Applied research
Supporting economic recovery

La recherche appliquée
au service de la reprise économique

Spotlight on climate change

Vitrine sur les changements climatiques

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The current pandemic has brought into sharp focus the critical importance of innovation to navigate our way through a crisis. Colleges and institutes across Canada connect innovators in business with state-of-the-art facilities and expert faculty and students to solve real world problems. As we all hunker down for a dark winter, these innovative institutions and people are a beacon of hope – the light at the end of the tunnel. In this volume, you'll read about some of the solutions being developed in diverse areas, including medical technology, fisheries, grasslands and skills and training. We also shine a spotlight on efforts to address climate change and to help build Canada's clean tech sector, including innovations in weather monitoring, energy efficiency and sustainability. The stories here are only the tip of the iceberg. We're proud to showcase the exemplary applied research going on Canada's colleges and institutes.

La pandémie actuelle a clairement fait ressortir le rôle primordial que joue l'innovation dans la sortie de crise. Les collèges et instituts du Canada permettent aux innovateurs du monde des affaires d'avoir accès à leurs installations de pointe, aux experts de leur corps professoral et à leur étudiantes et étudiants pour trouver des solutions à de vrais problèmes. Alors que nous nous préparons toutes et tous à affronter un hiver des plus sombres, ces établissements novateurs et ceux qui les animent sont une lueur d'espoir et nous font entrevoir le bout du tunnel. Le cahier actuel vous familiarisera avec quelques-unes des solutions actuellement en développement dans des domaines aussi variés que la technologie médicale, les pêches, les pâturages, en plus du développement des compétences et de la formation. Nous y mettons également en évidence les initiatives visant à lutter contre les changements climatiques et à renforcer le secteur des technologies propres au Canada. Celles-ci passent entre autres par la surveillance des conditions météorologiques et l'efficacité et la durabilité énergétiques. Les exemples repris ici ne sont que la partie visible de l'iceberg. Nous sommes très fiers de pouvoir mettre en valeur cette recherche appliquée exemplaire qui est mise en œuvre au sein des collèges et instituts du Canada.

Jeffrey Crelinsten

Publisher & CEO
Research Money

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Applied research in support of a resilient and sustainable economic recovery

By: Denise Amyot,

President and CEO, Colleges and Institutes Canada

Denise Amyot

COVID-19 has forced us all to innovate in unexpected ways as we adjusted to a new reality of social distancing, telework and limited movement. As we now begin to reflect on what a post-pandemic recovery will look like, it is clear that our capacity to innovate will remain one of the key success factors. Luckily in Canada we have a strong network of colleges and institutes that has shown over the years, and throughout this pandemic, that post-secondary institutions can truly occupy an essential place in our country's innovation landscape.

With over 95% of Canadians living within 50km of their local college or institute, few other institutions are poised to have a positive impact right across the country. This means that their applied research offices are able to have a real impact on both Canadians and their communities, including businesses, and in particular SMEs, which have been hit particularly hard by the pandemic.

Canada is a nation of small and medium sized enterprises (SMEs) that often lack the capacity, equipment and networks to undertake the kind of research and development that would drive their businesses forward. This can be a huge challenge when your world gets turned upside down, almost overnight. By working directly with thousands of SMEs and serving as gateways to the innovation ecosystem, colleges and institutes have been able to support many SMEs throughout the pandemic, and will continue to play that role in the months to come. From developing respirators and personal protective equipment for healthcare workers using 3D printing and other advanced manufacturing techniques, to using cloud computing to create a real-time COVID-19 outbreak tracker, colleges and institutes, and their students, have already been involved in many projects to help Canada face the pandemic.

In fact, applied research activity involving students has been growing incredibly fast at colleges and institutes over the past decade. In 2017-18, CICan members entered into over 7,300 partnerships to produce more than 4,400 prototypes, products, processes, and services, 87% of which were completed in less than one year. More than 77% of these partnerships were with private sector partners, and most of these with SMEs.

Given their focus on meeting the needs of their communities and helping local businesses find practical solutions to a variety of challenges, it only makes sense that colleges and institutes will have lots to contribute to Canada's recovery from COVID-19, helping businesses find a new normal. Getting students involved to leverage their fresh perspectives and ingenuity is a win-win proposition for students and employers.

Colleges and institutes can also support the government's broader objectives as it aims to "build back better". This includes an important focus on rebuilding a greener and more sustainable economy. Once again, innovation will be key, and colleges and institutes have the expertise needed to support this transition.

In 2017-2018, half of Canada's colleges and institutes conducted research on clean technologies and utilities.

By working directly with thousands of SMEs and serving as gateways to the innovation ecosystem, colleges and institutes have been able to support many SMEs throughout the pandemic, **and will continue to play that role in the months to come.**

Whether it's testing new electric vehicles to make sure they work well in cold climates, or developing more efficient manufacturing processes, these projects have direct impacts in greening their communities while supporting thousands of SMEs who are growing Canada's sustainable economy.

In addition to new funding for green infrastructure to help upgrade and retrofit campuses across the country, this would boost the capacity of colleges and institutes to meet employers' skills development needs, support innovation through applied research, and reboot an inclusive, environmentally sustainable economy.

With the next federal budget expected to focus on economic recovery, it will be important to fully leverage the innovation potential of colleges and institutes. We believe that investing $165 million over two years in the College and Community Innovation Program (CCIP) would help maintain the college applied research capacity to help businesses and communities survive the challenges of the COVID-19 pandemic and pivot as the economy adjusts.

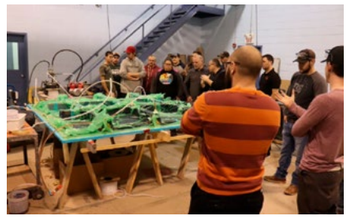
An amount of $85M over two years is needed to support rapid-response and entry-level grants to improve or develop new products and services, including those involving technology adoption and green innovation; with an additional $80M over two years for colleges to engage SMEs and other partners in applied research to support community recovery efforts.

Additional support for college sustainability Centres of Excellence would also empower institutions to collaborate with community partners and municipalities to infuse the labour market with graduates equipped to support zero carbon, diverse and resilient communities.

Building with CCNB-INNOV… Relationships that go a Long Way!

The Collège communautaire du Nouveau-Brunswick (CCNB), through its Provincial School of Fisheries, has always had a special relationship with the regional shipbuilding industry. CCNB-INNOV, the applied research and development arm of CCNB, has therefore adapted its range of services to better meet their unique needs and expectations.

Pairing a former instructor to an advanced materials researcher, outfitted with modern analytical equipment, gives its budding Advanced Materials Division the capacity to offer applied research, technical assistance, and knowledge transfer to such companies across Atlantic Canada.



Workshop on infusion

Atlantic Boat Builders midshore crabbing vessel

Skills transfer activities make it possible to offer specialized on-the-job training adapted to the context of each company, while facilitating the integration of new technologies and manufacturing processes.

The fishing boats built by Atlantic Boat Builders Inc. are renowned for their manoeuvrability, stability, and reduced fuel consumption. The CCNB-INNOV team contributed to the improvement of the advanced material processes that led to the successful launch of the Lady Esther, among others. "We were able to benefit from the expertise of a former instructor from CCNB to optimize our manufacturing processes and integrate the infusion process for certain components" according to Jean-Pierre Robichaud, Executive Director.

Profibre employee

R.P. Pro-Fibre Ltd. has developed and now sells light, composite-based rust-resistant cabin doors and hatches for boats. The owner, Mr. René Paulin, emphasizes the professionalism and commitment of the CCNB-INNOV team: "It is a pleasure to work with highly qualified professionals who are passionate about new technologies and innovation. The relationships maintained between the teams and the skills passed on have enabled us to grow together, benefiting our clients and our communities."

Profibre boat hatch

The use of cutting-edge production methods offers the possibility of developing products with exceptional physical properties and mechanical performances. With these eco-responsible manufacturing methods, the quantities of resins used are optimized, thus minimizing losses.

By facilitating the integration of socially acceptable, environmentally responsible, and economically viable solutions, the CCNB-INNOV team contributes to the sustainable development of businesses and communities.

Cleantech's audacious global goals

By Ivette Vera-Perez

Canada has declared a BHAG (Big Hairy Audacious Goal) for the clean technology sector: to capture a sizable part of the global market for cleantech. This market is expected to exceed $2.5 trillion by 2022. The goal is to triple the value of Canada's annual exports to $20 billion per year by 2025 from $7.8 billion in 2017.

Given the relatively small size of Canada's domestic market, strong export growth is simply a necessity. For clean technology and environmental products and services to be in the top five exports by 2025, exports will have to grow by an average of 11.4 percent per year. There are a handful of examples that prove that it can be done; Canadian cleantech companies that are very well recognized internationally such as Ballard Power Systems, Ecobee, and MineSense. Notably, all of these success stories are small- and medium-sized companies (SMEs) that are global leaders in their respective field.

But successful as they are, they are also few and far between. Cleantech startups face enormous challenges. In general, SMEs in cleantech often lack the critical access to public and private capital. Many clean technologies are capital intensive, but this capital also needs to be patient, as investments take time to reveal their true potential. Fortunately, we can see a progressive increase in size and sophistication of Canadian funds. This promises to play a role in preventing Canadian cleantech companies from migrating south of the border or being acquired by foreign firms.

A second challenge among cleantech start-ups and SMEs are barriers to accessing talent on the technical side and limited entrepreneurial, business and soft skills. Such start-ups are often founded by tech entrepreneurs with vision and expertise, but a lack of knowledge of the regulatory and policy environment results in some of these companies failing to become successful. Mitacs aims to fill a portion of this gap by helping companies bring in talent from post-secondary academic institutions to help companies execute on their roadmaps.

With the right mix of human and financial capital and supportive institutions in place, Canada's cleantech industry can become one of the most important areas of export growth and give our economy the boost in innovation and productivity that it needs.

Ivette Vera-Perez

Ivette Vera-Perez is the Team Lead for Mitacs's Account Management group. She directs a multidisciplinary group of account managers across Canada, with the mandate of helping industry secure top talent to advance innovation. Ivette has over 15 years of experience in the cleantech and environmental technologies sector. Her expertise spans from business development to site engineering, operations, and financing.

Climate data analysis can reduce risks to Ontario farmers

Weather has always played a critical role in agriculture, directing the decisions that growers make in the field. Therefore, accurate long-term forecasting can be a game changer for farmers.


Mike Duncan, PhD.

At Niagara College, the analysis of sophisticated weather data is headed by Mike Duncan, PhD, at the Agriculture & Environmental Technologies Innovation Centre (AETIC). Duncan and his team set out to look at what farmers might face in a changing climate. While the forecasts may be distressing, the advantage for growers to have accurate predictive data means the ability to prepare.

"We have raw weather data for southern Ontario for 18 years, including the lakes flooding in 2017, as well as predictive data for climate change over the same area for 18 years in the future, that shows differences in how the rain will fall and how the temperature will change," says Duncan, who is the Natural Sciences and Engineering Research Council (NSERC) Industrial Research Chair for Colleges, in precision agriculture and environmental technologies.

The AETIC team has analyzed two data sets; the first is a forensic recreation of the weather in farming areas for 2000 to 2018, based on the ERA-Interim global data set, and the second is based on the IPCC RCP(6.0) climate change scenario for the years 2030 to 2048.

Both data sets use the Weather Research and Forecasting (WRF) — a state-of-art model that generates 140 weather variables at 33,075 grid points across the farming areas to allow the Artificial Intelligence (AI) algorithms to make precise climate suitability maps of growing areas to match crop requirements.


Flooded Corn Field

The second data set also shows a snapshot of what 'might happen' if CO2 levels keep increasing, says Duncan. "It is unique in the sense that there are very few realizations of climate change data that show what might happen at the ground level as the climate evolves."

For southern Ontario, this detailed projection is calling for more significant, more extreme, and more variable rain rates. And winter temperatures are predicted to rise to the tune of one degree Celsius every year, due mostly to the warming of winters. So, longer periods of above 0° C weather.

"While the rise in temperatures may be concerning, the water – the amount and variability of rainfall – is what's most important to agriculture," Duncan cautions.

The good news: such simulation data can help farmers make accurate data-based decisions, and Duncan's team can work with growers and other urban industries to provide specialized weather analysis to help determine the best areas to grow specific crops and to implement management strategies.

Niagara College's AETIC team works with private and public sector partners to develop innovative solutions to address today's challenges in agriculture, local and sustainable food production, plant growth, horticulture practices, greenhouse operations, aquaponics and environmental management.

Learn more by visiting ncinnovation.ca

Achieving climate change mitigation and adaptation by accelerating innovation

Accelerating innovation in climate change mitigation and adaptation technologies can help Canada cope and respond to its present impact and potentially establish a positive trajectory for climate health. Seneca's applied research program has established a successful foundation of delivering high-quality and robust results relevant to industry, driven by faculty, and centered on engaging students. A number of Seneca applied research projects, in different disciplines, focus on the development of climate change mitigation technologies and the demand for this type of research is growing.

Mitigating the impact of climate change through the development of net-zero energy homes can impact reduced carbon emissions and overall dependence on fossil fuels. The challenge recently presented by the I-EMS Group to Seneca's Data Analytics Research Centre (DARC) and School of Information Technology Administration & Security was to develop an energy management system (EMS) for net-zero energy homes.

Currently underway, the project will thoroughly analyze a year of data from net-zero energy homes to develop algorithms to optimize hourly and daily energy consumption. The outcomes of this project aim to grow Canada's clean energy technology sector through increased utilization, application and validation of advanced Machine Learning and Artificial Intelligence analytics. This will be DARC's first application of robust data science techniques to inform and enable efficient energy management in smart homes. Increased capacity and consumer utilization will also benefit Canada's efforts to reduce greenhouse gas and CO2 emissions, and support operational cost reduction and increased system capacity goals.

Seneca has also embarked on an applied research initiative with Environmental Bio-Detection Products Inc. (EBPI), a Burlington-based biotechnology company. EBPI specializes in the development, manufacturing and distribution of biological testing kits focused on toxicity, genotoxicity and mutagenicity for pharmaceutical, research and environmental purposes.

Maintaining sustainable and clean drinking water processes which are responsive to climate events and increased population demand, is essential for urban and rural contexts worldwide. The ability to monitor volumes of water at controlled flow-rates in real-time will allow engineers to extrapolate data and target areas of concern with greater accuracy, which will support water supply sustainability, management and population health.

Working with Seneca's School of Electronics & Mechanical Engineering Technology, Seneca's research team will advance the design and efficacy of an initial prototype of a water testing device developed in a previous applied research project. The goal is to optimize the design of the existing prototype by adjusting pumps, reconfiguring Programmable Logic Controller coding, addressing quality assurance requirements and performance of the new water testing system across an array of operational metrics. The modified design will allow end-users the ability to target and monitor for compounds of concern such as DNA/RNA, microplastics, analytical endpoints as well as biological responses.

Seneca is committed to stewarding, conserving and protecting our environment and, this year, earned a silver rating for sustainability achievements from the Association for the Advancement of Sustainability in Higher Education. The efforts of several dedicated applied research teams at Seneca, including the two projects described here, contributed to this achievement and will continue to support Seneca and the regional innovation ecosystem in our mutual efforts to mitigate climate change through innovation.

To learn more about collaborating with Seneca, contact research@senecacollege.ca.

Addressing Skill and Training Gaps through Research & Innovation

By Dr. Mehdi Sheikhzadeh,

Vice-President, Research & Innovation, Lambton College

Colleges play a crucial role in supporting Canada's economy through research and development (R&D), but these activities also provide pathways for colleges to identify and address our nation's skill and training gaps.

Research & Innovation (R&I) departments at colleges collaborate with industry through R&D projects to develop new and/or improve existing technologies, processes and products. Through the development and execution of projects, research and administration staff are able to identify the partners and other businesses' training needs in that sector.

Furthermore, Industry 4.0 technologies including digital, automation and biotechnologies are affecting all industrial sectors as well as the need to acclimatize to remote and other modified working environments and service delivery models due to COVID-19. College R&I are on the frontline working to help companies with the integration of new and emerging technologies into operations, products and services. Colleges have realized upskilling or reskilling is also required upon technology adaption.

At its core, R&I operations are based on partnering and communicating with industry and are driven by the demand and focus of the sector. Colleges often employ Business Developers that are focused on connecting and developing partnerships from all sectors. In addition to promoting the R&D capacity, these Developers can play a critical role in identifying skill shortages and gaps and the need for specialized training. Many of these business developers are hired to support Canada's Technology Access Centres (TAC), the leading centres in college applied research, funded by NSERC. These specialized R&D centres assist businesses—particularly small and medium-sized enterprises by providing applied research, innovation technical services and specialized training. Because of their specific focus on specialized training, TACs have been a great catalyst to identify training gaps and develop required solutions.

It is also important to mention that colleges have built industry-focused, world class and state-of-practice resources and infrastructure for research purposes, which may also be used for targeted advanced subjects, particularly in the form of micro-credentials and customized trainings.

All of the above mentioned efforts provide opportunities to identify and address skills gaps for both industry training and academic programing:

A) Industry training can address these disparities through specialized courses, labs, workshops or competency-based training solutions (e.g. micro-credential) to upskill or reskill existing employees.

B) Identified required competencies can also be embedded into existing courses or establish new academic programs to prepare future workforces. R&I can communicate and collaborate with other college departments including co-operative placement, skill trades and corporate and career services that prepare students for the workforce upon graduation and can make these departments aware and prepared to address industry needs. As well, R&I is active in the development of not only new technologies but also the emergence of new industries and can provide this knowledge to the academic and student service departments to anticipate, pivot and modify programs and services as required.

The R&I departments in colleges have the capacity to position Canadian colleges at the forefront of supporting industry to adapt to a world with constant evolving skilled workforce challenges in addition to helping industry with their R&D goals.

Birds of a Feather: Building Student Success Through Research Partnerships

With 89.7 per cent of its graduates finding employment within six months of graduation and a bank of 6,200 employer partners, Georgian College demonstrates how supporting student learning objectives through problem-solving for local business and industry leads to success for all parties. This synergy is especially evident in research projects throughout the college.

Companies draw on Georgian's expertise in program areas like engineering technology, computer studies, research analyst, business, and environmental studies. They leverage Georgian's highly developed skillsets, capabilities, equipment, and infrastructure while giving students the opportunity to learn and gain relevant experience in real-world scenarios that only industry can provide.

Grassland Habitat, Stephanie Sabean

Grassland Habitat, Stephanie Sabean

Nicole Barbato is the program co-ordinator for Environmental Technician/Technology programs and the instructor of the Applied Research Project course. She's one of many faculty members across the college who act as research project leads, matching student researchers with industry clients and guiding them through the research and reporting process. She recently paired Environmental Technology student Stephanie Sabean, who was looking for a project that could incorporate her love of birding, with the Nature Conservancy of Canada (NCC), an organization whose mission is to conserve important natural areas and biological diversity.

The NCC needed help with grassland habitat restoration projects at two of their properties in Utopia, Ontario. Habitat loss since the 1970s had drastically reduced grassland bird populations in the area. Before proceeding with restoration, baseline data was required to establish the number of existing species to compare with future numbers post-restoration. Through June 2020 Stephanie performed eight surveys and conducted a literature review. The data she collected in her report will help validate the restoration project and her future management recommendations will guide the NCC through the establishment and preservation of the restored habitat.

"It was an amazing experience," said Stephanie. "I was able to research a topic that I have a real passion for, and it has helped to develop the direction of my career. I learned so much and had great support networks in both Nicole and the NCC."

For Nicole, it's gratifying to see success on both sides. "The NCC was impressed with the quality of the research and has asked for more 'exceptional' students like Stephanie to help with further projects," said Nicole. But the thing she loves most is watching the growth of her students. "They come into my class with a passion for a particular topic, and to see them take such huge strides analyzing the data and communicating that information confidently just wows me."

Businesses and community organizations who would like to participate in applied research projects or are looking for talent to support their research activities can reach out to Georgian's Research and Innovation department.

Georgian

ResearchandInnovation@georgiancollege.ca.

Cégep de Thetford: Leader in Innovation

Research and education devoted to 21st century Canadian industries

The Cégep de Thetford's national leadership in college applied research and innovation is very much related to the dynamism of its two research centres, both recognized as College Centres for Technology Transfer (CCTTs) and Technology Access Centres (TACs). COALIA and Kemitek offer high-end expertise in five sectors: mineral technologies, plastics processing, advanced materials, green chemistry, and chemical process scale-up. Their successes and world-class infrastructure are attractive incentives to numerous local and national businesses as well as international clients. Furthermore, the Cégep de Thetford is a partner of choice for the training of highly qualified personnel, whether through college programs, continuing education, tailor-made training, work-based learning, or internships.

Over the last 5 years, Research at the Cégep de Thetford represents...

- **$30M total income**
- **80 experts dedicated to research**
- **$30M in research equipment and infrastructure**
- **More than 350 clients for more than 600 mandates**
- **More than 270 newly developed products**
- **Nearly 15,000 h of internship**

COALIA: Material Science, Processing Expertise

For more than 35 years, COALIA has made every effort to encourage economic development in Quebec and Canada through applied research, technical assistance as well as training and information activities. With sustainable development in mind, the Centre promotes the development and transfer of technological solutions. COALIA is unique in its work in two distinct business sectors: **mineral technologies** and **plastics processing** as well as hosting the NSERC Industrial Research Chair in **Advanced Materials**.

"COALIA is a proactive player in innovation, carrying out numerous applied research and technical market-driven projects each year. Thanks to its high-level expertise and its state of the art infrastructure, COALIA is recognized as an essential scientific and technical centre of expertise," affirms Annie Rochette, Executive Manager for COALIA.

For Dr. Pascal Vuillaume, Director of Research in the Plastics Sector, the Centre provides one of the most important service offers for testing, characterizing and transforming plastics in Canada. "COALIA realizes a large number of applied research projects, particularly in thermoplastics, materials for 3D printing, bioplastics and recycled polymers. In collaboration with industrial partners, we develop new functional materials, including organic-inorganic materials and nanomaterials. New reinforcing fillers for polymers are prepared to impart specific properties to final products, always keeping in mind their commercialization."

"Regarding the mineral sector, COALIA works mainly in the characterization and treatment of mineral substances for extractive metallurgy and mineralurgy. COALIA proposes a geometallurgical approach to its partners; integrating all the components of a mining project while minimizing risks by offering predictive tools that promote responsible exploitation of resources," says Caroline Chouinard, Director of Research in the Mineral Sector.

Kemitek: Green chemistry and chemical process scale-up

Founded in 2002, Kemitek is the college's research centre on **green chemistry** and **chemical process scale-up** whose installations are located in the former Asbestos Corporation headquarters, which is highly symbolic of the economic diversification the region has undergone since the end of the asbestos mining operations in the early 2000s.

The research team assists businesses in developing new safer chemical products or processes. To do so, the centre has developed expertise in synthetic organic chemistry, chemical engineering, renewable materials, analytical chemistry, and product formulation.

Kemitek's massive infrastructure of over 36 000 sq. ft comprises organic and analytical chemistry labs as well as a pilot plant. The pilot installation used to scale-up chemical processes is noteworthy, being one of the very few public-accessible organic chemistry pilot facilities in the country. "Kemitek's plant is available to any company walking down the path to commercialization, without having them spend prohibitive financial assets for expensive infrastructure having a short lifespan in the context of an emerging venture," mentioned David Berthiaume, Executive Director for Kemitek.

The centre has served multiple companies in achieving successful commercialization in the past, ranging from new process yielding high-value extracts of small berries (Nutra Canada), to a new renewable waterproofing solution (Soprema Canada).

Overall, the applied research services offered by the Cégep de Thetford have greatly improved the innovation capacity of local and national businesses. We look forward to continuing that mission and developing it into new research expertise that will help propel our partners and community even further into this new century!

Québec

CRSNG NSERC

In March 2020, Collège Boréal inaugurated its new centre for applied research: Research & Innovation Boréal (RIB)

This launch signaled College Boréal's intention to make its expertise in applied research available to the communities it serves, thereby contributing to their economic vitality and sustainable development. Whether they relate to new agri-food technologies or early childhood education, our research projects focus on priorities identified in collaboration with RIB's partners, in response to emerging opportunities.

Advances in the field of energy-efficient construction have brought environmental sustainability into the mainstream of residential construction, leading many small and medium companies to adopt green approaches and technologies. The most innovative companies continue pushing the boundaries.

Professor Denis Ouimette, Architecture Technology Program Coordinator, is presently working with two green innovators, Construction La Ray and Tooketree Passive Homes. Both partnered with Collège Boréal to design cutting-edge energy-efficient products for their customers.

With the help of Denis and his team of students, Construction La Ray is pioneering a high-performance window shutter which will prevent overheating and also reduce heat loss, energy consumption and GHG emissions. Tooketree Passive Homes is developing an innovative structural insulated panel that will improve building's energy performance while reducing construction waste.

Both projects will lead to long-term cost savings for customers while allowing them to further differentiate themselves within the construction industry, promoting sustainable building practices.

Des entreprises canadiennes du secteur des sciences de la vie s'associent au Collège La Cité pour mettre au point le premier bio-masque facial de qualité médicale

Arylide Life Sciences Inc. et Axcelon Biopolymers Corp. en collaboration avec le Bureau de la recherche et de l'innovation (BRI) du Collège La Cité à Ottawa, ont obtenu une subvention du Conseil de recherches en sciences naturelles et en génie du Canada (CRSNG) afin de créer un bio-masque protecteur avancé et basé sur une technologie brevetée de nanocellulose bactérienne.

L'objectif du projet, dans le cadre du programme Recherche appliquée en réponse rapide à la COVID-19, est d'utiliser un matériau unique de nanocellulose bactérienne intégré dans une matrice de charbon actif, revêtu de nanoparticules antimicrobiennes et ainsi concevoir un masque facial avancé réutilisable destiné aux professionnels de la santé.

Le projet sera mené par une équipe pluridisciplinaire de chercheurs faisant partie du BRI et dirigée par Nathalie Méthot, Ph.D. Les laboratoires de biosécurité de niveau II du Centre d'accès à la technologie en bio-innovation (CAT-B) ainsi que les imprimantes 3D du Centre d'expertises en prototypage intelligent (CEPI) de La Cité seront utilisés pour réaliser le projet.

Le CAT-B contribue au secteur de la biotechnologie en accélérant l'innovation dans les entreprises par le soutien au développement et à l'amélioration de produits dans les domaines de la biotechnologie agricole, la biotechnologie de la santé et la biotechnologie industrielle. L'infrastructure de recherche du CAT-B comprend un laboratoire de biosécurité de niveau II (bioréacteurs, hottes à flux laminaire, équipements spécialisés pour mesurer l'efficacité de la filtration bactérienne des matériaux), un laboratoire de génétique moléculaire (enceintes de sécurité biologique, PCR en temps réel, extracteur d'ADN) et une large gamme d'instruments de chimie analytique à la fine pointe technologique (microscopie à fluorescence, LC-MS, GC-MS).

Le Centre d'expertises en prototypage intelligent (CEPI) contribue à accélérer l'innovation dans les entreprises grâce à une approche intégrée et multidisciplinaire du développement rapide de prototypes intelligents. Le Centre se concentre sur trois principaux domaines d'application: la santé intelligente, l'infrastructure intelligente et la mobilité intelligente. Les laboratoires du CEPI sont équipés d'outils d'usinage, d'imprimantes 3D et d'une infrastructure pour l'intelligence artificielle permettant aux entrepreneurs de collaborer avec des chercheurs dans toute une série de domaines de fabrication intelligente.

Offrant plus de 140 programmes dans des installations à la fine pointe de la technologie au sein d'un milieu d'apprentissage moderne et tourné vers l'avenir, La Cité est le plus grand collège d'arts appliqués et de technologie de langue française en Ontario et hors Québec.

Pour plus d'informations:
Nathalie Méthot, Ph.D., Directrice, Collège La Cité – BRI, T: 613-742-2483, bri@collegelacite.ca, https://www.collegelacite.ca/bri

La recherche appliquée à l'appui d'une reprise économique résiliente et durable

Par: Denise Amyot,

Présidente-directrice générale de Collèges et instituts Canada

Denise Amyot

La COVID-19 nous a poussés à innover comme jamais auparavant. Nous avons en effet dû composer avec une nouvelle réalité faite d'éloignement social, de télétravail et de limitation des déplacements. Maintenant que nous avons entamé une réflexion sur la reprise après la pandémie, il est certain que l'un des facteurs clés pour sa réussite réside dans notre capacité à innover. Nous sommes chanceux au Canada. Notre réseau des collèges et instituts prouve depuis des années, et encore plus depuis le début de la pandémie, que les établissements postsecondaires occupent une place essentielle dans le milieu de l'innovation.

Plus de 95% des Canadiennes et des Canadiens vivent à moins de 50 km de leur collège ou institut local. Il existe peu d'autres établissements qui peuvent se targuer d'apporter un tel impact positif, et ce, dans tout le pays. Nous pouvons dès lors affirmer que les centres de recherche appliquée ont un réel impact sur les Canadiennes et Canadiens et leurs collectivités, ainsi que les entreprises qui y sont localisées. Cela est d'autant plus valable pour les petites et moyennes entreprises (PME), frappées de plein fouet par la pandémie.

Les PME du Canada n'ont en général ni la capacité, ni les outils et les réseaux nécessaires pour entamer la recherche de pointe et le développement de nouveaux procédés pourtant indispensables à leur prospérité. Le défi est énorme lorsque notre monde se retrouve bouleversé presque du jour au lendemain. En travaillant directement avec des milliers de PME pour leur construire une passerelle vers l'écosystème de l'innovation, les collèges et instituts leur ont apporté le soutien nécessaire pendant la pandémie. Et cela sera encore le cas pendant les mois à venir.

Avec leurs étudiantes et étudiants, les collèges et instituts ont contribué à de nombreux projets pour épauler le Canada dans sa gestion de la pandémie. Ceux-ci vont de la conception de respirateurs et d'équipement de protection personnelle pour les travailleurs de la santé en utilisant des techniques de production avancées, dont l'impression 3D, à l'exploitation de ressources infonuagiques pour concevoir un outil de suivi en temps réel des foyers de COVID-19.

Cela fait maintenant dix ans que les étudiantes et les étudiants sont impliqués dans les activités de recherche appliquée des collèges et instituts. Et leur participation ne cesse de croître. En 2017 et 2018, les membres de CICan ont formé plus de 7300 partenariats ayant abouti à plus de 4400 prototypes, produits, processus et services. Et 87% de ceux-ci ont vu le jour en moins d'un an. Plus de 77% des partenaires provenaient du secteur privé et étaient en majorité des PME.

Les collèges et instituts s'efforcent d'abord de répondre aux besoins de leurs collectivités et d'apporter des solutions concrètes aux problèmes des entreprises locales. Il est donc naturel pour eux d'apporter une large contribution à la reprise de l'après COVID-19 et à aider ces entreprises à fonctionner dans ce qui sera pour elles une nouvelle normalité. Les étudiantes et les étudiants impliqués mettent à profit leur vision novatrice et leur ingéniosité, ce qui leur bénéficie tout autant qu'aux employeurs.

Les collèges et instituts peuvent également aider le gouvernement dans son objectif plus large de « mieux reconstruire. » Une attention particulière sera portée à une reconstruction économique verte et durable. Là encore, il faudra passer par l'innovation. Les collèges et instituts possèdent l'expertise nécessaire à cette transition.

Toujours en 2017 et 2018, la moitié des collèges et instituts du Canada ont mené des recherches sur les technologies et les énergies propres. Qu'il s'agisse de tester de nouveaux véhicules électriques pour vérifier leur bon fonctionnement dans les climats froids ou d'améliorer l'efficacité des procédés de fabrication, ces projets aident directement les collectivités à devenir plus écologiques tout en apportant le soutien nécessaire à des milliers de PME qui contribuent à la durabilité de l'économie canadienne.

Le prochain budget fédéral se concentrera certainement sur la reprise économique. Il est dès lors important de maximiser le potentiel d'innovation des collèges et instituts. Nous pensons qu'un investissement de 165 millions de dollars sur deux ans dans le Programme d'innovation dans les collèges et la communauté (PICC) donnerait aux collèges la capacité de recherche appliquée nécessaire à aider les entreprises et les collectivités à survivre aux difficultés engendrées par la pandémie de COVID-19 et à suivre les ajustements de l'économie.

Idéalement, 85 millions sur deux ans favoriseraient les subventions de réaction rapide et d'entrée et permettraient d'améliorer ou de concevoir de nouveaux produits ou services, dont ceux nécessitant une adoption de technologie et une innovation verte. Les 80 millions restants permettraient aux collèges d'impliquer leurs partenaires, et parmi eux les PME, dans des projets de recherche appliquée aidant à la reprise de leurs collectivités.

Une aide accrue aux bureaux de durabilité des collèges favoriserait également la collaboration avec les partenaires communautaires et les municipalités pour amener sur le marché du travail des diplômés capables de soutenir des collectivités carboneutres, diverses et résilientes. Outre un nouveau fonds pour infrastructures vertes permettant de moderniser les campus du pays, les collèges et instituts verraient grandement s'accroître leur capacité à combler les besoins en développement des compétences des employeurs, à soutenir l'innovation par le biais de la recherche appliquée et à contribuer au redémarrage d'une économie inclusive et durable.

En travaillant directement avec des milliers de PME pour leur construire une passerelle vers l'écosystème de l'innovation, les collèges et instituts leur ont apporté le soutien nécessaire pendant la pandémie. **Et cela sera encore le cas pendant les mois à venir.**

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