

PARTNER PERSPECTIVE

ULaval takes Northern Research to New Heights

By Debbie Lawes

Canada is stepping up its game when it comes to monitoring the rapid changes underway in the Arctic. In July, the federal government announced that its largest investment ever in northern research would go to a Quebec university with the world's largest concentration of scholars specializing in northern and Arctic studies.

Université Laval, which jumped to #6 from #8 in the current Top 50 Research Universities ranking, is also a global leader in photonics, neuroscience, cardio-metabolic health, microbiology and food and nutrition.

The \$98-million grant from the highly competitive Canada First Research Excellence Fund (CFREF) – Laval's biggest research award ever – enables the university to link these specialties to develop better

tools for probing and predicting the effects of climate change and industrialization on northern ecosystems and populations.

Sentinel North brings together researchers from 15 universities from around the world, indigenous organizations and communities (e.g. Nunavut Research Institute and the Grand Council of the Crees) and provincial, territorial and federal governments. Also participating are some 20 companies, including those working in photonics (e.g. Ericsson Canada Inc. and TeraXion), drug discovery (Pfizer Canada), natural health products (Nutra Canada and Atruim Innovation) and transportation (e.g. Airbus).

One priority is to create a network of connected sensors robust enough to withstand the unforgiving conditions of northern regions. These devices need to be portable, energy conserving, remotely accessible and

sensitive enough to measure changes as they happen.

"We have 8 field stations currently monitoring conditions in the north, but the technologies they use take longer to produce results and they monitor mostly for weather and climatic conditions," explains Dr. Edwin Bourget, VP research and innovation at Laval. "With Sentinel North, we will be able to accelerate and expand how we monitor these changes and develop solutions faster."

As well, researchers are using new materials in optic photonics to build remote sensors with higher resolution to better understand the effects of a changing north on food chains, pollution, urbanization and infrastructures. One of the leaders in this space is Dr. Marcel Babin, who returned to Canada after working in France for 18 years.

Babin is a Canada Excellence Research Chair (CERC) in Arctic

remote sensing and one of three Laval-based CERCs involved in Sentinel North. His is currently developing an "Arctic-proof" drone that can plunge to depths of nearly 2 kilometres under the Arctic Ocean to collect data about marine organisms. The drones will fill an important gap in a global network of ocean-observing beacons.

Sentinel North is also led by Dr. Yves de Koninck, a Laval neuroscientist who will study the effects of a changing north and high-risk diets on people's health. Research will also focus on brain diseases caused, for instance, by consuming seafood with trace amounts of heavy metals.

Two other key contributors are Drs. Younes Messaddeq and Pierre Marquet. Messaddeq left Brazil in 2010 to accept a CERC at Laval in optical materials, including new types of fibres and glass. He made headlines a year ago with his inven-

tion of "smart" clothes that monitor a wearer's glucose levels, heart rhythm and brain activity and then transmit these data instantly to a doctor via wireless networks.

Marquet is an expert in the emerging science of neurophotonics, which uses photons – or quantum units of light – to study molecular processes in the brain.

Bourget stresses that Sentinel North's research is designed to focus on solutions that detect and treat problems early.

"We're talking about an investment that will have lasting and tangible benefits in areas including health, resource management and socioeconomic development," he says.

LONG-TERM PARTNERSHIPS ARE KEY

Bourget credits Laval's success in winning a CFREF grant to several factors: the establishment of dozens of new

research chairs; a growing number of researchers who work across disciplines; and a rapid rise in the number of partnerships with companies.

In 2008, Bourget embarked on an ambitious plan to more than double Laval's 80+ research chairs. Today, the university has 84 federally funded Canada Research Chairs, more than 75 partnership research chairs and three prestigious CERCs.

"The biggest change we've seen from these partnerships is a switch from short-term research investments to longer-term partnerships with companies and organizations," says Bourget. "It has fundamentally changed how many businesses think of university collaborations. Partnering over five or ten years gives companies a competitive edge well into the future."

Debbie Lawes (Debbie@dovercourteditorial.ca) is an Ottawa-based science writer.