Chain reaction

Researchers discover that their quest for answers often leads to social advances and economic gains

By Quentin Casey

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Atlantic Canada's post-secondary R&D is wide ranging in its approach and topics—from 3D printing to gluten-free beer to helping Adidas design better basketball shoes. Such research, spanning the region's many universities and public colleges, is producing important scientific discoveries as well as innovations with commercial potential. It's also linking global academics, from New Brunswick to New Delhi, in their pursuit of innovation and knowledge. The following profiles detail some of the region's most interesting R&D projects.

Brew master

Aidan Brunn was diagnosed with Celiac disease a decade ago. He quickly grew "frustrated and overwhelmed" with the dietary changes he had to make, most notably the avoidance of gluten.

"I was even more upset with the lack of affordable, quality gluten-free food options on the market," he recalls.

So Brunn, along with his partner, Jennifer Laughlin, started Schoolhouse Gluten-Free Gourmet. Based in Martins Point, N.S., the company sells products ranging from potato-millet bread to pumpkin muffins, macaroons and butter tarts.

Schoolhouse, in partnership with a researcher at Halifax's Mount Saint Vincent University, is now working to develop a new gluten-free beer. Bohdan Luhovyy, an assistant professor of applied human nutrition at MSVU, will help Schoolhouse refine its beer formula and prepare it for the gluten-free product.

The work is being funded through a $25,000-productivity and innovation voucher from the provincial government. The work is aimed at optimizing the nutritional value and taste of the Schoolhouse suds. If successful, Schoolhouse's brew will put the company at the crossroads of two popular trends: craft beer and gluten-free food.

The collaboration between Luhovyy and Schoolhouse was aided by MSVU's Industry Liaison Office, which aims to link the university's research with industry players.

Said Laughlin: "We are excited by the opportunity to work with (professor Luhovyy) and hope to introduce our new beverage to the market within the next two years."

Dr. Bohdan Luhovyy, the Mount Saint Vincent University researcher who is helping to create a gluten-free craft beer.

Work it out

A class of second graders assembles in the gym at Park Street Elementary School in Fredericton. The students have been invited to a "Particle Party" and they are the particles. The students must move and dance as sub-atomic particles would at various temperatures. Swings in temperature are cued by changes in the tempo and energy of the music.

The scene playing out is one of 14 science lessons being designed and tested for K-12 students by Grant Williams, a professor in St. Thomas University's School of Education. Williams calls the lessons "Kinulations" (an amalgam of "kinesthetic" and "simulations"): movement-based learning activities in which students act out scientific phenomena. A lesson for ninth graders involves students pretending to be batteries, wires, switches and light bulbs—part of a mock electric circuit.

"This approach to learning differs from the use of traditional computer-based simulations because it gets students up out of their seats, away from digital screens and has them working physically and cooperatively to build working human models of the scientific systems and phenomena they are learning about," Williams explains.

Williams' work, initially proposed as a two-year project, has been funded with a $4,500 research grant from St. Thomas' Senate Research Committee. He hopes to push his collection of lessons into the K-12 science curriculum across Atlantic Canada. The goal is to boost scientific literacy among students who will make up the next generation of scientists and engineers.

Said Williams: "This study is exploring the role that Kinulations-based lessons may have in equipping the children of the current generation with the insight and creativity that will be required to solve the problems they will inevitably face."

Images isolated from classroom episodes of Dr. Grant Williams' Kinulations lesson trials last spring. Dr. Williams is a researcher with the School of Education at St. Thomas University.

Food fight

Earlier this year, students at the Culinary Institute of Canada (part of Prince Edward Island's Holland College) took part in a unique competition. The inaugural Canada's Smartest Kitchen Product Development Challenge asked students to harness their culinary creativity and develop novel food product ideas. The four-month competition, which finished in April, was funded by Canada's Smartest Kitchen ($15,000) and Cavendish Farms ($5,000).

Led by product developers Krista MacQuarrie and Jen Bryant, the Challenge encouraged students to research food trends, develop new formulas, and experiment with food styling and photography. To aid their efforts, the students had access to leading industry professionals.

Christine Murnaghan's kale & potato gnocchi, one of many tasty experiments being cooked up in Canada's Smartest Kitchen (Culinary Institute of Canada, Holland College).

Canada's Smartest Kitchen Product Development Challenge asked students to harness their culinary creativity and develop novel food product ideas.

In the end, the challenge provided Cavendish Farms with seven new product concepts, which must now be reviewed and refined by the company's R&D team, to gauge their commercial potential.

Noted the organizers: "Working with a strong commercial partner provided students with exposure to not only the ideation and concept development process, but helped (them) to better understand the business aspects of product development and the work required to scale up a product from a prototype and take it to market."

In addition to their introduction to "real world product development," the students also gained exposure to new jobs emerging in the food industry.

"There are an increasing number of food manufacturers in Atlantic Canada looking for assistance with product development," the organizers noted. "This competition opened up opportunities for the students to gain valuable skills that they could use in the field."

Do the wave

Sea-based aquaculture is a growing industry in Atlantic Canada. It's also controversial, with concerns about pollution produced at coastal aquaculture sites.

At the College of the North Atlantic's Wave Energy Research Centre, in Burin Bay Arm, N.L., researchers Michael Graham and Leon Fiander are working to develop land-based aquaculture technology.

Graham and Fiander's aquaculture research involves two goals: building a wave-powered pump to deliver water cheaply to land-based aquaculture farms, as well as a system to ensure the on-land production is environmentally sustainable.

Specifically, the pair is developing a pilot facility where effluent from fish tanks will flow down through tanks holding other sea creatures, such as sea urchins and scallops. That "cascade" approach will help filter the water and support other creatures that could be sold or used as feed.

As Graham notes, the approach will also remove a large portion of the organic pollutants typically associated with fish farming before the water is returned to the sea.

The five-year project, now in its third year, is funded with $3.1 million from the Natural Sciences and Engineering Research Council, the Research and Development Corp., and the province's Department of Innovation, Business and Rural Development.

Graham says land-based aquaculture enterprises could be an economic driver for traditional fishing communities. "In addition to possibly enabling the development of a new industry, this project will leave a lasting scientific, technical and economic legacy in the region," he says. "The project represents a significant increase in research activity for Burin campus and the college as a whole."

The College of the North Atlantic's Wave Energy Research Centre, in Burin Bay Arm, N.L. has the potential to revolutionize land-based aquaculture.

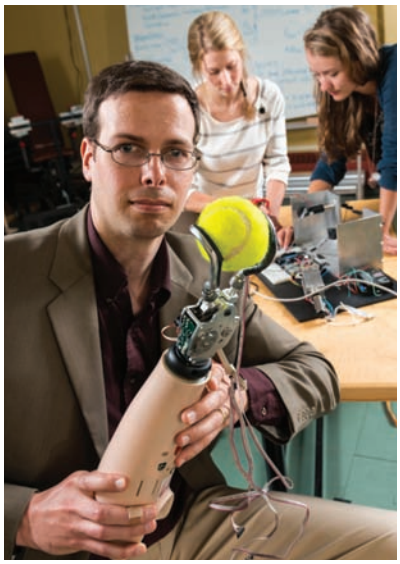
Talk to the hand

Some of the research emerging from the University of New Brunswick's Institute of Biomedical Engineering (IBME) seems to be from the future.

"Over the past four years, the institute has led several major projects that will result in potentially disruptive technologies in the rehabilitation field," says IBME director Kevin Englehart, one of the institute's researchers.

Perhaps the most notable project is the UNB Advanced Hand System.

The $2.8-million project, funded through ACOA's Atlantic Innovation Fund, will result in a state-of-the-art electromechanical hand prosthesis, including "smart sensors" that interpret and digitize muscle signals, translating them into actual hand movements. In other words, the device tells the prosthesis what the brain wants it to do, meaning the patient needs only to think about a task to make it happen.



Jon Sensinger is associate director of UNB's Institute of Biomedical Engineering and one of the researchers working to develop a state-of-the-art electromechanical hand prosthesis.

"The UNB Hand System has the potential to revolutionize the prosthetics industry," Englehart says.

IBME's other initiatives include a $3.4-million project that is developing devices to aid patients with multiple sclerosis, spinal cord injuries, or cerebral palsy.

A new IBME partnership will form the world's first dermoskeletics research centre, which will develop devices to prevent occupational injuries and improve the mobility of those living with neurological conditions.

"Many research projects at the Institute have a direct path to commercialization," Englehart says. "The medical devices and technology sector is expected to experience rapid growth in the next decade, and IBME's researchers are positioning their research to have the greatest economic and social impact possible."

The Architextile@Lab research group has developed a mechanized ceiling system that can alter the acoustics of a room by adjusting a series of rotating tiles.
Photographer: Ken Kam

Sound's great

Anyone who has ever given or tried to listen to a speech in a room with poor acoustics will be encouraged by the research of Sarah Bonnemaison, of Dalhousie University, and Robin Muller, from NSCAD University.

The pair, through their Architextile@Lab research group, have developed a mechanized ceiling system that can alter the acoustics of a room by adjusting a series of rotating tiles. The tiles can both deflect and absorb sound, as the situation requires.

"The concept for this project was to transform any room into a musical instrument," Bonnemaison explains. "We didn't want to merely absorb, diffuse or reflect sound. Our goal was to create a dynamic and interactive system that could respond to changing sound qualities in a room and 'tune' it for a desired activity."

The technology includes a pattern recognition program that can automatically adjust the tiles to create the perfect acoustics. The acoustic ceiling module is one of five projects developed at the lab. The entire research effort is aided largely by $1.3 million from ACOA.

The Faculty of Architecture and Planning at Dalhousie University is currently testing the ceiling prototype in a room used for exhibitions and reviews. The tests are scheduled to run for six months.

"I believe noise pollution is becoming the next issue architects and interior designers will need to tackle," Bonnemaison says. "As our society ages, being able to hear well in a restaurant or airport will become increasingly important. To have acoustic modules that can adapt… as needed would be extremely valuable."

Digging deeper

Mining is a dirty business. At Cape Breton University's Verschuren Centre, Alicia Oickle is working to help clean it up. Her work is only in its infancy, but the end result could be powerful: the development of mineral processes that reduce the environmental challenges associated with traditional mining and smelting.

The program started earlier this year and is expected to run until 2019. Funding is being pulled from Yava Technologies Inc. ($2 million) and ACOA ($500,000).

Oickle says the resulting technologies could aid mineral processing as well as the environmental treatment of mining byproducts such as tailings, which can leach metals into nearby water sources. "The relative simplicity of the technology allows it to 'bolt on' to existing infrastructure," she says.

"Finding alternative mineral processing technologies allows low-grade deposits to be mined, such as those that were previously uneconomical to pursue with traditional techniques, which in turn increases a mine's life," she adds. "And removing traditional mining techniques such as smelting also reduces significant portions of pollution associated with the mining industry."

Dr. Alicia Oickle, industrial research chair in green mining at Cape Breton University, is in the early stages of a project that could improve the environmental outcomes of traditional mining and smelting. Photo: Katheryn Gordon

Oickle says the resulting technologies could aid mineral processing as well as the environmental treatment of mining byproducts such as tailings, which can leach metals into nearby water sources.

Ironed out

Hemochromatosis is the most common genetic disorder in the western world, affecting an estimated one in 300 Canadians of Northern European descent. (Hemochromatosis is sometimes called "the Celtic Curse" as it may impact as many as one in 20 people with Celtic ancestry.)

Hemochromatosis is a genetic, metabolic disorder that results in iron overload. In other words, the body absorbs and retains too much dietary iron. The disorder can affect many organ systems including the liver, pancreas, heart and endocrine glands. And though it is potentially fatal, the disorder is easily treated if diagnosed early.

Treatment for hemochromatosis involves many avenues, including the removal of excess iron from the blood. The designers of a new app believe their creation will simplify what can be a complicated treatment process.

The app is a joint project between Andrew Hamilton-Wright (a mathematics and computer science professor at Mount Allison University) and Gary Grewal, a professor at the University of Guelph's School of Computer Science in Ontario.

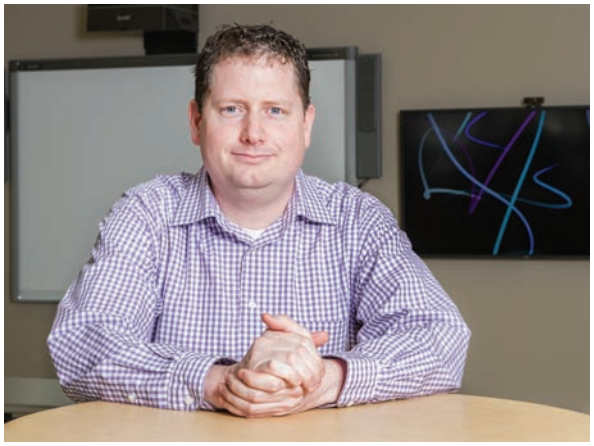
"The Iron Tracker App… gives patients a single place where treatment and life-long progress can be tracked," Hamilton-Wright says.

The project, which was launched in February, has been funded with NSERC Discovery Grant funds and $8,000 from Mount Allison.

According to Hamilton-Wright, the app will ideally aid treatment management, improve the health of patients and reduce health care costs. The app could also aid the collection of hemochromatosis-related data.

"Such data will allow for improved understanding of the disease," Hamilton-Wright says, "and lead to better treatment and general health for affected people."

Andrew Hamilton-Wright, a mathematics and computer science professor at Mount Allison University, has developed an Iron Tracker App to help hemochromatosis patients track the treatment and progress of their disease.



Harrison Duffley is the research lead on a project at New Brunswick Community College which is investigating consumer-based uses of 3D printing.

Among the creations was a prototype storage case, which a local business intends to use to house the electronic circuit boards in devices it is designing.

DIY manufacturing

3D printing is a booming field. According to *Forbes,* a third of all recent engineering job postings prioritized 3D printing as the most sought-after skill.

Meanwhile, a new research project at the New Brunswick Community College is investigating uses of consumer-based 3D printing and its potential impact on the economy. Led by researcher Harrison Duffley, the year-long NBCC initiative started in April and is funded with $5,000 from the NBCC Strategic Initiatives fund.

"We have been able to print some fairly complex 3D objects," Duffley says.

Among the creations was a prototype storage case, which a local business intends to use to house the electronic circuit boards in devices it is designing.

"The business provided the computer-based 3D drawings of the case… and we were able to print the case so that they could see how their ideas would work," Duffley explains. "This would not be a finished product but would assist in the proof of concept phases of product development."

The goal, he adds, is to aid other businesses in developing new products and testing prototypes.

Duffley says the project is also aimed at inspiring 3D printing entrepreneurship among NBCC students. "Our hope is to demonstrate the technology to our various faculties and have them bring ideas to light in their respective fields, while at the same time engaging our students with this technology."

No motion commotion

Sam Fisher believes his creation could alter modern filmmaking. Fisher and his NSCAD University colleague Mike MacDonald have developed the Andra Motion Focus system, a new technology for obtaining sharp focus in the film industry. "The system uses a motion capture system to provide distance data between the camera and the performer," Fisher explains. "This distance data is then used to drive a focus motor which adjusts focus in real time." The result is a crisp shot.

The Andra Motion Focus system has been in development for four years, with $60,000 in funding from GRAND NCE (Canada's largest digital media research network) and the Social Sciences and Humanities Research Council (SSHRC).

The technology has passed the prototype and proof of concept stages and is now being developed as a marketable product.

Fisher says professionals in both the film and television industries could soon be using the product on their sets. "Though it is impossible to predict how any technology will be received or adopted, it is possible that this technology could become widely used in the industry and change the way we currently make films," he says.

NSCAD University researchers Sam Fisher and Mike MacDonald are working on a fully automated motion system for the film industry, allowing for the continued focus of a subject or subjects as they move within the frame.

Footloose

Scott Landry's research at Acadia University has varied goals, from preventing athlete injuries to helping Adidas produce better sneakers.

At the John MacIntyre mLAB (motion Laboratory of Applied Biomechanics), Landry uses 13 high-speed cameras and a variety of sensors to analyze the movements of athletes as they run, jump, land, side-cut and perform other key movements. The motion-capture technology aids Landry in researching ways to enhance performance and prevent injuries, such as anterior cruciate ligament (ACL) tears often suffered while playing soccer, basketball, rugby, volleyball and football.

Acadia's mLAB also boasts a research partnership with Adidas. Since 2012, Acadia researchers have helped the global sportswear giant assess the performance of elite athletes wearing its basketball shoes.

For example, Acadia researchers conducted some of the original performance-based testing on the Adidas Crazyquick basketball shoe, which is used by many NBA and college players.

The John MacIntyre mLAB was completed in May, thanks to $860,000 from the Canada Foundation for Innovation, the Nova Scotia Research and Innovation Trust, and the Acadia Kinesiology Society.

Landry, an associate professor in Acadia's School of Kinesiology, says the research partnership between Adidas and Acadia provides undergraduate students with a unique opportunity to do industry-based research for a global company.

"The lab offers students the opportunity to work together and gain exposure to high-level, hands-on multidisciplinary research," he says. "Students hoping to pursue further education in physio-therapy, medicine, biomedical engineering and other health-related graduate studies are benefiting significantly from this exposure."

Dr. Scott Landry, an assistant professor in the department of kinesiology at Acadia University, uses high-speed cameras and sensors to study athletes in motion. His work aids in injury prevention and is helping Adidas design better sneakers.

Professor Gordon McOuat (University of King's College) is program director of an international collaboration between institutions in India, South East Asia, and Canada to explore different styles of reason and culture and how they are related to globalization. The project launched in Singapore this past August.

It's a wonderful world

Gordon McOuat's research project has a long name and an even longer list of contributors. McOuat, a University of King's College professor, is the project director of Cosmopolitanism and the Local in Science and Nature: Creating an East/West Partnership.

It's a far ranging project, involving a dozen researchers and collaborators from universities including Dalhousie, Harvard, Jawaharlal Nehru University in New Delhi and the National University of Singapore.

"The project aims to open up new perspectives on the genesis and place of globalized science, expose a largely Eurocentric scholarly community in Canada to widening international perspectives and methods, and create a robust international research network that can support student and scholar exchanges, summer schools, workshops, lecture series, course development and more," McOuat explains.

The three-year, $200,000-project launched this summer and is funded by a grant from the Social Sciences and Humanities Research Council (SSHRC).

McOuat points to the project's potential to create a connected network of students and scholars across Canada, India and Southeast Asia: "Communities that haven't networked very much yet."

"Our world is increasingly shaped locally and internationally by science and technology. This fact is a source of both social hope and anxiety," he says.

"We also must look internationally, especially to those societies facing the full force of a developing scientific modernity. India, for instance, is now one of the largest producers of scientists and technologists in the world today, and scholarly and public discourses on science and technology are urgently needed if fundamentalism, for or against science, is to be avoided."

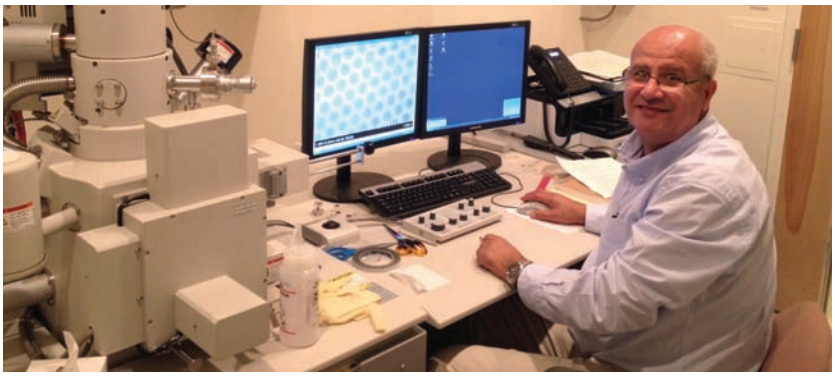
Shields up

Yahia Djaoued believes his research at the Université de Moncton has significant commerical potential. And when you're targeting a multi-billion-dollar industry, that could mean big business.

Djaoued, a chemistry professor who chairs the science department at UdeM's Shippagan campus, has partnered in a research project with Inex Intercalaire, Inc., a Montreal-based manufacturer of plastic extrusions. (Extrusions include items such as weather stripping and window frames).

Djaoued has developed a novel protective coating for plastic outdoor extrusions which he says provides an effective barrier against water vapour, argon gas leakage and chemical fogging. The coating also reduces discoloration caused by sunlight exposure.

Funding for the two-year $269,700-research project includes more than $55,000 from Inex and $52,000 from the New Brunswick Innovation Foundation. According to Djaoued, the specialty coatings market was worth $6 billion in 2008. With his technology now finalized, the focus has shifted to commercialization.



Dr. Yahia Djaoued, a professor and chair of the department of sciences at Université de Moncton's Shippagan campus, is working on exterior coatings that protect against water vapour, argon gas leaks and chemical fogging.

Inex already sells its patented PVC extrusions in North America and the U.K. The new coatings could help boost the company's market share. "Inex believes that they would be the first to market such a technology," Djaoued says. "Inex would expect to quickly double its sales and thereafter increase it several fold, in particular in European markets."

There are also plans for related spin-off enterprises focused on custom protective coatings, perhaps involving chemical products, pharmaceuticals, and biological fluids. Those could lead to opportunities for New Brunswick manufacturing, Djaoued added.

"(I) see few impediments to the adoption and commercialisation of the technology. No direct product competitors have been identified."

Grid lock

At the Nova Scotia Community College, Alain Joseph is attempting to modernize the region's electrical grid.

His "Energy Distribution using Advanced Telemetry and Analytics" (Energy DATA) research project will construct an "electricity grid within the grid." It will involve a research micro-grid capable of interconnection, or isolation, from the larger utility electrical grid. "Local companies participating in the Energy DATA program will develop new products and software, test their systems, and participate in a variety of additional research activities leading to commercial applications," he explains. "This research activity will also help train skilled workers, strengthen local communities, and improve industry's ability to implement advanced energy projects."

The five-year project, funded with $2.3 million from an NSERC CCI-IE (College and Community Innovation—Innovation Enhancement) grant, is in the initial stages of development. But Joseph foresees many benefits, including industry partnerships with players ranging from IBM to small start-ups.

The project will also bring new energy technologies to the region; help train several Masters-level researchers, and perhaps boost energy efficiency in the region.

"The research is directly linked to industry R&D challenges. It is designed to assist local industry in improving its current energy products and services as well as developing new ones, an approach which allows for significant commercial potential for the research," Joseph says. "The program could help elevate Nova Scotia's standing in the sector to that of a leader in energy management technologies and smart-grid research."

Alain Joseph is working on an applied research program that seeks to discover how renewable energy can be integrated into the existing power grid (Nova Scotia Community College).

Northward bound

The Arctic is a land of unique challenges, particularly for any company trying to do business there.

At Memorial University, Claude Daley, along with his engineering faculty colleague Bruce Colbourne, is attempting to help companies better address the Arctic's unique attributes. The two engineering professors are behind the Sustainable Technology for Polar Ships and Structures (STePS2) project. The nearly six-year project, which ends this year, is developing tools to ensure safer design and assessment of the ships and offshore structures used in Arctic conditions.

Among the topics the STePS2 project has examined: the ability of structures to withstand ice load. According to Daley, the project has made a number of significant findings in that field, including practical methods for engineers to model ice loads.

"Through a combination of experimental and numerical research, STePS2 is laying the groundwork for a new generation of design and assessment tools for use in Arctic offshore engineering," Daley says.

The project has been funded with a total of $5.5 million, of which $1.25 million was derived from industry players such as Husky Energy, Samsung and Rolls-Royce.

The goal, Daley says, is to help companies develop their Arctic operations. "Such businesses have the potential to add trillions of dollars to Canadian GDP as a result of Arctic successes," he says.

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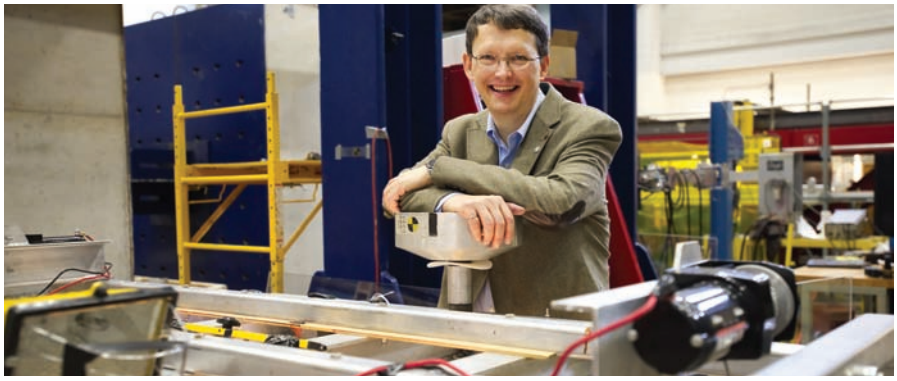

At Memorial University of Newfoundland, engineering faculty Claude Daley (shown here) and Bruce Colbourne are developing tools to design and assess Arctic-bound ships and offshore structures.

Green think

Many of our modern conveniences rely on or produce hazardous substances. Rob Singer, the director of the Atlantic Centre for Green Chemistry, is hoping to change that.

Founded in 2010, the ACGC is based out of Saint Mary's University but involves researchers at universities throughout the region.

Singer, a chemistry professor, says the Centre's research is aimed at developing chemical products and processes that use benign substances, reduce waste and energy consumption, and make the most efficient use of non-renewable resources.

As well, the goal is to offer industry a clean sustainable alternative to traditional chemical and manufacturing processes.

"Green Chemistry, also called sustainable chemistry, is a chemical philosophy encouraging the design of products and processes that reduce or eliminate the use and generation of hazardous substances," he says.

Hazardous materials are used in sectors ranging from energy and transportation to agriculture and medicine. But Singer says the chemical industry is attempting to change its ways and reduce its environmental impact.

The ACGC boasts 23 green chemistry researchers working in nine universities across Atlantic Canada. ACGC members are funded from a wide variety of sources including federal (NSERC), provincial (Springboard Atlantic), and municipal sources.

"This program will provide the region's brightest minds with specialized expertise and resources that will accelerate the pace of innovation and ensure more discoveries make it to market," Singer concludes. "The ACGC is still in its start-up phase. Despite this, there have been numerous scientific publications and provisional patents submitted based upon the activities of its members."

The Atlantic Centre for Green Chemistry, under the direction of Dr. Rob Singer (shown here), is conducting experiments in sustainable chemistry, searching for products and processes that reduce or eliminate the use and generation of hazardous substances..

No harm, no foul

At St. Francis Xavier University, a group of professors with specialties spanning from biology, engineering and physics has teamed up to fight small marine creatures.

The five professors are at the heart of the university's Centre for Biofouling Research, which is seeking environmentally-friendly methods for controlling marine biofouling. Biofouling affects industries from oil and gas to shipping, and the St. FX researchers are banking on a large demand for non-toxic solutions.

The group is focusing much of its effort on anti-fouling in local aquaculture, particularly the mussel industry.

"A number of fouling species cause considerable economic burdens on aquaculture by increasing weight and (causing) equipment failures, impeding growth of farmed stocks and increasing cleaning costs," they note. Thus the group is examining various non-toxic coatings to be used on boats, docks, lines, buoys and other infrastructure.

"Cleaning unwanted marine growth off of aquaculture infrastructure in the water is very time consuming and expensive. Successful aquaculture depends upon a clean environment and therefore only non-polluting and sustainable means can be used."

Funding for the research includes $300,000 from Encana Corp. and an NSERC Collaborative Research and Development grant. It also involves the testing of various coatings in the field.

(L-R) Dr. Russell Wyeth and Dr. Cory Bishop, assistant professors and researchers in the biology department at St. Francis Xavier University. They are investigating environmentally-friendly ways of protecting aquaculture operations from invasive species.

"The most prominent immediate local significance of this project will be the potential for more economically efficient mussel farming," they add. "The progress we make combatting fouling in the aquaculture industry will likely have crossover benefits in other industries. Indeed, we are already exploring how our antifouling solutions can be refined for applications in the Atlantic Canadian oil and gas industry."

How does coastal erosion affect Prince Edward Island? That's what researchers at UPEI are investigating with their CLIVE technology. Here, an image of North Rustico under a simulated two meter sea-level rise.

Seeing is believing

Coastal erosion is a serious issue on Prince Edward Island. And climate change is making it a concern in locations around the globe.

Researchers at the University of Prince Edward Island (in partnership with colleagues at Simon Fraser University) have developed a tool to both track and predict coastal erosion and rising sea levels.

The Coastal Impact Visualization Environment (CLIVE) tool draws on P.E.I.'s archive of aerial photographs and the latest high-resolution digital elevation data. From that, the tool is able to develop models and images of future sea level scenarios.

The Partnership of Canadian-Caribbean Climate Change Adaptation, the Mi'kmaq Confederacy of Prince Edward Island, and the UPEI Climate Research Lab have funded the project, which began in 2013.

The first version, launched in February 2014, was focused on P.E.I. CLIVE version 2.0, now in development, will produce mapping and simulated coastal erosion and sea-level rise in locations such as New Brunswick, Hawaii, Bermuda and Lake Huron.

"By allowing citizens to view scientific data and explore climate change projections at any scale in their own neighborhood, we help them understand these often abstract phenomena at local, human scales," says Adam Fenech, the director of UPEI's Climate Research Lab. "We believe this is a way to connect all stakeholders to this mutual problem, enhancing awareness, education, dialogue, and collaborative problem-solving at all scales of society and government."

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