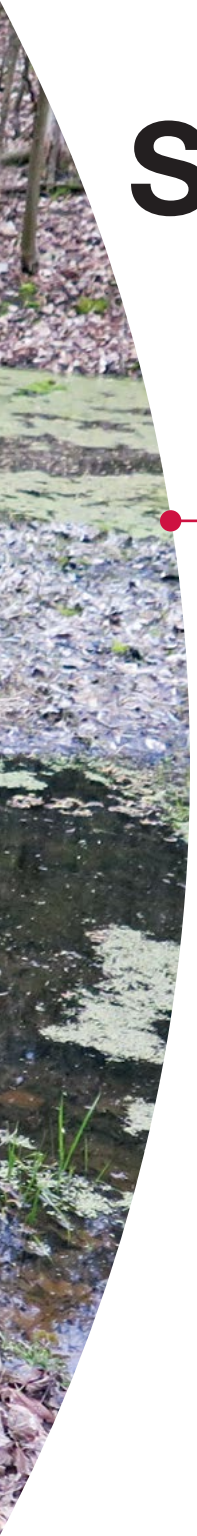
Innovation grants

$465,000

in innovation grants distributed to **16** innovative research projects


6 issued patents
190 reported inventions
Technology transfer and licensing
$2.22 m license income
30 licenses/options signed
274 active agreements
20 active start-ups
6 issued patents
Start-ups
6 new start-ups
$46.2 m private capital raised by start-ups since 2007
143 current jobs created by U of G start-ups

Start-up Highlights



Environmental sampling by Precision Biomonitoring

Photo: Precision Biomonitoring

Precision Biomonitoring

Accurately surveying potential building locations for the presence of a species at risk can often require a lot of time, money and luck. Using tools developed at the Biodiversity Institute of Ontario by researchers including Professor Bob Hanner (*Integrative Biology*), Precision Biomonitoring provides services to identify species in the environment by detecting DNA traces that they leave behind. This new technique enables the detection of species in a location without capture or direct observation, allowing better decision making.

FloNergia

Airlift pump technology developed by Professor Wael Ahmed (*Engineering*) is changing the way oxygenation and water flow are managed in aquaculture and aquaponics systems. The systems reduce energy use by 50 to 70 percent and have fewer moving parts compared to traditional systems. FloNergia is focused on expanding its markets, and in 2018 was named a finalist for Fast Company's World Changing Ideas Award and a "2019 company to watch" by *The Globe and Mail*.

Photo: Flonergia

Accelerator Guelph

accelerator GUELPH

In January 2018, RIO launched an entrepreneurship support program designed specifically for researchers who have developed commercially viable concepts in the course of their research at the University of Guelph.

Key stats from the pilot cohort

- **6** teams
- **3** have started companies

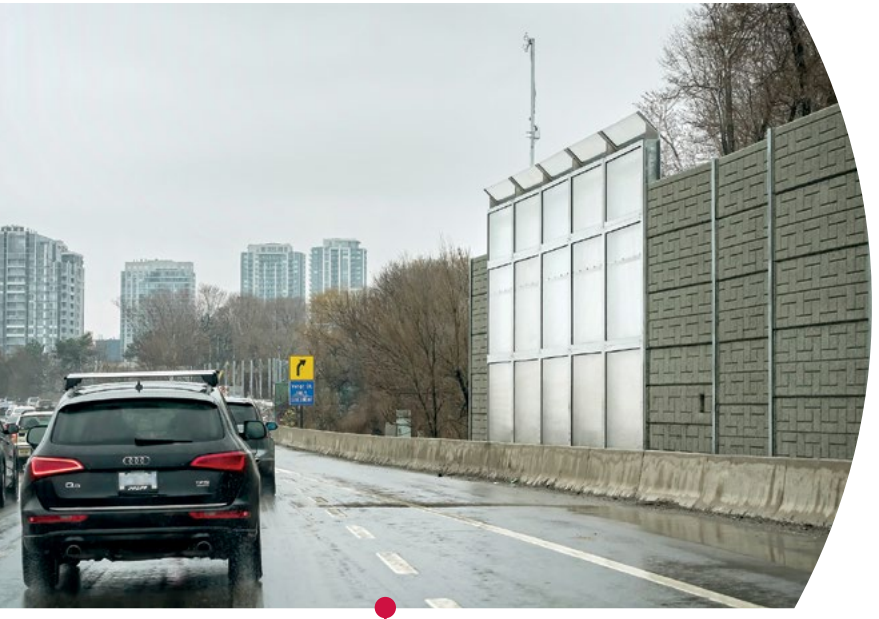
Based on the Waterloo Accelerator Centre's award-winning entrepreneurship training program, our Accelerator Guelph pilot cohort participated in 20 weeks of hands-on workshops, mentorship and the use of online planning tools. Of the six researcher-led teams that participated, three have gone on to incorporate companies, enter the marketplace and join phase two of the Accelerator Guelph program, which helps budding entrepreneurs build momentum for their start-ups. The remaining teams report that they are now incorporating entrepreneurial thinking and tools into their day-to-day work on campus.

Given this initial success, the Accelerator Guelph program will continue to admit teams on a yearly basis with two intentions:

1. Amplifying the economic impact of research conducted at U of G; and
2. Fostering a culture of entrepreneurship on campus.

Accelerator Guelph cohort 1
Photo: Alex Rodgers

Innovation Highlights



A pilot version of the smog barrier installed along the highway

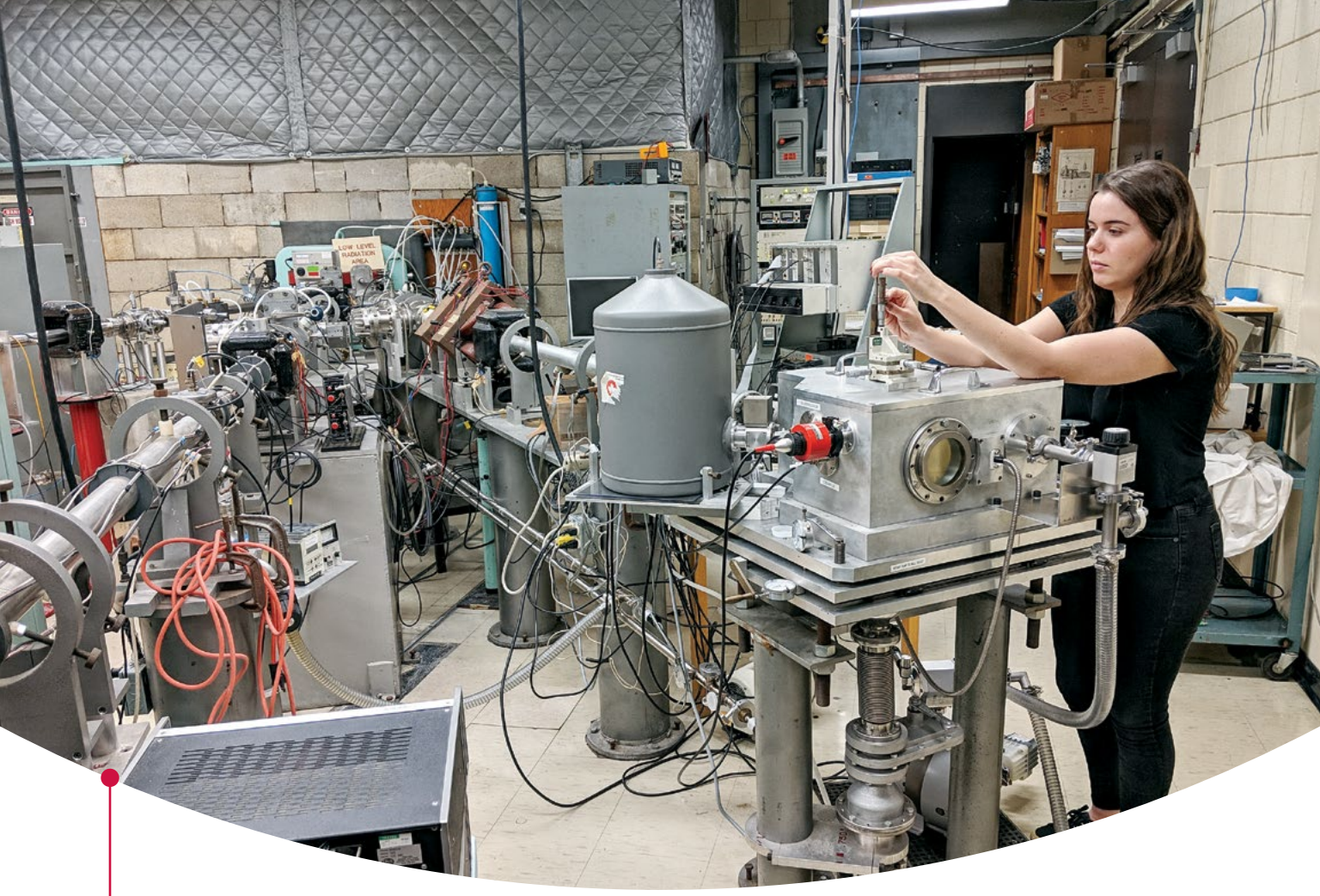
Photo: Bill van Heyst

Finding a solution to smog

The world's vehicles emit millions of tonnes of pollutants each year that are linked to health problems. Research from the lab of Professor Bill van Heyst (*Engineering*) is contributing to a solution. His team, together with Guelph company Envision SQ, has developed a roadside smog barrier coated with a photocatalyst that reduces pollutants such as nitrogen oxide by up to 50 percent. The smog barrier is being marketed by Envision SQ, who continues to support research and collaborate on improvements with van Heyst's lab.

Expanding the impact of Guelph soybeans

Enhancing the productivity of agricultural land will help meet the world's growing need for food and feed. In certain developing countries, including Ukraine, there is a need for high-yielding, non-GMO soybean varieties to improve crop performance for everything from animal feed to biodiesel production. Working with the company Cangro-Genetics Inc., varieties from both the Guelph and Ridgetown breeding programs are finding new life in Ukraine, helping farmers optimize the use of their land.



Software brings understanding to X-ray spectra

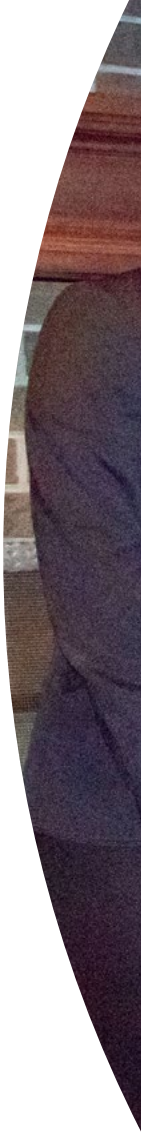
Determining the elemental make-up of a painting without ruining the art is one of many applications for proton-induced X-ray emission (PIXE). GUPIX and GUMAP software packages developed by Professor Iain Campbell (*Physics*) have become the global standard for PIXE practitioners to analyze their data. The software has been licensed to more than 170 institutions and companies worldwide, including art museums, universities and research centres.

MSc candidate Leanne Sargent prepares a sample for PIXE analysis.

Photo: Steve De Brabandere

Innovation of the Year

The annual award from the Research Innovation Office recognizes and celebrates U of G innovations with significant socioeconomic impact.



Professor emeritus Mansel Griffiths (*Food Science*) was selected as recipient of the 2018 Innovation of the Year award for pioneering the use of probiotic extracts to reduce the spread of harmful bacteria, enhancing the health and welfare of livestock and companion animals today, and eventually translating these benefits to humans in the future. Medical doctor Maira Medellin-Peña was also recognized for her contribution to the innovation.

MicroSintesis estimates that market applications of the technology are worth more than $12 billion.

"The work of Prof. Griffiths is an example of what the University stands for and demonstrates the vital importance of the research we conduct. The innovation he has achieved through persistent and tireless investigation is one that undoubtedly has the potential to improve life—whether by enhancing the life of farm animals or improving the general well-being of the human population," says Malcolm Campbell, Vice-President (Research).

To survive and thrive in the complex systems of human and animal gastrointestinal tracts, bacteria have discovered ways to communicate with one another and the host body. Griffiths' team discovered that probiotic extracts, known as proteobiotics, may effectively circumvent this communication. By blocking the chemical signals these bacteria transmit, intestinal infections can be prevented.

"I am honoured to be selected from all the brilliant research that is being conducted at University of Guelph," says Griffiths.

Start-up company MicroSintesis has partnered with the University to commercialize the proteobiotics. The company has conducted two clinical trials, launched four products

in animal health, and are refining their manufacturing process. MicroSintesis estimates that market applications of the technology are worth more than $12 billion.

From left: MicroSintesis CEO Hannah McIver, Professor emeritus Mansel Griffiths, Dr. Maira Medellin-Peña, U of G VP (Research) Malcolm Campbell.

Photo: Alex Rodgers

Knowledge Mobilization

Knowledge mobilization helps create opportunities for knowledge exchange between researchers and government, industry and the community — helping to move knowledge into action.

Services include mentorship, grant assistance, and presentation skills training.

At RIO, our newly formed Knowledge Mobilization team offers a number of services that help researchers to accelerate the adoption of research information. These services include mentorship and assistance for developing and executing knowledge mobilization plans for grants and projects, training in clear-language writing and presentation skills, and convening discussions between researchers and information end users.

Growing into 2018–19

The Food from Thought Policy Fellowships Program will bring senior policy-makers to campus for three days of intensive exposure to University of Guelph research. Fellows will engage with faculty to learn about cutting-edge research that can inform important policy decisions and will discuss emerging research and policy needs that could help inform research agendas.

In collaboration with the Arrell Food Institute, we will also develop a series of 10 discussion papers that bring together insights gathered from groups comprised of University of Guelph researchers from across all seven colleges and external stakeholders. These reports will provide a clear-language synthesis of interdisciplinary knowledge to address big picture challenges in agriculture and food — providing relevant, timely and useful information for decision-makers around complex, multi-faceted issues.

The Guelph Family Health Study is following families for 20 years to learn about how childhood health behaviours are maintained or change over time. It is an example of research being conducted together with community partners and will have a long-term impact on public health. Photo: Jess Haines

Industry Liaison

Our Industry Liaison (IL) team makes connections and provides strategic advice regarding federal and provincial funding programs that support collaborative research. In doing so, we foster stronger relationships to help companies and their research teams achieve their goals and increase their impact. In the past two years, the IL team has helped with more than 60 projects worth more than $10 million.

New opportunities for edamame

Edamame soybeans represent a great consumer market opportunity in Canada, but growing the beans in Ontario is hampered by a lack of varieties that are both disease-resistant and suitable for our climate. Professor Milad Eskandari (*Plant Agriculture*) is working with MacKellar Farms to solve these problems. Our IL team helped these partners to obtain funding from Ontario Centres of Excellence's VIP program. The first varieties from this collaboration should make it to Canadian tables in a few years.

Edamame beans

Photo: MacKellar Farms

Tackling a debilitating disease in cattle

Johne's disease is a chronic and debilitating illness that impacts ruminants, including cattle and sheep. Difficult to detect and treat, it causes significant harm to Canada's dairy and beef industries. Professor Lucy Mutharia (*Molecular and Cellular Biology*) has identified biomarkers to improve early diagnosis of the disease in cattle. The IL team helped her and Ontario company Pro-Lab Diagnostics (pro-lab.com) to secure funding from NSERC's Collaborative Research and Development grant program. Pro-Lab and Dr. Mutharia are now working together to translate her discoveries into a commercial test.

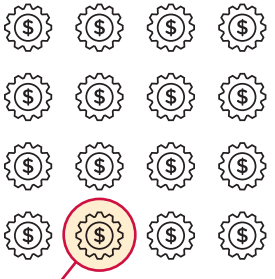
Associate Professor Lucy Mutharia (left) and post-doctoral fellow Jin Duan

Photo: Steve De Brabandere

Innovation Grants

Sometimes projects, ideas and inventions need a little boost to convert them from early-stage research into an innovation with realizable commercial potential.

16 Gryphon's LAAIR grants



$29,000
average value

A project may require prototype development or a market analysis. RIO's Research Innovation Grants were designed to give those projects the support they need. In 2017–18, 16 Gryphon's LAAIR grants with an average value of $29,000 were awarded for projects that can address needs in Ontario's agriculture and food industries.

Helping plants to feed themselves

Synthetic nitrogen fertilizer is essential for modern agriculture but costly to produce and a major source of greenhouse gas production. Professor Manish Raizada (*Plant Agriculture*) is developing probiotics that will help plants, including corn, produce their own nitrogen from the air. He was awarded a Research Innovation Grant to create a commercial probiotic to increase corn yields with reduced nitrogen use.

Professor Manish Raizada Photo: SPARK

Reducing landfill from greenhouse operations

Tomatoes grown in greenhouses have long vines that require plastic clips for support. When harvest is finished, these plastic clips contaminate the organic waste, making it difficult to compost. Professor Manjusri Misra (*Engineering*) was awarded a Research Innovation Grant to commercialize biodegradable resins that can be used to make tomato clips that are compostable.

Professor Manjusri Misra

Photo: Martin Schwalbe

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