Challenge:
“For Indigenous people, by Indigenous people” describes the concept that no policy should be decided or research conducted without the full participation of members of the Indigenous community. The collection and ownership of data falls within this category.

Solution:
Moneca is recognized for her contribution to an Indigenous data sovereignty project that developed a web-based app which empowers Indigenous communities to survey their populations. Developed in partnership with Integral Ecology Group, the app — Our Data Indigenous — started out in response to COVID-19 as a way to support Indigenous communities disproportionately affected by the pandemic and for communities to conduct their own research, generating data that helps inform local decision-making.

Benefit:
The positive response to the app led to expansion beyond COVID-19 to surveys that help understand other concerns such as housing, language, and youth empowerment. Communities can use the data to develop funding proposals and long-term goals and objectives. The uptake has expanded beyond Manitoba to British Columbia, Puerto Rico, and Ecuador.

Due to historical events, many chiefs and council members have questions about who’s going to own the data and what’s going to be done with it. We’re trying to do research differently — for Indigenous people, by Indigenous people. The success of this project is in part due to Mitacs finding an industry partner that was such a good fit.
Challenge:
Touchscreens are being installed in aircraft cockpits. They are being retrofitted into older cockpits, where screens are often placed far from the pilot. Helicopter pilots experience particularly high levels of vibration. There is a need to establish industry guidelines for the safe integration of touchscreens into this challenging environment, to reduce pilot error.

Solution:
Adam built an adjustable, customizable vibration test platform, collaborating with industrial partner CMC Electronics of Montréal, and used real helicopter vibration data. This platform can mimic a broad range of cockpit environments. He conducted a study where 24 participants performed a task under vibration. The results can be used to establish minimum touchscreen button size guidelines for vibrating environments. They also challenge the utility of a hand-support strategy recommended by an aviation standard.

Benefit:
Adam’s work is proving to be an industry game-changer. The platform will be used for rapid prototyping and testing of aviation touchscreens to design the flight deck of the future. CMC hired Adam full-time, allowing him to directly apply his research findings in the design of real aircraft systems.

Whereas most research granting agencies lean towards theoretical studies, Mitacs is the ideal partner for practical, applied projects. Aviation is a very complex industry and Mitacs allowed this project to be possible, providing an invaluable opportunity to work with aerospace and touchscreen experts.
Challenge:
Ocular melanoma, the most common cancerous eye tumour found in adults, can be lethal in the small percentage of Canadians who develop it each year. Current diagnosis methods require highly trained staff to take pictures inside the eye using specialized equipment or remove a piece of the tumour in the eye for a biopsy. The current approach provides a static snapshot of cancer, and cannot be done repeatedly due to its invasive nature.

Solution:
Prisca has developed the first-ever liquid biopsy for early-stage patient screening that uses simple, routine blood work. Her novel method successfully identifies small DNA fragments in the blood, called circulating tumour DNA, which accurately relay information about the presence and malignancy of an eye tumour at its earliest stage.

Benefit:
Prisca’s research is expected to have a major impact on eye cancer patients, serving as an indicator of cancer development and to predict tumour formation before clinical imaging. Her work may help retain eyesight and ultimately save lives through the development of an easily accessible screening test that can be deployed at ophthalmology clinics.

As part of my PhD studies, I learn about molecular biology and pathology, but the Mitacs training gives me the opportunity to learn important skills like time management and strong communication that I also need to manage my project successfully.
Challenge:
Canada has the longest coastline in the world, yet Canadians rarely pause to think about why the ocean matters: more than 50 percent of oxygen comes from the global ocean. It regulates climate; stores carbon; and provides food, medicine, and jobs. Though 90 percent of Canadians agree the ocean plays an important role in our economy, only one-third feel it directly influences their day-to-day activities.

Solution:
Diz spearheads an innovative research collaboration to develop the world’s first national ocean literacy strategy, positioning Canada as a global leader in promoting and sustaining ocean health. She leads a landmark marine social sciences study to measure people’s ocean literacy — their understanding of how the ocean influences them and vice versa. Over 3,000 Canadians and 400 organizations participated; the study culminated in the launch of *Land, Water, Ocean, Us: A Canadian Ocean Literacy Strategy*, a model for the international community.

Benefit:
The national strategy is being implemented by the Canadian Ocean Literacy Coalition. Objectives include launching a nationally coordinated Ocean Week Canada celebration, strengthening ocean-climate education, establishing a microgrant program to support community-based work, increasing engagement and diversity in early career training and leadership opportunities, and co-developing international research collaborations.

Dr. Lisa (Diz) Glithero

We’re shifting consciousness and building relationships with each other and the ocean. We couldn’t have done it without Mitacs.
2021 Mitacs Award for Exceptional Leadership — Professor

Challenge:
Over the course of two decades, Ray — a Professor of Computer Science and expert in numerical analysis, scientific computing, and high-performance computing — has overseen 16 Mitacs research projects. In essence, he develops new and more efficient algorithms and software to solve mathematically formulated problems on supercomputers. One of his projects focuses on the challenge of online-shopping returns — currently soaring to 30-40%.

Solution:
His team is working on developing a virtual dressing room to create a lifelike shopping experience. The idea is that shoppers provide a few key body measurements such as height or weight, upload a photo, and once their custom avatar is generated, begin virtually trying on clothes.

Benefit:
Whereas other virtual dressing rooms offer a simple Photoshop-like experience, Ray’s team uses the principles of physics to give users a realistic view — and feel — of how clothing will fit. The result is a unique simulation capable of modeling the give of a fabric, thus reducing returns. This is just one of many Mitacs projects that span Ray’s work ranging from mental health to agriculture to policing and the environment.

Collaborating with Mitacs is a win-win-win-win-win scenario — for Canadians, the business, the university, the student, and my research program. Students gain the opportunity to apply their talents to real-life challenges and more rapidly access an industry career path, while other stakeholders benefit from their contribution to the innovation continuum and economic outcomes.

Dr. Ray Spiteri
**Challenge:**
In current political systems, the critical contributions of women partners are often overlooked. Historically speaking, there is much that has been shared about the influence of Western European queens. Yet, there is far more that could be said about the political and cultural contributions of those in what we now refer to as the Czech Republic — Bohemian queens. The problem is that no one has made the effort to say much — until now.

**Solution:**
Sophie’s work contributes to feminist political research, the relevance of which we are only just beginning to understand. Her gender-critical, feminist counterview of queens in the Kingdom of Bohemia (modern-day Czech Republic) provides keen insights into the influence of the wives of Charles IV, especially Anne of Świdnica, as evidenced by her correspondence with Petrarch, the Italian humanist and poet.

**Benefit:**
Sophie’s painstaking and meticulous research is not only closing the gender gap in medieval history but is also shedding light on Central European queenship at large. Her work is expected to have a lasting impact on both medieval and gender studies.

The Mitacs Globalink program enabled me to pursue my dream to research medieval history in the Czech Republic and develop the specialized language and manuscript skills I need to achieve my career goals.
Challenge:
There has been no greater challenge over the last 18 months than COVID-19, as millions have been infected and died and economies have shut down. Although studies indicate that masks reduce the spread, transmission still regularly occurs even with widespread mask usage.

Solution:
Arash seized a golden opportunity to find a silver bullet for COVID-19. While exploring anticorrosion coatings, the pandemic hit, and he applied his graphene research towards virus prevention, devising an antiviral coating material for face masks to thwart transmission. He invented a novel, low-cost compound that is more than 99.99 per cent effective made from a graphene oxide-silver combination. Recently, the first mask using this coating has received Health Canada approval.

Benefit:
After receiving approval in late September, ZEN Graphene Solutions made its first commercial sale of the coating — marketed as ZenGuard™ — to Ontario-based TreborRX Corp., which plans to market a “game-changing” four-ply mask. ZEN has responded to the anticipated demand by investing $15M to scale up production to reach 800 million antimicrobial masks per month.

Dr. Seyyedarash (Arash) Haddadi
Mitacs helped me commercialize my research in two important ways. First, as a university graduate from Iran, Mitacs introduced me to research and industry in Canada. And secondly, the stipend Mitacs provided enabled me to focus on my research and discovery.
2021 Mitacs Award for Exceptional Leadership — Industry

**Challenge:**
The traditional pharmaceutical business model doesn’t support drug discovery for rare diseases, where the market is too small to justify the costs, or for emerging priorities such as developing vaccines and antiviral cures for global pandemics that require mass collaboration and fair access.

**Solution:**
The Structural Genomics Consortium (SGC) is a global public-private partnership that accelerates the discovery of new medicines by making research materials and data related to human genes and proteins available in the public domain. Its pioneering open-science business model allows for seamless collaboration among a large network of scientists in academia and industry with no intellectual property restrictions or patents. With approximately 200 scientists in six major research labs at universities in Canada, the United States, and Europe, its partners include pharmaceutical companies, government institutions, and foundations.

**Benefit:**
Their groundbreaking work is causing a foundational shift in the way we find cures for rare diseases, giving hope to the estimated one in 17 people affected by rare diseases. Over the past 20 years, the organization has evolved from a focus on structural biology to be an open-science drug discovery consortia working with the private sector and academics to identify inhibitors for drug targets expressly to make them openly available. The inhibitors have been used by thousands of researchers all over the world to unlock new areas of disease biology, launch new companies that focus on open science and affordability, and develop medicines.

— Dr. Arij Al Chawaf on behalf of SGC.