# Collaboration in Ocean Technology Development

By Andrew Safer, with Mark Callanan

Dr. Ray Gosine, Associate VP (Research), Memorial University of Newfoundland

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Dr. Ray Gosine, Associate Vice President (Research) at Memorial University of Newfoundland, speaks about Memorial's "special obligation" to Newfoundlanders and Labradorians which dates back to the tragic losses suffered at the Battle of Beaumont Hamel on July 1, 1916. Of the 780 Newfoundlanders who fought there, fewer than 100 survived. "Probably every family in the province was affected," he says, adding that Memorial College was established in 1925 to honor the fallen. "We have a memorial that's more than a cenotaph," he says. "It's a living Memorial."

Referring to a line in Memorial's mission statement ("We recognize our special obligation to the citizens of Newfoundland and Labrador"), he said, "I've never seen that in another university mission statement. I think everyone in the institution understands that where we meet our obligation is not simply in creating knowledge, but in having an impact on the people of this place, and the industry—that's what is important." Reflecting on the province's harsh environment that has spurred innovation, he says, "We have made use of this place and the challenges that are associated with where we live, and that has helped us develop areas of world-class expertise and the ability to contribute to the development of a pool of knowledge, and now we're seeing this translate to collaborations with industry, which is fulfilling something that's front a center in our mission."

Dr. Gosine helped support $97m in externally funded research at Memorial in 2011, approximately one-third of which was oceans-related. Current ocean technology projects in the Faculty of Engineering and Applied Science at Memorial range from a collaboration with Provincial

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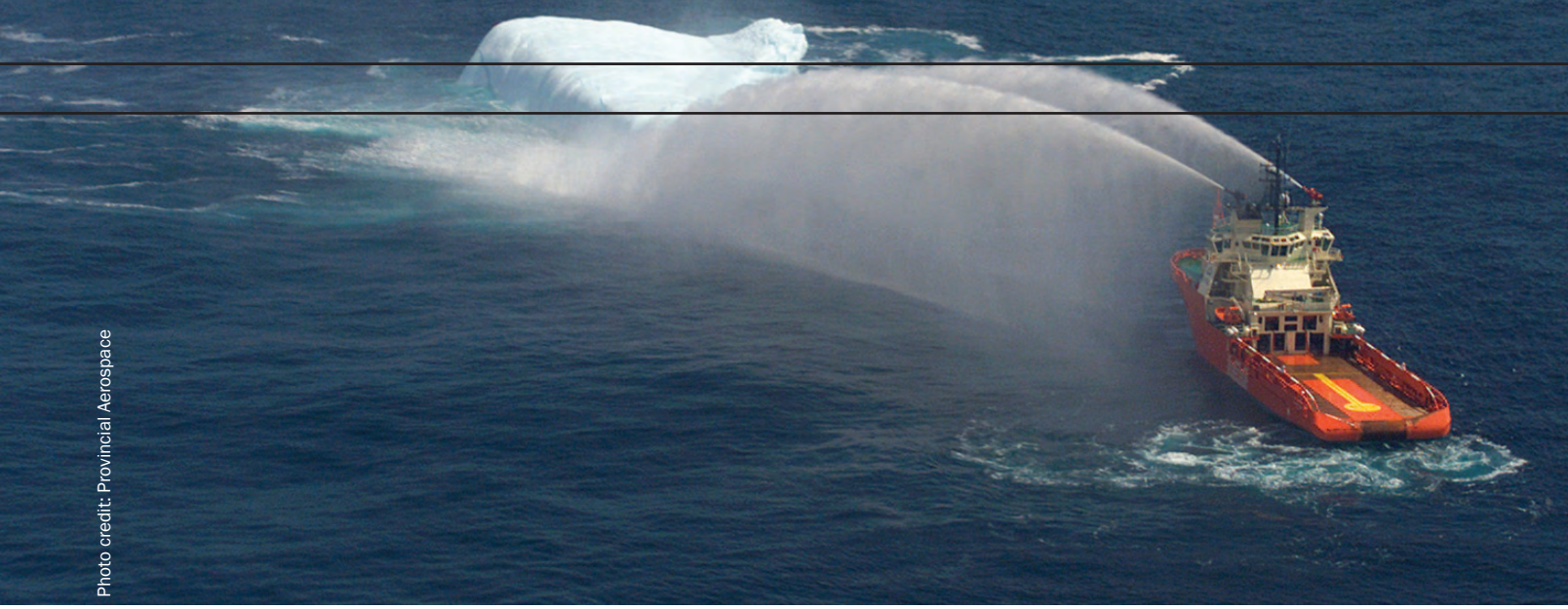

Photo credit: Provincial Aerospace

**Provincial Aerospace and C-CORE collaborate on ice management services on the Grand Banks, offshore Newfoundland, and in Greenland.**

Aerospace, the industry representative on the development of remote aerial vehicles for environmental monitoring of the ocean, to a collaboration with Rutter Inc., the industry representative on a seafloor instrumentation project focused on developing geological imaging and earthquake detection capabilities via a network of wireless marine sensors.

Virtual Marine Technology (VMT), a developer of simulators used to train operators of survival and fast-response craft, has collaborated with Memorial on three research projects over the past eight years. Simulation is used to develop competencies and skills that would otherwise be too difficult or dangerous to introduce using on water training. It all started with an informal collaboration in 2003. After heading up research and development efforts for the Coast Guard, Captain Anthony Patterson, now president and CEO of VMT, was working at the Center for Marine Simulation at the Fisheries and Marine Institute of Memorial University (Marine Institute). He figured that with all the engineering capability at the university, they should be building simulators to meet Canada's unique requirements for operating in harsh environments. Dr. Brian Veitch, currently Associate Dean of Research and a professor in Memorial's Faculty of Engineering and Applied Science, was the Terra Nova Project Junior Chair in Ocean Environmental Risk Engineering at the time. He was looking into personnel safety issues in the offshore. He and Antonio Simões Ré, a naval architect and senior research officer at the NRC—Institute for Ocean Technology, had been conducting research on lifeboat performance to identify the performance limitations of lifeboat evacuation systems. Dr. Veitch and Capt. Patterson discussed the issues of lifeboat evacuation and, together with Simões Ré, decided to collaborate on developing a simulator that could be used to safely train people to launch in emergency conditions. They secured project funding from Petroleum Research Atlantic Canada. Randy Billard, Dr. Veitch's student who had just started working on his Master's degree in Ocean and Naval Architectural Engineering, started to work on the project. In 2004, the two of them co-founded Virtual Marine Technology. Capt. Patterson came onboard as CEO three years later.

"Simulation technologies are advanced by Memorial to commercially viable prototypes," Capt. Patterson explains. "At that stage, VMT starts to work with the University to help bring the technologies to fruition." The first project involved modeling and simulation of harsh environments, including rough seas. The second took the early-stage proof of concepts to commercially ready technologies, and the third, currently under way, is expanding VMT's suite of technologies to include emergency health and safety training programs for the offshore. Collaboration with Memorial's School of Human Kinetics and Recreation enables VMT to ensure the simulators are experientially realistic. VMT and Memorial both share the intellectual property, which is developed through a cross-licensing agreement. The licensing arrangement enables the university to use the technology for research. "We get a really strong R&D flywheel moving, and the university gets a partner that's bringing relevant applied research projects to the table," says Capt. Patterson. "Ultimately, the university derives benefits from the commercialization of the technology, but they don't have to take the risks of commercializing it." In May 2010, VMT was the first company to receive international certification for a lifeboat simulator from Det Norske Veritas.

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**VMT Production Engineer Andrew Edwards explains the procedural hook trainer which teaches how to safely prepare lifeboat hooks for launch.**

Memorial University is the proponent of VMT's current research project in which VMT is the industry partner and sponsor, and Dr. Veitch and Dr. Scott MacKinnon, a professor of Human Factors in the School of Human Kinetics and Recreation at Memorial University, are co-leaders. Supported by the Atlantic Canada Opportunities Agency's Atlantic Innovation Fund, the project is focused on expanding the use of virtual environments for training in the offshore. A team of full-time researchers employed by Memorial University—software developers and 3-D modelers—and co-op students in the Faculty of Engineering and Applied Science are collaborating with VMT staff, as well as Dr. Veitch's team of software and hardware developers, and a Human Factors team supervised by Dr. MacKinnon. "Having professors and staff from Memorial involved is a huge help," says VMT Production Engineer Andrew Edwards. "It provides us access to all of the academics, and the research experience they bring with them."

Some of Memorial's development team are located at the University, and some are co-located with VMT's development team. "When we bring the development teams from Memorial and VMT together, they can innovate faster," says Capt. Patterson, adding that the VMT staff who have a lot of experience can help guide the Memorial developers "and help them avoid some of the mistakes we've made." He says if there were two separate groups, the handover from one to the other would be less efficient. "Putting the two teams together," he says, "accelerates innovation." The Atlantic Canada Opportunities Agency (ACOA)'s Atlantic Innovation Fund has supported two simulation research projects in which Memorial and VMT have collaborated. Both the Government of Newfoundland and Labrador's Department of Innovation, Business and Rural Development, and the Government of Canada's ACOA are supporting VMT's efforts to market and sell their technologies globally.

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At the National Research Council's Institute for Ocean Technology, Canada's national centre for ocean technology R&D, Antonio Simões Ré has continued to collaborate with VMT since his initial work on the development of numerical models that formed the basis for the lifeboat simulator software. He received the 2010 Federal Partners in Technology Transfer award for his contribution towards VMT's commercialization of the technology. Over the last two years, in a project funded by Transport Canada, Simões Ré and Dr. MacKinnon have compared the effectiveness of simulator-based training and physical training in trials where coxswains navigated rescue craft in ice conditions. In the first year, 18 people were tested using a simulated ice field, and in the second year, the deployments were on real ice. "The simulator-trained people performed better, given the fact that they had never been inside a real lifeboat," Simoes Ré reports. "The simulator-trained novice drivers had a higher pass rate than the others." The final reports have been submitted to Transport Canada. VMT provided its lifeboat simulator and an instructor to conduct the training at the Offshore Safety and Survival Centre on the south side of St.

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