Good day, and welcome to Niagara College’s Research & Innovation Division Annual Report for 2015-16. We had a great year full of success for industry, faculty and students. I hope you’ll take the time to discover some of the year’s highlights in these pages. Our infographic gives you a preview of the good year in full, while there is more to discover on our new website, www.ncinnovation.ca.

In Welland, the construction of our new Walker Advanced Manufacturing Innovation Centre building was completed in March, and we’ve been able to attract a diverse array of manufacturing firms, Digital Health, and Advanced Manufacturing Technicians, and our Welland administrative staff. You’ll find a wealth of expertise here. While we’ve covered a lot of ground, our success has been thanks to our research project manager, Mike Sajn, and our Welland administrative staff. You’ll find all manner of expertise in these pages, but we have more to share. Visit us on the web to view our videos:

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Niagara College’s Agriculture & Environment Innovation Centre (AEC) is a hub for innovation, where the latest technological advancements and research are applied to solve real-world problems in agriculture and the environment. The Centre is equipped with state-of-the-art facilities, including a 20,000 square-foot greenhouse, eco-lab, and hydroponics systems, which are utilized to support research projects and to develop practical solutions for industry.

### Projects Spotlight

#### Sustainable Food Project: Grass-to-Organic Garden Conversion

**Innovation Partner:** White Oak Conference Resort & Spa

**Project Duration:** April 2014 to Oct. 2017

**Project Type:** Precision agriculture with Soil and Crop Information

**Funding:** NRCan/NSERC

**Research Lead:** Gregor MacLean

**Challenges:**
- Farming equipment is computers, programs, and data analysis.
- Ontario and Canadian farmers are seeking solutions.

**Solution:** The team has developed and implemented a sustainable farming system, which includes using data analytics to optimize crop yields. This involves applying data management techniques to support sustainable food production.

#### Aquaponics: Aquaculture Meets Hydroponics

**Innovation Partner:** Niagara College Research & Innovation Centre

**Project Duration:** March 2015 onwards

**Project Type:** Sustainability research and development

**Funding:** NRCan/NSERC

**Research Team:**
- Gregor MacLean (Director)
- Meghan Beattie (Senior Researcher)
- Dean Wilson (Senior Researcher)

**Challenges:**
- The team had to develop a small-scale hydroponics system for a course-based project.

**Solution:**
- The team has integrated aquaponics into a sustainable food production system, demonstrating the potential for small-scale farming.

#### Precision Agriculture Advanced for Ontario

**Innovation Partner:** Grain Farmers of Ontario

**Project Duration:** April 2016 to Oct. 2017

**Project Type:** Precision agriculture with Soil and Crop Information

**Funding:** Grain Farmers of Ontario (GFO) and Growing Forward 2 (Ontario Agriculture and Food)

**Research Lead:** Mike Thomas, NRCan

**Challenges:**
- The team had to develop a web-based Crop Monitoring Tool for farmers, which takes their machinery’s raw data, cleans and analyzes it.

**Solution:**
- The web-based Crop Monitoring Tool for farmers, which takes their machinery’s raw data, cleans and analyzes it.

### Niagara College Agriculture & Environment Innovation Centre by the Numbers

#### Programs

- 10 Students
- 4 Researchers
- 2 Projects
- 7 Programs

### Niagara College Agriculture & Environment Innovation Centre

The Centre provides a unique opportunity for students and researchers to work on real-world projects and to develop innovative solutions. With its state-of-the-art facilities and collaborative atmosphere, the Centre is a leader in advancing sustainable agriculture and the environment.
Alejandra Ruiz Aguirre
Research Associate

Business & Commercialization Solutions

Every opportunity is both a learning and a business opportunity. "I never imagined I would do my whole career in Research & Innovation," says the holder of an International Business & Commercialization Solutions Research Associate with the business team at Niagara College. "I wanted to teach, to run really small programs, either in my native Colombia, or elsewhere."

From his native Colombia, turned activist and international hip hop entertainer. Jal Gua is now served in a café in the Greater Toronto Area. But before that, she convinced her family to let her travel to Canada, to take an ESL course in her native Colombia, scholarship in hand. That constant feedback makes us better, " says the holder of an International Commerce and Global Administration diploma, and a degree in International Business. "I never imagined I would do my whole career in Research & Innovation." From initial market research to defining the competition, their strengths and weaknesses. To create a marketing plan, students worked with the Jal Gua brand, its small and wellness industry was supported and marketed to discover possible target markets, market trends and the kind of competitors. Data analysis of pricing, rising and components of competitive products was conducted to facilitate like-market environment. Strategies were recommended for Jal Gua to capitalize on the current market position.

Superfood Marketing Plan

Project Manager: Alejandra Ruiz Aguirre
Project Duration: Jan to Sept 2015
Project Type: Marketing Plan
Funding: Niagara Region Voucher
Research Team: Dylan Fabiano (Research Associate); Alejandra Ruiz Aguirre (Student)

Challenges: Jal Gua (translation “to walk with peace”) is an instant powder superfood created by former child soldier and international hip hop entertainer. The mix of two staple African ingredients: sorghum and moringa. In entering this highly saturated market, the CFWI Innovation Centre team was asked to illustrate the market environment. Strategies were recommended for Jal Gua to capitalize on the current market position.

Solution:

Business & Commercialization Solutions

Funding:
Niagara Region Voucher
Project Type:
Marketing Plan
Project Duration:
Jan to March 2016
Funding:
Niagara Region Voucher

Research Team:
Melissa Horne, Mark Hardwick (Faculty); Alejandra Ruiz Aguirre, Myles Fisher (Research Associate); Alison Kellet (Student)

Challenges:
Funden Signs & Graphics has been a leader in the sign industry in the Niagara Region for over 40 years. The company’s branding and website needed a major overhaul with the transition to a new company owner.

Solution:

Funding:
Niagara Region Voucher
Project Type:
Market Research and Web Design

Research Team:
Melissa Horne (Faculty); Alejandra Ruiz Aguirre (Research Associate); Paula Body (Student)

Challenges:
Master Systems Inc. is a floor care company based in Danville. Former child soldier and international hip hop entertainer. Jal Gua is now served in a café in the Greater Toronto Area. But before that, she convinced her family to let her travel to Canada, to take an ESL course in her native Colombia, scholarship in hand. That constant feedback makes us better, " says the holder of an International Commerce and Global Administration diploma, and a degree in International Business. "I never imagined I would do my whole career in Research & Innovation." From initial market research to defining the competition, their strengths and weaknesses. To create a marketing plan, students worked with the Jal Gua brand, its small and wellness industry was supported and marketed to discover possible target markets, market trends and the kind of competitors. Data analysis of pricing, rising and components of competitive products was conducted to facilitate like-market environment. Strategies were recommended for Jal Gua to capitalize on the current market position.

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Solution:
While Gavin Robertson once studied Dr. Amy Proulx (INNOVATION CENTRE) and Partners with faculty, recent graduates testing and nutritional labelling, the new recipe development to shelf-life new products and processes. From innovation and commercialization of a suite of services to support industry funding, the CFIA and the Canadian Food & Wine Institute Innovation Centre (CFWI) have experienced a surge in growth and activity.

There was a need to expand the level of expertise capital, equipment and expertise, the actual shelf-life to extend quality and shelf-life, but due to limited resources, the project’s success was to create a detailed Craft Beer Shelf-Life Extension Resource.

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The team completed two types of shelf-life tests, following the UBC (University of British Columbia) guidelines, and the tests included air-dried, frozen, and fresh product storage conditions. The team monitored the sensory and shelf-life characteristics of the sample products throughout the storage period, and the results were compared to the predicted shelf-life based on microbiological criteria.

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**Project Information:**

**Project Name:** Craft Beer Shelf-Life Extension Resource

**Industry Partner:** Ontario Craft Brewers Association (OCBA)

**Project Duration:** Oct. 2015 to Sept. 2016

**Funding:** CFI, ONRF, CFI, ONRF

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Yield Maps are developed using the Crop Portal and its custom tools. These tools provide support and leverage technologies for the modern Canadian farm business. Yield Maps provide accurate data, yet these technologies are not being fully leveraged. Between 1991 and 2011, there was a 24.8% decrease in farm operators. Total farmed land in 2011 was 160.2 million acres, or a reduction of 4.1% since 2006. Finally, between 1991 and 2011, there was a 9.6% decrease in farm operators. Statistics tell us there is a movement to fewer and larger farms, with a stable-to-shrinking number of operators. A population of 9.5 billion will require food security. This is heightened with climate change, and people demanding higher-quality food. Farmers are expected to meet higher standards in order to maintain their competitiveness. With one third of the world’s freshwater, Canadian farmers have a significant natural digital advantage. 30% of arable land per person, Canada who is 1 in the world.

The above-mentioned advantages showcase the opportunities for Canadian farmers to support new technologies. Having the tools and practices that gather yield data, the sensors, the data, the sensors, and the statistical and analytics will help farmers to identify and mitigate harmful weather events. Thermodynamics from the NC vineyard. The red lines are the upper (3 metres above ground) and lower (1m above ground) temperature sensors, the blue lines are the upper and lower relative humidity sensors. The data, the sensors, the statistical and analytics will help farmers to identify and mitigate harmful weather events. Micrometeorology equipment installed in the Niagara College Campus, and throughout the vineyard in Summer 2016. Micrometeorology Analysis for Tender Fruit Growers. and worldwide. He leads a research team at Niagara College developing new tools, unique algorithms, and software that are being deployed in the vineyard in Summer 2016. Micrometeorology is the study of small changes over the course of seconds, and it is specific to a combination of temperature, humidity, and wind speed. Developing new tools, unique algorithms, and software that are being deployed in the vineyard in Summer 2016. Micrometeorology Analysis for Tender Fruit Growers. and worldwide. He leads a research team at Niagara College developing new tools, unique algorithms, and software that are being deployed in the vineyard in Summer 2016. Micrometeorology is the study of small changes over the course of seconds, and it is specific to a combination of temperature, humidity, and wind speed. Developing new tools, unique algorithms, and software that are being deployed in the vineyard in Summer 2016. Micrometeorology Analysis for Tender Fruit Growers. and worldwide. He leads a research team at Niagara College developing new tools, unique algorithms, and software that are being deployed in the vineyard in Summer 2016.
Matt Sajn
Faculty
Academic and Liberal Studies

Being a communications professor means having the chance to get students interested in a topic that they need to use in their future careers, which is very gratifying.

Sajn, who teaches in the Faculty of Academic and Liberal Studies, says that seeing the students take the initiative to get involved in communication projects makes what he teaches more relevant and applicable to their lives.

Matt notes that during his own schooling he had heard about the “authentic learning experience.” It was a challenge, but he was pleased with how it turned out.

In the past year, he guided his 16th communications program, a communication project with the Ontario Centre for Innovation, the Students Association, and industry. The students had to come up with a project that benefits both the student and the company.

Building an Innovative Greenhouse

The Boys & Girls Club of Niagara

PROJECT DURATION: Jan. to April 2016

COORDINATOR: Dave DiPietro

INSTRUCTOR: Dr. Amy Proulx (Faculty)

PROGRAM: Marketing

SOLUTION: Using an open innovation approach, each student in the Culinary Innovation course presented their fresh ideas to a client.

Chicken Sausage Prototypes

The Boys & Girls Club of Niagara

PROJECT DURATION: Jan. to March 2016

PROGRAM: Business Administration - Marketing

SOLUTION: Students worked in pairs to organize, analyze, and present market data they collected. The boys & girls club was interested in knowing what was popular among youth, which led to the development of a menu of options.

Market Research

The Boys & Girls Club of Niagara

PROJECT DURATION: Jan. to March 2016

PROGRAM: Business Administration - Business Management

SOLUTION: Students were asked to present at the Boys & Girls Club of Niagara, after the final presentations on campus, students were selected to present to the Boys & Girls Club, and we were interested in knowing further details about what was happening, and they needed a survey tool to better capture the needs of the clients.
The Digital Media & Web Solutions team works with small- and medium-sized businesses to assist with the design, creation and implementation of various technology applications, including PC, web and mobile applications, as well as 3D visualization, video production, and graphic design. To do this, the team uses the most up-to-date programming languages, platforms and software packages.

**Building a Better Online Presence**

Today, more than half of Canadians own a smartphone, meaning mobile technology has completely permeated their lives. Smartphones are used for everything from updating social networks to online shopping and finding restaurant recommendations. Modern websites need to be mobile friendly, to allow the content to be accessed on the smaller screens of mobile devices.

**SOLUTION:** The Digital Media and Web Solutions team have worked with 14 companies to address these potential customers, using three potential outcomes to make the ideal reader drop from the brand to contact the customer. The websites act as an online brochure which is able to streamline the process of 12 to 15 hours a week. By using WordPress, the company now has the ability to stay up to date with the latest trends without having to hire a full-time developer.

**CHALLENGE:** A website is only as strong as the content it contains. These potential outcomes are the ideal reader drop from the brand to contact the customer. The websites act as an online brochure which is able to streamline the process of 12 to 15 hours a week. By using WordPress, the company now has the ability to stay up to date with the latest trends without having to hire a full-time developer.

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**BRONTÉ BEAN**

**PROJECT SPOTLIGHT**

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**PROJECT TITLE:** Building a Better Online Presence

**ENHANCES:** Ontario Centres of Excellence Vouchers for E-Business and Technology Adoption

**RESEARCHER:** Anita Dunk, Josh Hanson, Myles Fisher, Neil Wilkinson

**PROJECT TYPE:** e-Business Solutions

**PROJECT DURATION:** Sept. 2015 to March 2016

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**PROJECT DURA
Felipe (right) and Esteban Puello (left) working in the lab.

16 explains. how they are produced, or how they run, “he are always thinking about how things are made, the Automotive Mechanic and Repair program

Before attending Niagara College in the Mechanical Engineering Technology program, but he

would give him real-world experience while Manufacturing Innovation Centre is located in a Technology Access Centre — one of 10 such centres funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) — to support the research and innovation needs of the advanced manufacturing sector of Niagara and beyond.

By working with college faculty and industry, the centre provides a key industry-friendly environment, offering access to cutting-edge equipment and related services — for the development of products and services.

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Niagara College’s Research & Innovation Division provides real-world solutions for business, industry and the community through applied research and knowledge transfer activities. We conduct projects that provide innovative solutions, such as producing and testing prototypes, evaluating new technologies, and developing new or improved products or processes for small- and medium-sized businesses.

With funding support from various regional, provincial and federal agencies, students and graduates are hired to work alongside faculty researchers to assist industry partners leap forward in the marketplace.

FACTS & FIGURES

The Research & Innovation Division plays an increasingly important role within the strategic mandate of Niagara College. By expanding technical services offering and engaging new sectors, we continue to grow research and knowledge transfer activities. We conduct projects that provide innovative solutions, such as producing and testing prototypes, evaluating new technologies, and developing new or improved products or processes for small- and medium-sized businesses.

WHERE THE FUNDING COMES FROM...

Total funding for Niagara College Research & Innovation 2015-16

<table>
<thead>
<tr>
<th>Category</th>
<th>Funding</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry In-Kind</td>
<td>$235,049</td>
<td>3%</td>
</tr>
<tr>
<td>Industry Cash</td>
<td>$1,516,134</td>
<td>18%</td>
</tr>
<tr>
<td>College Support</td>
<td>$683,834</td>
<td>9%</td>
</tr>
<tr>
<td>Municipal Funding</td>
<td>$4,610,355</td>
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<tr>
<td>Provincial Funding</td>
<td>$1,128,268</td>
<td>7%</td>
</tr>
<tr>
<td>Federal Funding</td>
<td>$73,469</td>
<td>29%</td>
</tr>
<tr>
<td>OCE Discovery Conference</td>
<td>$0</td>
<td>2%</td>
</tr>
<tr>
<td>NSERC funding proposals</td>
<td>$935,019</td>
<td>35%</td>
</tr>
<tr>
<td>NSERC funding proposals</td>
<td>$216,910</td>
<td>66%</td>
</tr>
<tr>
<td>Total funding for Niagara College Research &amp; Innovation 2015-16</td>
<td>$8,195,971</td>
<td></td>
</tr>
</tbody>
</table>

FUNDING FOR RESEARCH

Where the funding goes...

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
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WAYS COMPANIES ACCESS RESEARCH & INNOVATION

<table>
<thead>
<tr>
<th>Sector</th>
<th>Research Projects</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>28</td>
<td>22%</td>
</tr>
<tr>
<td>Agriculture &amp; Environment</td>
<td>12</td>
<td>9%</td>
</tr>
<tr>
<td>Business &amp; Commercialization</td>
<td>11</td>
<td>8%</td>
</tr>
<tr>
<td>Agriculture &amp; Environment</td>
<td>19</td>
<td>15%</td>
</tr>
<tr>
<td>Business &amp; Commercialization</td>
<td>16</td>
<td>13%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>18</td>
<td>14%</td>
</tr>
</tbody>
</table>

2015-16 BY THE NUMBERS

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects</td>
<td>214</td>
</tr>
<tr>
<td>Students</td>
<td>1,791</td>
</tr>
<tr>
<td>Programs</td>
<td>28</td>
</tr>
<tr>
<td>Researchers</td>
<td>67</td>
</tr>
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</table>

RESEARCH PROJECTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Services</th>
<th>Research Projects</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-15</td>
<td>46</td>
<td>108</td>
<td>75%</td>
</tr>
<tr>
<td>2015-16</td>
<td>52</td>
<td>234</td>
<td>27%</td>
</tr>
</tbody>
</table>

TECHNICAL SERVICES

<table>
<thead>
<tr>
<th>Services</th>
<th>2014-15</th>
<th>2015-16</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>194 COMPANIES</td>
<td>142</td>
<td>52</td>
<td>75%</td>
</tr>
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RESEARCH FUNDERS

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</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>9</td>
<td>3</td>
<td>72%</td>
</tr>
<tr>
<td>Advanced Manufacturing</td>
<td>13</td>
<td>6</td>
<td>76%</td>
</tr>
<tr>
<td>Innovation Centre</td>
<td>14</td>
<td>8</td>
<td>86%</td>
</tr>
<tr>
<td>Institute Innovation Centre</td>
<td>13</td>
<td>8</td>
<td>86%</td>
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Facts & Figures

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PAN AMERICAN ECONOMIC PLAYBOOK

The CFWI Innovation Centre at Welland Campus will be opening in September 2016, with the first phase completion date set for January 2017.

APRIL 2015

Dr. Mike Oates a keynote speaker at QCI Customer Solutions Conference in Niagara Falls.

JUNE 2015

Dr. Dolly Nantel, Associate Professor in Agriculture at the CFWI Innovation Centre at Welland Campus, wins the Mayor’s Award of Niagara Region.

JULY 2015

The CFWI Innovation Centre at Welland Campus announces its first industry partnership with Walker Advanced Manufacturing Inc., and the Province of Ontario’s funding for the Walker Advanced Manufacturing Innovation Centre.

SEPTEMBER 2015

Dr. Martin Benner and Dr. Marc Nantel are interviewed on CBC News Network’s morning show for their contributions to CFWI Innovation Centre.

OCTOBER 2015

The CFWI Innovation Centre at Welland Campus presents to the City of Welland on the topic of how the Centre can assist municipal projects.

NOVEMBER 2015

The CFWI Innovation Centre at Welland Campus announces its first industry partnership with Walker Advanced Manufacturing Inc., and the Province of Ontario’s funding for the Walker Advanced Manufacturing Innovation Centre.

DECEMBER 2015

The CFWI Innovation Centre at Welland Campus announces its first industry partnership with Walker Advanced Manufacturing Inc., and the Province of Ontario’s funding for the Walker Advanced Manufacturing Innovation Centre.

APRIL 2016

Charles Lecompte, Senior Laboratory Technologist, and Andrea Zehler, Manager of Digital Media at the CFWI Innovation Centre are well received at the Canadian Food & Wine Institute Innovation Centre at Welland Campus.

MAY 2016

Research Colleges list published by Research Colleges Canada. Placed No. 10 in Top 50 Research Colleges.

JUNE 2016

The Walker Advanced Manufacturing Innovation Centre (WAMIC) is now fully operational.

JULY 2016

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AUGUST 2016

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2015-16 HIGHLIGHTS
Our team of researchers, students and administrators are here for you. We provide

SOLUTIONS FOR INDUSTRY
2015 • 16

Agriculture & Environment Innovation Centre
Business & Commercialization Solutions
Canadian Food & Wine Institute Innovation Centre
Digital Media & Web Solutions
Walker Advanced Manufacturing Innovation Centre

nc Research & Innovation
FOR APPLIED RESEARCH PARTNERSHIP OPPORTUNITIES CONTACT US AT:
w ncinnovation.ca
e research@niagaracollege.ca
t 905-735-2211 Ext 7180