Dream teams

Finding better ways to contend with harsh marine environments has challenged the best and brightest in seafaring communities around the world. A global hotbed of oceans innovation is St. John's, pop. 180,000. **Andrew Safer** finds out what's in the water

Armed with degrees in oceanography, meteorology, and physics, in 1978 Judith Bobbitt figuratively jumped into the uncharted waters of Newfoundland's fledgling oceans sector. She completed graduate work at McGill's Marine Science Centre and landed her first job at the three-year-old Newfoundland Oceans Research and Development Corporation (NORDCO) in St. John's. She began her career designing a mooring system for Esso to measure waves in the Davis Strait. By 1981 she had her own company, which had steady work doing physical oceanography for Petro-Canada and the Department of Fisheries and Oceans. "It [NORDCO] introduced me to the real world," she says. "One I never would have known working in the academic environment."

Today Bobbitt is seated at an oak boardroom table in a 100-year-old, 20,000-square-foot building that Oceans Ltd. occupies near downtown St. John's. Her team of 30 specialists produces weather forecasts for the offshore oil industry, measures the effects of environmental pollution on fish health, forecasts vessel routes, and profiles icebergs. "We can produce 3-D pictures of icebergs," says

The dream team (from left): Judith Bobbitt, Oceans Ltd.; Randy Gillespie, Centre for Applied Ocean Technology, Marine Institute; Brian Veitch, Faculty of Engineering and Applied Science, Memorial University; and Tony Patterson, Virtual Marine Technology.

ANDREAE CALLANAN

Bobbitt with pride. "That's measuring the iceberg underneath the water. We're the only ones in the world who do that, and we've been doing it since 2002."

Bobbitt's team is preparing to export that capability to the Sakhalin oil and gas project in Russia and to Greenland in time for the next ice season. Of her company's trajectory, she acknowledges that the training ground provided by NORDCO and C-CORE (see "Promising frontiers" on page 155) in those early days not only fuelled her venture but also laid the groundwork for the development of the province's oceans industry. "The training ground provided by those two institutions was remarkable," she says. "A lot of people left there to do other things. That was their incubation."

At 14, Bobbitt left her home in a fishing village of 300 on Quebec's north shore to live on her own and attend school in Montreal. Today that self-reliance resonates with her colleagues. "Newfoundland people have always been very independent," she says. "They've had to be to survive, and they don't mind trying new things." For example, Oceans Ltd. incorporates real-time current data for the Grand Banks and Labrador into its forecast models because standard models don't work that well, and when they need equipment that's not available, they build it themselves. "If there's anything we need for data collection in the ocean," says Bobbitt, "we can build it."

When fellow "Nordconian" Randy Gillespie moved to Newfoundland from southern Ontario in 1979 to attend Memorial University, he recalls encountering a different mindset. "This province had its back to the ocean and it was looking toward the mainland," says Gillespie, now the director of the Centre for Applied Ocean Technology at the Marine Institute. Today, he says, those tables have turned. "The province is embracing the ocean as its niche. We can stand on our own two feet in an economy that's ocean based."

Having spent almost three decades in the oceans industry, Gillespie credits strong public sector support as the principal driver of innovation here. "For industry to take the opportunities and run with them, they need that raw material—money—to drive the process." He's a strong believer that if you're not firing on all three cylinders—government, academia, and industry—you're doomed to fail.

Gillespie points to the province's hefty commitment to investing in the oceans sector. Looking back, he singles out Paul Mills, Atlantic Canada Opportunities Agency's vice-president, Newfoundland and Labrador, as the godfather of

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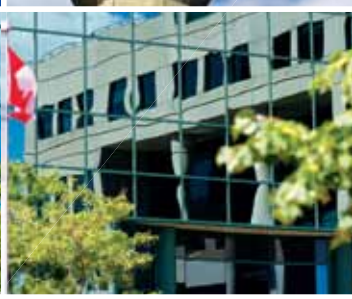

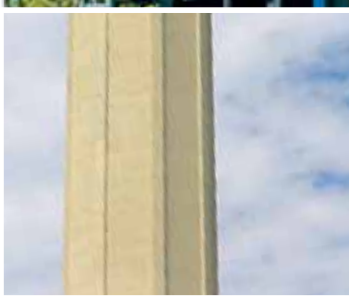

the ocean technology community. "He has had a big influence on some of the major decisions that were made to support ocean technology here," he says. Another key factor was the Offshore Development Fund, a $300-million federal fund established in the early 1980s to support the offshore industry as part of the Hibernia deal.

Many of the key people in the local ocean tech community got their start at NORDCO. Soon after graduating from Memorial with a master's degree in earth sciences, Gillespie went to work there, staying until the company shut down in 1990. He believes the vast majority of Nordconians stayed in St. John's. Many of those seeds that were scattered have since ripened into companies that have developed world-class innovative products. Others went to work in government labs and federal and provincial line departments, where they have played key roles in supporting the sector's growth.

The can-do attitude of Bobbitt and her equipment-building colleagues seems endemic in St. John's, but Gillespie views this as a characteristic of smaller societies generally. "Rural people tend to rely more on each other, and they tend to be more innovative because they have to be," he says. "If your car breaks down in Toronto, there's a good chance there's a garage on the next corner. But if your boat breaks down 20 miles offshore, you'd better know how to fix it."

"If they don't go to sea, they go into engineering and build something that goes to sea"

Tony Patterson traces the genesis of the ocean technology cluster back to Memorial in the 1970s, when the sector became an area of interest within the university community. "The vision of the future where Newfoundland could be great in ocean technology started from the faculty of engineering," says Patterson, who is now the president and CEO of Virtual Marine Technology (VMT), a world leader in the development of simulators to train those who operate survival craft and fast-response craft. "They started grooming the generation of presidents and CEOs of today."

Around the same time, the federal government relocated the National Research Council's tow tanks near Memorial, and the Marine Institute expanded beyond its role as a training facility when the Canadian Centre for Marine Communications was established in 1989. "Young hotshots were coming out of university programs," says Patterson, "and some said, 'I'd like to have a career in the ocean tech field.' Newfoundlanders view themselves as seafaring people. If they don't go to sea, they go into engineering and build something that goes to sea." There was a first wave of companies, including Rutter Inc., Northern Radar, and Sigma Engineering Ltd., then a second wave began in the mid-1990s, followed by a third wave in the mid-2000s, VMT among them.

Born in Belfast, Patterson earned a diploma in nautical science at the Canadian Coast Guard College and a bachelor's degree in maritime studies at Memorial.

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He's a master mariner and, in addition to heading VMT, chair of OceansAdvance, which represents the ocean tech cluster in Newfoundland and Labrador. "Everyone in this province is somehow connected to the sea," he says, "some more closely than others."

The collective consciousness focuses on solving the harsh-environment challenges of fishermen who experience bad weather at sea, *Titanic*-size icebergs, the huge rogue waves that sank the Ocean Ranger, and, more recently, Cougar Helicopters' fatal Flight 91. "People involved in this sector have extensive maritime knowledge, so it's easy for governments to explain why they're supporting an ocean technology cluster and why we have ocean and marine engineering," says Patterson. "This is what we're good at."

Patterson is quick to mention that much of the groundwork was laid by the companies during the first wave. "We were emerging from the same academic

FRONTIER SCIENCE

Randy Gillespie and Judith Bobbitt can trace much of the recent innovation that has occurred in the St. John's oceans sector to Newfoundland Oceans Research and Development Corporation (NORDCO Limited). Established in 1975 and funded through a federal-provincial agreement, NORDCO was a commercial applied R&D company focused on improving marine technology for northern and ice-infested waters. It had an ice properties division for ice profiling, iceberg tracking, and remote sensing of sea ice; a fisheries technology-environment division; and a marine transportation division.

"The advent of the energy crisis and discoveries of hydrocarbons on the Continental Shelves of the northern oceans have created an interest in the problems related to these oceans which was unexpected less than two decades ago," states NORDCO's first annual report. "It has been emphasized that the Canadian frontiers are among the most promising areas for hydrocarbon exploration, but the lack of applicable technology for production is hampering development. NORDCO, with its multi-disciplined staff, has been active in carrying out research, development, laboratory, and field service activities directed toward the solution of these problems." The report added that NORDCO, Memorial University, and C-CORE were partnering to fill the gaps in knowledge and technology, assisted by local institutions and consulting companies. In 1982–83, NORDCO had 110 employees and $5.6 million in revenue.

Also established in 1975 and incorporated within Memorial University, C-CORE (formerly the Centre for Cold Ocean Engineering) is currently in its 36th year of operation. Its staff of 80 conducts applied R&D in radar and vision systems, ice engineering, and geotechnical engineering. Its offshore oil and gas team of 17 ice engineers and scientists, eight remote sensing specialists, and six geotechnical engineers is believed to be the largest team of its kind in the world.

C-CORE provides ice engineering services in all regions of the Arctic and sub-Arctic, including: detecting and monitoring sea ice, icebergs, and icebergs in pack ice; managing icebergs and icebergs in pack ice; determining the risk sea ice and icebergs pose to offshore structures and ships, seabed installations, and pipelines; monitoring pack ice, iceberg, and atmospheric ice conditions; and determining the design-impact forces of icebergs and pack ice on offshore structures and ships.

In June C-CORE launched The Centre for Arctic Resource Development (CARD) to help unlock the potential of the Arctic's rich, and largely untapped, natural resources. CARD is supported by $16.5 million in combined funding from the Hibernia and Terra Nova projects and the Research & Development Corporation of Newfoundland and Labrador (RDC). **— A.S.**

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*Statistics Canada Report on the Demographic Situation in Canada (July 2011)
**KPMG Competitive Alternatives Study (2006, 2008, 2010)

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milieu, but it was much more mature. There has been an accelerated growth rate." It's faster to go from idea to innovation today because the companies that have been through the school of hard knocks have cultivated strong distribution networks, and government organizations such as the National Research Council are developing fledgling ideas through incubation centres and business development centres.

"It's not like it was for the guys before us, who were unleashed into the cold world," says Patterson. "Now, we're unleashed into a network. If you're as good as you say you are, this network can use your capabilities. They'll plug you in." Because the population base in St. John's is so small, he adds, you don't have to go out of your way to network. "You can be sitting across the boardroom table from someone during the day, and in the evening bump into them in the supermarket."

"We'll reach out into the network and pull in people we think can help us"

The story of how VMT benefited from being in a network with mentors is one Patterson likes to tell. "Our first export sale came through Rutter. It was our first serious sale into the defence sector. It's a tiered supply chain, and Rutter brought us in at one of the lower tiers." Now VMT is about to find itself in a similar position. "We're going to be doing something that requires additional expertise," says Patterson, "so we'll reach out into the network and pull in people we think can help us."

Over the past 30 years, the size of the cluster has grown to more than 50 companies, and its breadth has increased. "Companies don't have to reach out very far to find subcontractors who are good," says Patterson. "In the network, you don't want to mess up in front of everyone else. It's positive peer pressure. Everyone wants to see everyone else succeed." While Memorial University, the National Research Council, and the Marine Institute have been instrumental to the growth of the cluster, there is cause for caution. "If the flywheel engine that's spinning out second- and third-wave companies were to stop, we would see that growth disappear," says Patterson. "It wouldn't happen immediately, but it would disappear within 20 years."

The way VMT got started illustrates the role that public institutions in St. John's can play in the innovation process. Patterson, who went to work at the Centre for Marine Simulation at the Marine Institute after heading R&D initiatives for the Coast Guard, is a self-described "serial innovator." Rather than having to rely on off-the-shelf simulators, with all the expertise at the university, he figured the centre should be able to task Memorial's faculty of engineering to build them instead.

At the time, which was 2003, Brian Veitch was the Terra Nova Project Junior Chair in Ocean Environmental Risk Engineering; today he's a professor and the associate dean of research in Memorial's faculty of engineering

and applied science. "I was investigating what the industry was interested in," he says, "and I had started to see the need for personnel safety." He had been doing research on lifeboat performance with Antonio Simoes Ré, a naval architect and senior research officer at the National Research Council Institute for Ocean Technology. Veitch and Patterson met and came up with the idea to develop a simulator to train people in lifeboat evacuation, an issue that hadn't been solved since the failure to properly deploy lifeboats had sealed the fate of the Ocean Ranger's crew. The three men wrote a proposal to Petroleum Research Atlantic Canada and secured project funding.

"One day in 2003, I opened the door and there was Randy Billard," says Veitch. "He had just finished his bachelor's degree and was starting his master's. He had missed all the scholarship deadlines. He said, 'Got anything for me?' so I put him to work on this project." Billard and Veitch went on to co-found VMT in 2004, and Patterson was hired as CEO in 2007.

Over the past decade, Veitch has hired more than 100 graduate students as interns to work on projects. "It's not the case that every one is a budding entrepreneur. Quite the contrary, but you've got to recognize that potential. Randy found himself in front of an opportunity he couldn't stop." Veitch finds the time he spends mentoring students meaningful. Every year students ask him for letters of reference for an MBA program, to which he responds, "Let me try to convince you not to do an MBA. Why don't you start a company? You've got to live the dream. You can't go to school forever."

Veitch admits that there are few Newfoundland companies outside the oil industry big enough for that kind of career and that the students almost never listen to him. He eschews the fact that the system rewards professors for publishing papers and getting grants rather than encouraging students to start companies. He figures he can get away with it because his articles have appeared in more than 260 publications. His conclusion? "Canadian universities are doing a poor job of supporting business innovation. If Canada wants to maintain a high standard of living and wants to be a rich country, we're going to have to get in the trenches and innovate."

Like Patterson, the network looms large for Veitch, who was born in St. John's. "It's not the strong bonds of loose ties," he says, speaking of his friends and colleagues. "It's the strong bonds of strong ties. I know their history. I know what motivates them. I know the problems going on in their lives. We're like cousins who are looking out for one another." Four years ago a recruiter for an offshore development in a remote part of the world called and offered Veitch "a shocking amount of money"—about three times his salary—which he immediately turned down. "I realized that money doesn't matter that much to me," he says.

Veitch continues to encourage students to become entrepreneurs because he doesn't want to live in a place that looks like the Klondike. "I want to build a proper society, not just take a windfall and live in a gold-rush town. Frankly, I didn't have this kind of motivation when I lived in Finland, where I got my PhD in engineering. Living here, there's something that permeates my behaviour from day to day. It's a gut feeling about this place."