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NEWFOUNDLAND AND LABRADOR

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Deep Dive Podcast

Dr. David Murrin, NRC

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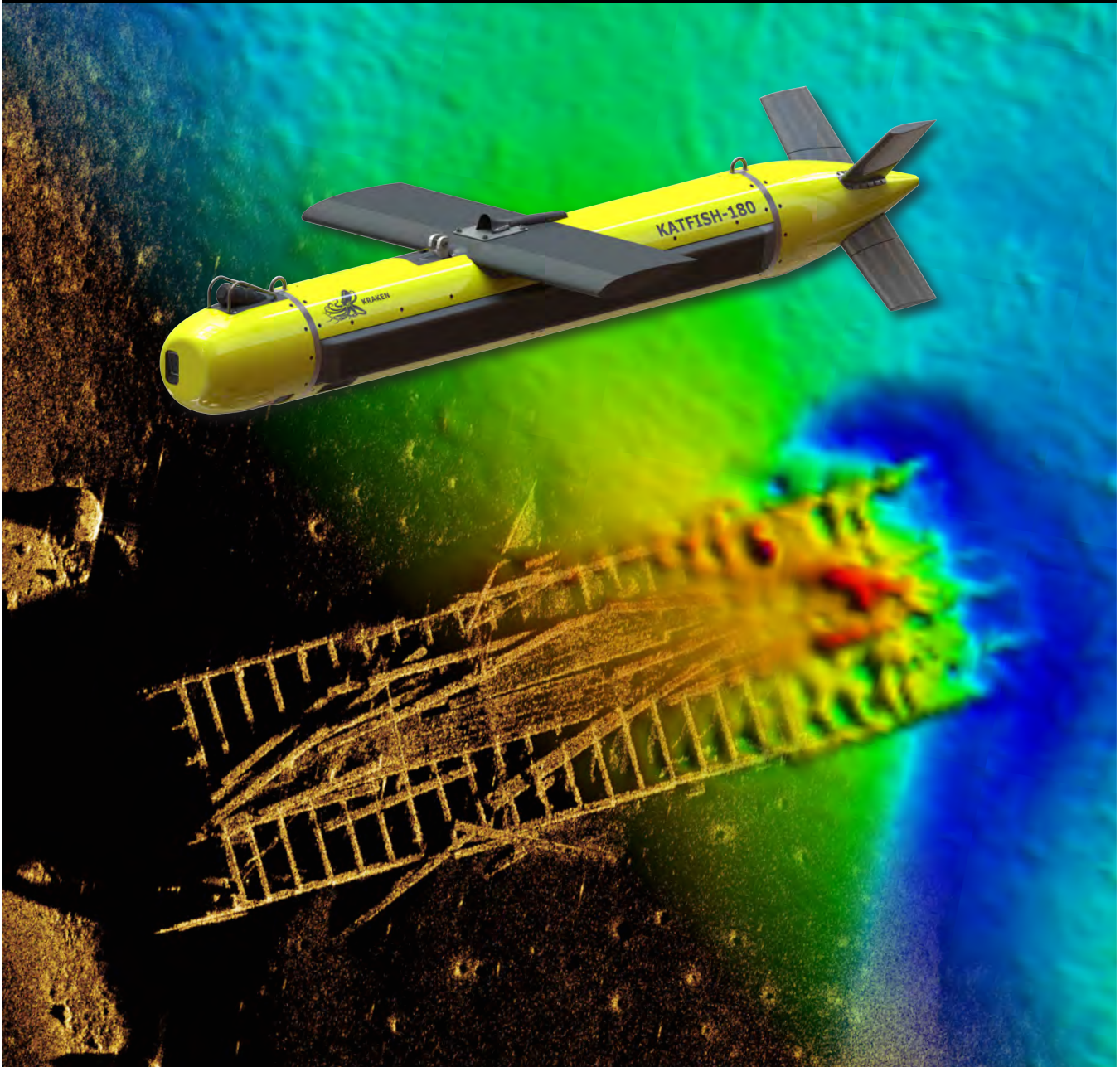
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Newfoundland and Labrador Supplement

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By Greg Trauthwein



Newfoundland and Labrador Supplement

Welcome



Welcome to the readers of New Wave Media – b2b publishers in the maritime, offshore energy and subsea spaces – from the vibrant ocean technology community of Newfoundland and Labrador. Nestled on the rugged Atlantic coast, our province is where innovation meets tradition, and the sea has shaped both our culture and our industry for centuries. Our community is a dynamic hub of research, development, and innovation, bringing together world-class expertise in marine technology, oceanography, and sustainable practices.

As pioneers in ocean technology, we are committed to advancing the blue economy, enhancing marine safety, and exploring the vast potential of our oceans. From cutting-edge sensor development to autonomous underwater vehicles, our initiatives are not only shaping the future of ocean exploration but are also addressing global challenges like climate change and sustainable resource management.

We invite you to dive into our stories of innovation, collaboration, and discovery, and to connect with the passionate individuals and organizations that make up Newfoundland and Labrador's ocean technology sector. Together, we are charting a course for a sustainable and prosperous future, where the ocean's potential is realized for generations to come.

Welcome to our community — where the ocean is not just our heritage but our future.

SHELLY PETTEN
Executive Director,
Oceans Advance

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Newfoundland and Labrador Supplement

Editorial



GREG TRAUTHWEIN
President & COO
New Wave Media

Earlier this year I was privileged to be invited to St. John's, Newfoundland & Labrador, to discover how the cumulative maritime, offshore energy and subsea industries have developed. I have a fairly long, nearly 20-year relationship traveling approximately 1,500 miles north of New York City, up the Atlantic coast of North America to its easternmost point and finding what is arguably one of the nicest, one of the heartiest and one of the most innovative populations per capita in the world.

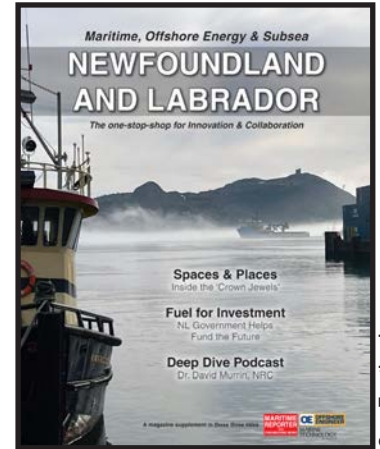
It had been many years since I last made the trek to St. John's – but to be fair the Covid years put a hold on many trips – and what I found exceeded expectation. Companies once small have emerged into world

leaders; led by the government, there is palpable growth and investment in the technology, people and infrastructure, investment to both help local companies grow and investment to attract international partners and collaborators.

- **“If it works here, it will work anywhere”** said the Honourable Andrew Parsons.
- Chris Hearn continued **“We are innovative by nature because we had to be.”**
- **“Kraken’s mantra is ‘innovate or die’”** David Shea concluded.

Those are not simply catch phrases. Newfoundland & Labrador holds a unique geographic position jutting out into the Atlantic Ocean, giving it a literal front row seat to a confluence of differing environmental forces; forces which can make life difficult, but can also help to develop a sharp group of innovators that must invent to survive.

With that, I welcome you to the special Newfoundland & Labrador supplement to *Marine Technology Reporter*, *Maritime Reporter & Engineering News* and *Offshore Engineer*. ‘Thank you’ too, to all friends in the region – old and new – that took their time and effort to help contribute to this publication. What follows is simply a glimpse of the opportunities that await.



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“Our province has been shaped by the Atlantic Ocean. It can be extremely cold, extremely unforgiving. If it works here, it will work anywhere. The technology we use here can be adapted anywhere else in the world. We are adaptive, we are nimble, we are problem solvers ... and at the end of the day, we are collaborative.”

– HONOURABLE ANDREW PARSONS,
Industry, Energy & Technology,
Newfoundland & Labrador



“We are innovative by nature because we had to be. I heard a great quote one time about Newfoundland & Labrador: it has a landscape that makes you want to live up to it, but it doesn't provide you the resources to do it! We've had more than 500 years of living here, and because we're isolated, we had to grow something here in order to be able to deal with things.”

– Chris Hearn, Director of the Center for Marine Simulation, Fisheries & Marine Institute, Memorial University



“We facilitate collaboration through targeted events, and we advocate for support from our provincial and federal funding partners for our members.”

– Shelly Petten,
Executive Director,
Oceans Advance



“Ocean Advance is an incredible association here in Newfoundland and Labrador, that is really looking at continue to raise the ocean sector within the province.”

– Paula Mendonça,
Executive Director,
Ocean Start Up Project

“

Looking out over the next five to 10 years, we will see more growth in the US, building on a base that we have started. We've built relationships there, we know the culture, we're part of the culture, and that's where the significant backlog of government work resides at the moment in the shipbuilding industry.

– LAURIE BALAN,
COO, Genoa Design International



”

“People love to say they're going to collaborate, but that's something that you have to curate, working actively to create the conditions for success. We're focusing on that piece; developing impactful collaborations through the space.”

– Meagan Kay-Fowlow,
President, Co.
Innovation Centre



“



Some of the early projects (at the OERC) were on iceberg towing; this was about the time that the early exploration for oil production off the coast of Newfoundland was taking place, and people were concerned about Iceberg Alley. It was a simple question: Can you move these things out of the way of something moored? That started research, and then other companies and local organizations developed that further.

– David Molyneux,
Director, Ocean Engineering Research Center
(OERC), Memorial University

”

“

Given the increasing threat of climate change and the growing need for safe, secure and efficient green transportation in Canada, we continue to focus on protecting Canadian sea coasts and supporting next-generation transportation and our ships.

– DR. DAVID MURRIN,
Director General of the Ocean, Coastal, and River
Engineering Research Center at NRC

”





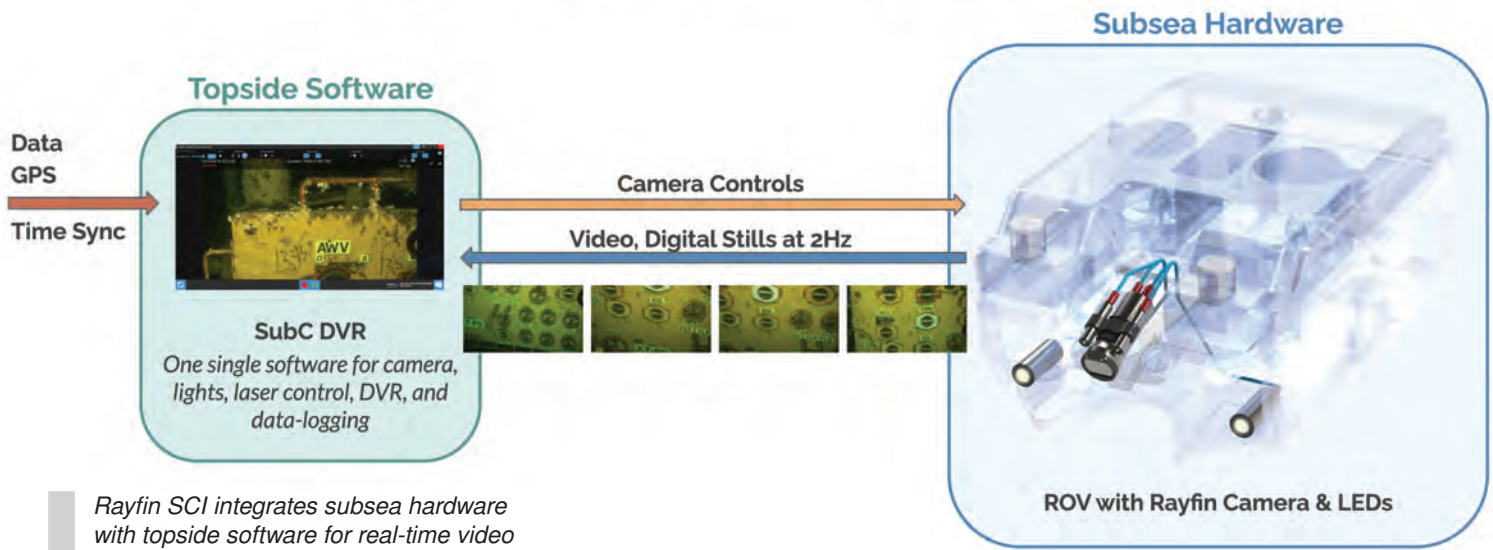
TRANSFORMING OFFSHORE SURVEYS WITH ADVANCED IMAGING AND REAL-TIME DATA

Technicians prepare an ROV equipped with a Rayfin Camera for an inspection.

All images courtesy SubC Imaging

The demand for more precise, efficient, and safer operations has never been higher in offshore operations. For 15 years, SubC Imaging, headquartered in Clarenville, Newfoundland & Labrador, has been at the forefront of this transformation, providing cutting-edge technologies that address the critical challenges survey and inspection teams worldwide face. With a deep commitment to solving customer pain points, SubC Imaging has consistently developed innovative solutions that enhance data integration, streamline operations, and drive the offshore industry toward a digital future.

Rayfin Single Channel Inspection (SCI)



Rayfin SCI integrates subsea hardware with topside software for real-time video streaming and high-resolution digital stills.

Customer-Centric Innovation

SubC Imaging's philosophy has always been grounded in understanding and addressing the needs of its customers. This approach has proven key in the offshore energy sector, where the stakes are high and operations are complex. Survey and inspection teams often face challenges that demand more than advanced technology; they require solutions tailored to their needs.

This commitment to customer-centric innovation is evident in SubC Imaging's product development process. By actively engaging with clients and understanding their pain points, the company has developed technologies that meet and exceed industry demands. One of the most significant trends observed in recent years is the growing need for better data integration. As companies increasingly adopt digital tools to manage their offshore assets, the ability to seamlessly integrate data from various sources has become essential.

Meeting the Demand for High-Quality, Integrated Data

The ability to gather, process, and analyze data quickly and accurately in offshore operations is paramount. SubC Imaging has recognized this need,

particularly as the industry shifts towards offshore digitalization, digital twinning, and other advanced techniques. This shift is crucial for monitoring the condition of offshore structures, predicting maintenance needs, and optimizing operations. However, their effectiveness relies heavily on the quality and integration of data.

SubC Imaging has recognized this need and responded with solutions designed to ensure that data from its systems can be easily integrated into broader digital frameworks. The company's advancements in this area are not just about capturing high-quality images and videos; they're about ensuring this data is readily accessible and usable. Offshore operators can make informed decisions more quickly, whether they're assessing the condition of a subsea structure or planning a complex inspection.

Breakthrough Solutions: Rayfin Single-Channel Inspection and Rayfin Rapid Digital Imaging

One of the standout examples of SubC Imaging's customer-focused innovation is the Rayfin Single Channel Inspection (SCI) software. Developed in direct response to customer feedback, Rayfin SCI is designed to reduce the time and effort required

Technology Profile

SubC Imaging



SubC Imaging's Rayfin SCI software enables real-time analysis, overlays, and voiceover annotations.



to process survey data. The software integrates seamlessly with SubC's cameras, lights, and lasers, offering a powerful tool that enhances the efficiency of survey operations.

Rayfin SCI has quickly become a game-changer for companies involved in offshore surveys. Ocean Ecology, a leading survey company, has praised the software for its impact on their operations. "The Rayfin SCI software from SubC Imaging has been a game-changer for OceanEcology's teams, cutting our post-survey processing times by at least half, and even more for larger projects. The efficiency it offers is unparalleled, making it an invaluable tool for our survey operations", said Ashley Kirby, Head of Survey at the company.

Another stand out of SubC's recent technology developments is Rayfin Rapid Digital Imaging. Rayfin RDI captures thousands of ultra-clear still images of subsea structures at more than double the speed of conventional ROV video inspections. These digital images deliver superior resolution and zoom capabilities compared to traditional video frames. Inspection teams can review the images offline while the ROV continues with other tasks, significantly cutting down on vessel time and operational costs. The high-resolution imagery can be leveraged to generate detailed 3D models, providing a comprehensive view of the structure.

Wood, a globally renowned leader in project management, engineering, consulting, and technical services for energy and materials markets, has been using SubC's RDI as a simple and cost-effective inspection approach with greater efficiency than the inspection methods they used in the past. "The level of detail captured by RDI has exceeded our expectations. It has enabled us to conduct the inspection of subsea assets more efficiently and cost-effectively than with traditional methods", noted Clinton Jensen, Field Engineering & Inspection Team Lead, Wood.

These testimonials underscore the real-world benefits that SubC Imaging's technology delivers. By drastically reducing inspection and processing times while delivering the highest quality data, Rayfin SCI and RDI technologies are enhancing operational efficiency and contributing to more accurate



Example of a digital still taken with Rayfin Rapid Digital Imaging technology.

and timely decision-making—an essential factor in the offshore industry.

Driving Offshore Digitization

SubC Imaging's commitment to innovation extends beyond individual products. The company is deeply involved in the broader trend of offshore digitization, which aims to enhance efficiency, safety, and environmental sustainability. Offshore digitization involves the use of digital technologies to collect, process, and analyze data from offshore operations, enabling companies to make better decisions and improve overall performance.

One of the key areas where SubC Imaging is making a significant impact is in real-time data capture and integration. The company's DVR systems, when paired with Rayfin cameras, allow for real-time video streaming and data recording. This capability is particularly valuable in hazardous environments, where it's often impractical or unsafe to have personnel on-site. By enabling remote monitoring and assessment, SubC Imaging's solutions help to reduce risk and improve safety.

The data collected by SubC's systems can be easily integrated into larger digital frameworks, supporting a range of applications from predictive

maintenance to environmental monitoring. This integration is essential for companies looking to stay ahead in a competitive and increasingly regulated industry. The ability to monitor offshore assets in real-time and predict potential issues before they become critical can lead to significant cost savings and operational efficiencies.

Shaping the Future of Offshore Technology

As the offshore energy sector continues to embrace digitalization, the role of companies like SubC Imaging will only become more critical. By focusing on solving customer problems and staying ahead of technological trends, SubC Imaging is not just a provider but a partner in the industry's evolution. The company's ongoing commitment to innovation ensures that its clients are equipped with the tools they need to succeed in an increasingly complex and competitive environment.

Where efficiency and safety are key, SubC Imaging stands out as a leader in delivering integrated, high-quality data solutions. With its roots in the Newfoundland and Labrador technology cluster, SubC Imaging is helping to shape the future of offshore operations, one innovation at a time.



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FUEL FOR INVESTMENT

NL Government Helps Power Regional Maritime, Offshore Energy, Subsea Tech Cluster



Photo courtesy the office of
Minister Andrew Parsons

Minister Andrew Parsons, Industry, Energy & Technology, Newfoundland & Labrador, Canada, discusses the innovative technology cluster that has grown within and outside of his province, with insights on the technology and the market sectors that will power the region and the country's future.

By Greg Trauthwein

Honourable Andrew Parsons is a member of the House of Assembly for a district called Burgeo-La Poile, but he's also the Minister of Industry, Energy and Technology in the Government of Premier Dr. Andrew Furey.

"When the Premier took over government in August of 2020, he combined the previous departments of natural resources with the economic development responsibilities of other departments, combining it all into one shop, but really also putting a focus on technology, putting that in the departmental name," said Parsons in a recent interview with Marine Technology TV.

Today his department handles all technology, everything from mining, electricity, oil and gas, offshore, renewables, marine technology, aiming to build a base for economic development opportunities and investment attraction.

"It's a wide, encompassing department, but I'm surrounded by an amazing team of public servants, people that really love Newfoundland and Labrador, people that go above and beyond to make people interested in our province and give them a reason to come here and to invest," said Parsons.

With a population just north of half a million, Newfoundland & Labrador is a small province, but its natural resources and cumulative centuries experience living and working by and on the ocean has created a unique and dynamic cluster of excellence in maritime, subsea and offshore energy.

"When you look back historically, the fishery was the backbone," said Parsons. "But that has grown over time, and now we are building on this blue economy, and the expertise has shifted."

Specifically, the discovery of oil and gas fields offshore helped to not only bolster the finances of the province, but the cumulative experience of discovering and recovering oil and gas in close proximity to iceberg alley has helped

Leading Off

Minister Andrew Parsons, Industry, Energy & Technology



at working efficiently, effectively and safely in some of the ocean's harshest conditions.

"We are home to the Hibernia gravity-based structure, which is the world's first offshore oil structure specifically designed to deal with harsh environments, including icebergs," said Parsons. "We are known as the east coast energy capital, and we cannot overstate the importance of oil to our province. In addition, we export our [offshore oil and gas] expertise all over the world." As it moves now into aquaculture and marine biotechnology, Parsons observes: "It's amazing, for our province as small as we are, we're certainly batting above our weight when it comes to the ideas that are created here, set up here and then brought elsewhere."

The Launch is a living lab operated by the university's Marine Institute. Located in Holyrood, a bay where the North Atlantic collides with the rugged coast.

Images on this spread courtesy the office of Minister Andrew Parsons

Banking on Success

The cumulative ocean industry is the driver of the Newfoundland & Labrador Province. The fishery is a billion-dollar industry, but like any commodity, it fluctuates.

"Last year the numbers were a bit lower, we just had a shade over 16,000 people employed [across the industry]," said Parsons. "As I mentioned [we're moving too into] aquaculture with salmon, trout and shellfish. [Last year] production was about 19,000 tons, which was almost a 50% increase over the previous year. So you're looking at about a \$200m market value that is anticipated to grow."

While the fisheries are the backbone, offshore energy is the muscle. Again, a commodity which has its peaks and valleys. In 2023 the Province produced about 73 million barrels, or about \$8 billion in oil production. With the Terra Nova FPSO going back into production in November 2023, Parsons expects oil production to rise to around 82 million barrels this year.

Another promising development is Cenovus'



nearly billion-dollar investment in constructing the West White Rose Project now, another key plank in ensuring rising production numbers.

“When you’re talking about 16% of our GDP and when you’re talking about a shade over 10% of our actual government revenue, it’s a big, big deal,” said Parsons. “In all, we have four developed oil fields: Hibernia, Terra Nova, White Rose and Hebron. Everybody’s producing again this year, [and the output is] going to go back up,” helping Newfoundland & Labrador retain its spot as the number three oil and gas producer in the country behind Alberta and Saskatchewan.

“Overall, our economy this year is expected to grow, the GDP growth is expected to be about 5% this year, which is certainly music to the ears of our finance minister, Siobhan Coady,” said Parsons.

The “Crown Jewels” of the Province

The Newfoundland & Labrador cluster is unique in the way that government, industry and academia mutually support one another. In assessing

the ‘spaces and places’ that he finds instrumental in the Province’s success, Parsons was eager to share his view, with a caveat: “when you’re asked to pick favorites, that’s a tough question for any politician, but sometimes you’ve got to bite the bullet!” Here’s the assets he selected:

- **The Launch:** “A state-of-the-art living lab operated by the Marine Institute out in Holyrood, which is my wife’s hometown! It’s an amazing facility, amazing community, and it brings the world’s harshest cold ocean environment to the client. They’re dealing with ocean tech through R&D, testing, demonstration; taking everything together and putting it to the test. You’re looking at near Arctic conditions, and it’s a test center for the NATO defense innovation accelerator.”
- **The Co. Innovation Centre:** The Co. Innovation Centre is helping to address the tech needs of established companies as well as the new ones that are pursuing remote ops in energy, healthcare, mining, fisheries, transportation and more.

Leading Off

Minister Andrew Parsons, Industry, Energy & Technology



Chris Hearn, *Director, Maritime Simulation Center*

- **The National Research Council:** “NRC has an amazing facility in St. Johns that is one of the most advanced indoor model ocean facilities in the world.” Among the facilities are the ability to produce multi-directional waves in extreme temperatures, at extreme sea states, able to generate wind to simulate real world marine conditions. NRC has a towing tank able to test most any vessel, including high speed vessels such as warships, to bulk carriers and patrol vessels. NRC also has “an amazing ice tank to simulate what’s going on in the Arctic,” able to grow ice quickly and control its properties.
- **Center for Marine Simulation:** An arm of the Marine Institute, which is a gem in itself with an amazing group of marine tech training, research and development.

The People

The environment is unique, sometimes harsh, always beautiful. The facilities are world-class, born in the fisheries, refined and globally expanded on the back of offshore oil and gas exploration. But the magic of Newfoundland & Labrador is the people: arguably the nicest collection of 500,000+ people on the planet, but also the most innovative and



Dr. Paul Brett, *Vice President of the Marine Institute and Chair of Oceans Advance*

technically adept.

“We are lucky to be surrounded by generations of brilliant Newfoundlanders and Labradorians with expertise,” said Parsons. “We try our best to help promote them and share them.”

While he stressed the list of leaders in the province is exhaustive, he did share insights on a few leaders and their contribution:

- **Captain Chris Hearn** at the marine simulation center. He is an amazing master mariner for Canada and for the world, also sitting on the board of the Irish Maritime Energy Cluster. We have a history of providing expertise that we love to share with our neighbors around the world and Chris is a prime example of that.
- **Dr. Paul Brett**, Vice President of the Marine Institute and the chair of Oceans Advance. The Marine Institute hosted an ROV competition for high school kids, and going down and spending time with Paul at that, you can see why Marine Institute boasts the student population that to do because you just like being around Paul. He’s a great guy, doing a great job of promoting the school and what they teach to these kids.



Dr. Lesley James, the Chevron Chair of Petroleum Engineering

Paul's an educator, he's an administrator, he's a data specialist. He's got too many things on his resume to name, but he's absolutely a leader in this province, and a great person to boot.

- **Dr. Lesley James**, the Chevron Chair of Petroleum Engineering, is doing a lot of work with us right now on carbon capture and offshore basins, and at the same time recognizing that we have to reduce the emissions offshore. When you look at emission reduction, we are far ahead of most other oil producing nations, but that doesn't mean we can't do better when we talk about net-zero aspirations. She's played a big part of that.

Find Your Home in Newfoundland & Labrador

While the government is seeking to help develop its own companies, technology and expertise for its own domestic use and for export globally, at the same time it wants to attract international talent and investment, and Parsons is quick to point out that with its Eastern locale, it is closer to Germany than British Columbia, the west coast of Canada.



Watch the full interview with Minister Andrew Parsons, Industry, Energy & Technology, Newfoundland & Labrador, Canada, on **Marine Technology TV:**



There are ample incentives for organizations to set up shop in the Province and collaborate with local companies and academia, but Parsons brings it back to the population and its mentality.

“One of the advantages of being our government is that we are truly nimble, we are adaptive and we want people to come here,” said Parsons. “We go out of our way to welcome you, and we'll work with you. We try to be as least rigid as possible. And again, surrounded by an amazing team of people that are interested and committed to economic development and opportunity. We want you to set up shop in Newfoundland and Labrador; it's very easy to sit down with decision makers in our province to get things done.”

“Our province has been shaped by the Atlantic Ocean. It can be extremely cold, extremely unforgiving. If it works here, it will work anywhere. The technology we [develop and] use here can be adapted to anywhere else in the world. We are adaptive, we're nimble, we're problem solvers. And at the end of the day, we are collaborative. We want to work together, to offer people a chance to make things better wherever they're in this world. This is just a little corner of the world that I think can help supply some of the strategies and solutions that will help us on a global basis.”



AI IN THE MARINE INDUSTRY

All images courtesy
Joseph Kemendy

By The Millron Group

Machine learning, also known as Artificial Intelligence, is divided into three categories: **Regression** based machine learning (estimating a given number, price of stock, etc.), **Classification** (given parameters, makes a decision) and **Generative** (output is a text, image or audio/video) are seen through the use of The Millron Groups use of their proprietary technologies and methodologies. These transform industries by allowing machines to perform tasks that would typically require human intelligence. These tasks include problem-solving, decision-making, learning from experience, understanding language, and recognizing patterns in vast amounts of data. AI systems use algorithms that guide computers to process and analyze data. Over time, these systems improve through techniques like machine learning and deep learning (a method in artificial intelligence that teaches computers to process data in a way that is inspired by the human brain), enabling them to adapt to new information and evolve their decision-making abilities.

First off, machine learning allows computers to learn from data without needing explicit programming for each task. It enables AI systems to analyze large sets of data, identify patterns, and make predictions or decisions based on what they've learned. Machine learning is categorized into several approaches. Supervised learning involves training AI models on labelled data, where each input is paired with a known output. Over time, the model learns

to predict the correct output for new, unseen inputs. In unsupervised learning, the AI system uses data without labelled outputs, identifying hidden patterns, clusters, or relationships within the data, often revealing insights that weren't previously known. Reinforcement learning, meanwhile, involves the AI system learning through trial and error. It receives feedback in the form of rewards or penalties for its actions, and gradually adjusts its strategy to maximize positive outcomes.

Secondly, deep learning, which is a subset of machine learning, uses neural networks similar to the structure of the human brain. These neural networks consist of layers of interconnected nodes (neurons) that can learn to recognize complex patterns in data. Deep learning is particularly effective for tasks like image recognition, speech processing, and natural language understanding. This capability is behind technologies such as facial recognition, autonomous vehicles, and advanced medical diagnostics.

We also have something called **Natural Language Processing**. NLP enables AI systems to understand, interpret, and generate human language. It involves tasks like speech recognition, language translation, sentiment analysis, and chatbots. By analyzing the structure and meaning of text or spoken words, NLP allows AI systems to interact with people in a more natural, human-like manner.

One specific and commonly used AI in the market as of now is Computer Vision. This is the branch of AI that enables machines to interpret and understand visual data, such as images and videos. This is achieved through deep learning and pattern recognition techniques, allowing AI to identify objects, faces, or scenes in visual data. Applications of computer vision include facial recognition, automated image analysis in healthcare, and the vision systems in self-driving cars.

AI systems operate in a cycle of data collection, analysis, learning, and decision-making. AI systems rely on large datasets to learn and make decisions. These datasets can come from sensors, cameras, databases, or user inputs, depending on the application. The quality and quantity of data significantly affect the AI system's performance. After collecting



raw data, it is cleaned, structured, and transformed into a format that AI algorithms can understand. This step is crucial, as high-quality data ensures that the AI system makes accurate predictions and decisions.

AI algorithms analyze the processed data, identifying patterns or trends. These algorithms may include decision trees, neural networks, or support vector machines, depending on the complexity of the task. The algorithms process the data and make predictions or decisions based on identified patterns. A key feature of AI is its ability to learn from experience. After analyzing data and making decisions, AI systems improve by learning from the results. In reinforcement learning, for instance, the system adjusts its future actions based on rewards or penalties received for previous decisions. This continuous learning allows AI to become smarter and more accurate over time.

AI's versatility has led to its adoption across numerous industries, enhancing automation, decision-making, and personalization. In healthcare, AI is revolutionizing healthcare by analyzing medical images, predicting disease outbreaks, and assisting in drug discovery. AI-powered diagnostic tools help doctors make more accurate decisions and deliver personalized treatment plans. In finance, AI helps detect fraudulent transactions, assess risks, and optimize investment strategies. By analyzing market data and consumer behavior, AI systems can forecast trends and identify opportunities for growth.

AI is increasingly part of our daily lives. Virtual assistants like Siri and Alexa use NLP to understand commands and provide assistance. Streaming platforms like Netflix and YouTube use AI to recommend con-

Technology Profile

The Millron Group

tent based on users' viewing history and preferences.

Similarly, e-commerce websites like Amazon leverage AI to personalize shopping experiences and suggest products. Autonomous vehicles, powered by AI, use sensors and computer vision to navigate roads, avoid obstacles, and make real-time decisions for safe driving. Autonomous vehicles rely heavily on deep learning and data analysis to improve their performance.

The marine industry, though vital to global trade, has traditionally relied on outdated, manual processes and legacy systems, particularly in areas like ship maintenance, cargo handling, and operational logistics. Many of these operations are reactive, slow, and inefficient, leading to unnecessary downtime, safety risks, and environmental impacts. AI offers a solution by modernizing these processes through predictive maintenance, real-time data monitoring, and automation, which optimize ship operations and ensure compliance with environmental and safety regulations. Importantly, AI doesn't eliminate jobs but enhances them—by taking over repetitive, data-driven tasks, AI allows workers to focus on higher-level responsibilities, like decision-making and strategic planning. It

also improves safety, reducing the need for dangerous manual inspections. Rather than replacing workers, AI tools help them be more effective, allowing for greater precision and efficiency in marine operations. Especially with the industry facing a shortage of marine personnel as well as the increasing complexity of the modern equipment that occupies the crew's time, AI is the umbrella that adds a layer of observation.

Such examples of AI implemented in the marine industry and elsewhere are seen with The Millron Group. Their predictive maintenance system uses machine learning to leverage real-time monitoring and predictive analytics which allows them to forecast equipment failures. This lets ship operators perform timely maintenance and prevent unplanned downtime. AI-driven operational optimization also helps automate tasks, manage resources, and make logistics more efficient. Another model is Millron RAILS which uses Computer Vision AI to accurately label and train its system for detecting rail anomalies through high-resolution image and video data. By using CVAT to annotate defects like cracks, wear, and other irregularities, the AI learns to recognize these patterns more effectively. This same technology can benefit the marine industry by training AI to identify damage on ships, docks, or marine infrastructure, helping to automate inspections, enhance maintenance, and improve safety through real-time monitoring and predictive maintenance. Other innovations like MAIA (Millron AI Assistant) uses the previously mentioned NLP AI to communicate and interact with employees and customers while their Winch and Motor Analyzer uses IoT and AI for problem diagnosis. All of these systems employed by The Millron Group use many of the different AI models described above to make these processes more efficient and safer.

Hopefully it can be seen that AI isn't as complicated as it seems and has practical, real-world applications in the marine industry. AI technologies like predictive maintenance, operational optimization, and safety monitoring are already transforming the way ships and ports operate. Companies like The Millron Group makes these proprietary processes more efficient, safer and are leading the way, applying AI to improve efficiency, safety, and sustainability in marine operations, proving that AI is not just theoretical but a valuable tool for the future of the industry.

The screenshot shows a software interface for managing a tugboat asset. The interface is split into several sections:

- Asset Information:** Displays 'Tugboat' as the asset type, '90000' as the ID, and 'Marine' as the category. A category image shows a tugboat on the water.
- Asset Details:** Lists 'Name: Mckeil Dover Spirit', 'Equipment Id: 90001', 'Status: DEPLOYED', and 'Type: Tugboat'. A location map shows the tugboat's position near Hamilton.
- Related Equipments:** A table lists the asset 'Mckeil Dover Spirit' with ID '90001' and status 'D'. It includes 'Expand' and 'Add' buttons.
- Real-time Gauges:** Shows three gauges: 'Fuel Level: 75%', 'Oil Level: 43%', and 'Battery Level: 89%'.



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INSIDE THE NATIONAL RESEARCH COUNCIL, CANADA (NRC)



The National Research Council, Canada (NRC) is a crown jewel of Canadian R&D. **Dr. David Murrin** is the Director General of the Ocean, Coastal, and River Engineering Research Center at NRC, and he shared insights on NRC technology and talent in MTR's *Deep Dive* podcast, Season 1, Episode 07.

By Rhonda Moniz, Host, MTR's Deep Dive Podcast

Born in Newfoundland and Labrador, Dr. Murrin's career exhibits a distinct love for ocean engineering. He obtained his ocean and naval architectural engineering undergraduate degree from Memorial University, and work assignments took him to places like Scotland and Germany, after which he entered the oilfield services industry in Texas and New Mexico. That chapter of his life came to an end when he returned to Newfoundland to earn a master's and Ph.D. in Ocean Engineering, focusing on computational fluid dynamics and vortex-induced vibrations (how structures such as pipelines shake when ocean currents flow around them). Murrin has now been working for more than 10 years at the National Research Council Canada (NRC), one of the most important research institutions in all of Canada.

Today, as the Director General of the Ocean, Coastal, and River Engineering Research Center at NRC, Dr. Murrin leads more than 100 researchers in critical inquiries to ensure the safety and performance of systems and infrastructure in extreme marine environments. With world-class facilities and a workforce unmatched in depth and breadth, the center stretches Canada's marine design and construction capability—a vital stretch since Canada's coastline is the longest in the world and borders the Atlantic, Pacific, and Arctic oceans. With 6 million square kilometers (over 2 million square miles) of its territory, it is adjacent to sea, coastal and riverine environments.

Unique Facilities

The facilities are indeed one of a kind; as Dr. Murrin explains, "We have offices in Saint John's and Ottawa. The facilities specialize in types of ships and other platforms in the ocean. So, we have the world's largest ice tank. It's 90m (295 ft.) long. It's a large facility but also very versatile and an excellent

The Tow Tank @ NRC is a 200m (656 ft.) towing tank.

All images courtesy The National Research Council of Canada / Conseil national de recherches du Canada



The Tow Tank:

NRC has a 200m (656 ft.) towing tank. "This tank has a carriage that's quite fast, fast enough to test high-speed vessels and evaluate the performance of various marine systems, such as bulk carriers, patrol vessels, icebreakers, submarines, etc.," said Dr. Murrin

modeling facility. It's been used to study dozens of challenges, including navigation and Arctic conditions and model tests of ice structure with temperatures that range to -25°C (-13°F). So basically, it's an indoor refrigerated tank facility that helps us simulate realistic Arctic northern conditions. And we also have a 200m (656 ft.) towing tank. This tank has a carriage that's quite fast. It's fast enough

to test high-speed vessels and evaluate the performance of various marine systems, such as, you know, things like bulk carriers and patrol vessels, icebreakers, submarines and that sort of thing."

Under Dr. Murrin's leadership, the center focuses its work across four pillars that ensure the focus is on Canadian maritime security, climate change adaptation, and related marine design:

- Resilient shores
- Zero-impact ships
- Safe operations, and
- Secure Canada.

"Given the increasing threat of climate change and the growing need for safe, secure and efficient green transportation in Canada, we continue to fo-



“ Given the increasing threat of climate change and the growing need for safe, secure and efficient green transportation in Canada, we continue to focus on protecting Canadian sea coasts and supporting next-generation transportation and our ships. ”

- DR. DAVID MURRIN,
 Director General of the Ocean, Coastal, and River
 Engineering Research Center at NRC



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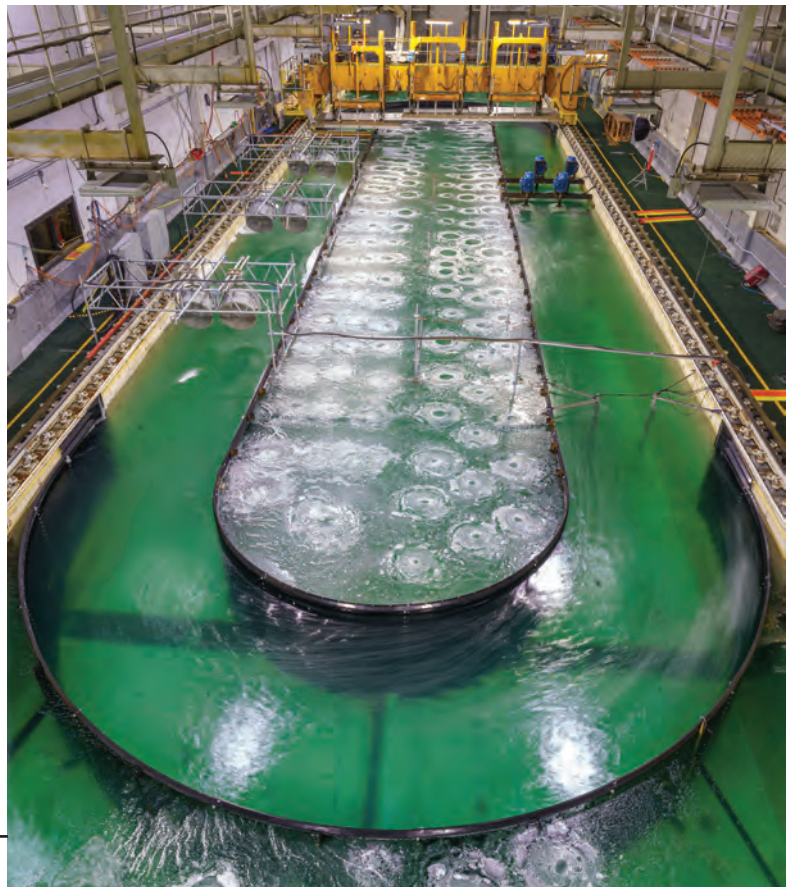
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The World's Largest Ice Tank:

The world's largest ice tank is 90m (295 ft.) long, and has been used to study dozens of challenges, including navigation and Arctic conditions and model tests of ice structure with temperatures that range to -25°C (-13° F).



All images courtesy The National Research Council of Canada / Conseil national de recherches du Canada

cus on protecting Canadian sea coasts and supporting next-generation transportation and our ships,” said Dr. Murrin. “We’ve identified four research pillars. These include Resilient Shores, Zero-Impact Ships, Safe Operations and Secure Canada. For Resilient Shores, this is focused on climate adaptation solutions to mitigate the impacts of weather extremes and other environmental factors on shorelines and communities and related infrastructure, including ports and harbors. For example, flooding. We see a lot of flooding in the news lately ... everywhere. Our Zero-Impact Ship pillar is focused on helping achieve the Canadian fleet’s decarbonization and emission reduction targets. With that, we’re collaborating with major Canadian universities and Canadian ferry companies to optimize fuel performance along a given route using machine learning techniques [for example]. Our pillar on Safe Operations is focused on the performance evaluation of ships and platforms and other equipment: ice, wind,

rain, drizzle and other things suited to Canada and Newfoundland are a lot of the work under this pillar, which involves physical model testing in our ice tank, towing tank or offshore clearing base. Finally, our fourth research pillar, Secure Canada, is focused on supporting the operational readiness needs of the Canadian Armed Forces in the Arctic.”

Partnering with Memorial University

NRC’s collaborative approach is one of its key features. Dr. Murrin underscored the gravity of working with the industry, academia and government on maritime research and innovation. An excellent example is NRC’s work with Memorial University and Virtual Marine (VM) on digital twin technology. This partnership is a prime example of leveraging decades worth of data and leading-edge simulation technology to produce high-fidelity models of vessels and their operations. Dr. Murrin holds that the ocean tech sector is poised for substantial expansion. This anticipated

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growth stems mainly from the ocean's increasing prominence in global environmental conservation and climate change agendas.

The strategic plan for 2024-2029 issued by the NRC steers the NRC once again toward supporting ocean engineering innovation and toward trying to help make Canada a leader in the blue economy.

“Right now, we're a supporter of innovation by Canadian companies. We're uniquely positioned, I'd say, at the intersection of industry, academia and government. Each year, our scientists, engineers and business experts work closely with thousands of Canadian firms tackling these important problems. We're helping bring these technologies to market. For decades, we have provided physical testing for industry and government clients to optimize the design of

ships, offshore structures and coastal infrastructure.”

Dr. David Murrin has taken the helm of the NRC, bringing a long and distinguished career in ocean engineering and, most importantly, a set of leadership principles that the marine sector could—and should—look to as a model. When we spoke with Dr. Murrin on MTR's podcast *Deep Dive*, we asked him about some challenges he faced during his tenure at NRC. “One of the experiences I'm probably most proud of is really the effort we put into building a trusting and collaborative relationship with Memorial University. And so, this was a bit of a challenge. This relationship is very important to me because of the influence on me from my days at the university. I want to ensure that we continue to inspire people to take on the challenge of ocean research and see the value collaboration can bring. One of the strongest collaborations we've had over the last little while has been with Memorial University. We collaborate with researchers, hire work-term students, and, in many cases, co-supervise graduates. So, five or six years ago, the NRC launched an initiative to co-locate researchers from both the universities and the NRC to drive research excellence in areas where Canada can excel. These are known as collaboration centers. In June 2019, we successfully opened the Karluk Collaboration Space between Oak Creek, RK, and Memorial University. The focus here is on increasing our impact in ocean engineering, bringing researchers together, developing highly qualified personnel, and inspiring students to explore the oceans.”

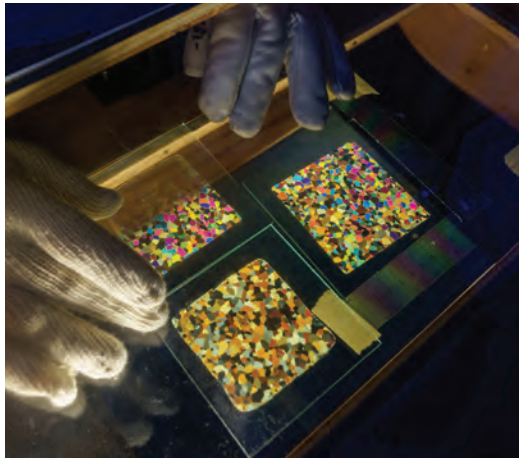


Safe operations is one of the four pillars of focus @ NRC.

The Karluk Collaboration Space

The Karluk Collaboration Space is named after a brigantine christened Karluk, initially used as a whaler. The saga of the Karluk is one of the most affecting survival stories in the record of Arctic exploration. In 1913, the ship was caught in the ice while it was part of a Canadian Arctic expedition off the northern coast of Alaska. Under the leadership of Vilhjalmur Stefansson, a well-known explorer of the Canadian Arctic, an ice floe slowly crushed the ship. The crew had no option but to abandon the vessel. After the Karluk sank, the crew established a makeshift camp on the ice. They endured a wait that was hard to fathom, with extreme cold, and scant supplies as they drifted toward the Siberian coastline. The eventual outcome was never in doubt.

Stefansson had boarded a ship that departed on

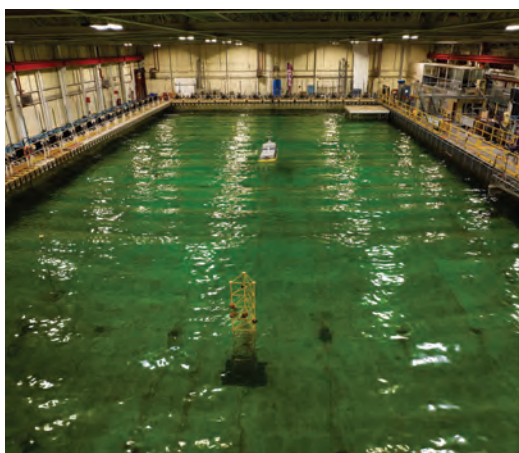
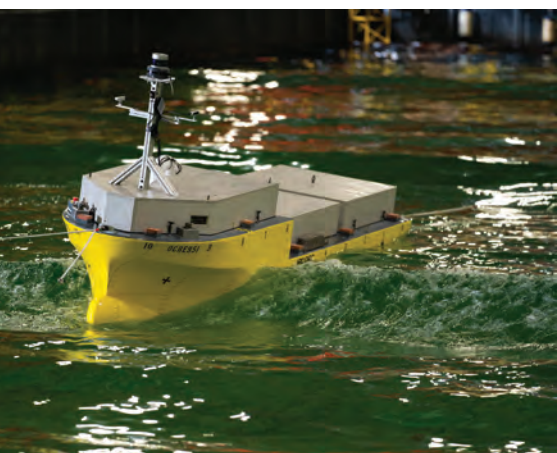


an ill-fated voyage. After leaving the ship for what was supposed to be a short hunting excursion, he never came back, and the crew was left to take care of themselves. They eventually made it to Wrangel Island, where they experienced many not-so-great adventures before being rescued. Despite the unfortunate fate of the Karluk, its survivors somehow managed to live to tell the tale. The St. John's, Newfoundland and Labrador, based Karluk Collaboration Space, is where Memorial University of Newfoundland and the NRC work together in ocean engineering, technology and science. The NRC and Memorial University have a long and successful history of working together, and this collaboration is an excellent example of what can happen when leading-edge academic research teams team up with a world-class research and development organization like the NRC.

All images courtesy The National Research Council of Canada / Conseil national de recherches du Canada

DEEP DIVE

If you would like to hear more about the NRC and how you can get involved, be sure to listen to the entire interview with Dr. Murrin on the MTR podcast Deep Dive by scanning the QR code




Spaces & Places

The 'Crown Jewels' of St. John's, Newfoundland & Labrador

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ROCK SOL



Aerial view from Signal Hill across Gibbet Hill with the Queen's Battery Barracks and the Narrows into St John's Harbor.

The spaces and places of Newfoundland and Labrador's maritime, offshore and subsea industries.

By Celia Konowe

The maritime industry in Newfoundland and Labrador (NL) is unique—versatile, adaptable, collaborative and community-focused. This is not only due to the North Atlantic's proximity, providing some of the most challenging and harsh ocean conditions, but also to centuries of sea living by determined and innovative people who created spaces that encourage synergy and minimize barriers. As a result, the province is home to state-of-the-art facilities supporting research, simulation and training, and innovation. Together, they are the spaces and places that help NL maritime science and technology evolve and thrive.

Atop the Rock

Known colloquially as The Rock, NL has rugged geology and sticks out into the North Atlantic, which offers dynamic and unpredictable weather system thanks to the Gulf Stream and the Labrador current colliding offshore. Water depths range from 80 to more than 3,800 meters at the infamous Titanic wreck. With a population of just over 500,000, NL has centuries of living by and depending on the sea, explained the **Hon. Andrew Parsons**, Minister of Industry, Energy and Technology. Fishery was the original backbone of the economy, although that has shifted to reflect the blue economy and a diverse array of maritime challenges.

The reason that NL developed a unique array of maritime expertise is simple: they had to.

"There were opportunities to grow it here because a lot of technology that was available—or not available—didn't reflect, or couldn't deal with [our unique] operational challenges, the reality of our conditions: this mixture of weather, ice, sea state and isolation, as well as the variability and quick change in the weather patterns here," explained **Chris Hearn**, director of the Centre for Marine Simulation at Memorial University of Newfoundland

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Spaces & Places

The 'Crown Jewels' of St. John's, Newfoundland & Labrador



Centre for Marine Simulation at Memorial University of Newfoundland (MUN).

Image courtesy Memorial University Maritime Simulation Center

(MUN). “When you live in a harsh environment, you have limited resources and you’re isolated, you have to be really good at coming up with solutions and problem solving on demand,” added **Meagan Kay-Fowlow**, president of the Co. Innovation Centre. “You don’t have a choice.”

The provincial government, Hearn said, recognized the need for and benefit of innovation early on. “We are truly nimble, we are adaptive, and we want people to come here,” Parsons emphasized. “[We’re] surrounded by an amazing team of people that are interested and committed to economic development and opportunity. We’re very proud of our responsiveness; it’s very easy to sit down with decision makers in our province in order to get things done.”

MUN Grounds Provincial Research

MUN, located in the capital of St. John’s, serves as home base for NL’s maritime sector, providing academic programs, testing and research facilities, plus opportunities for collaboration. The Ocean Engineering Research Centre (OERC) in the Faculty of Engineering and Applied Science boasts state-of-the-art technology, influential partnerships and researchers asking crucial questions for marine activity.

Its oldest asset is a tow tank with a wavemaker that has been used for hydrodynamic studies into ships and offshore structures, explained **David**

Molyneux, OERC’s director. The Structures Lab features large equipment that can test almost full-scale ship panels with ice. “There’s a related piece, which instead of looking at crashing loads, we look at sliding loads where a piece of glacial ice comes into contact with the side of a ship and is pushed into the side, because that actually changes the maximum load,” he added. There’s always been a level of risk with going to sea to earn a living, but “in order to make that environment as safe as possible, [we have] a long history of research into ship safety and offshore structures.”

The **Centre for Cold Oceans Resource Engineering** (C-CORE) is one of the OERC’s partners, originating as a university offshoot with extensive ice research history, particularly in the oil and gas industry. **The National Research Council** (NRC) of Canada also has facilities in St. John’s, allowing students and professors to utilize its technologies for research.

Lately, OERC’s focus has been on the Arctic and related environments, which are sensitive and carry a unique set of hazards. With anticipated shipping growth in the North, it’s crucial to ensure that seafarers have lifesaving knowledge and technical capacity. “In the naval architecture world,” Molyneux explained, “classification societies have been the go-to organization for certifying our ships and making sure that they meet the best standards.” As vessels enter new environments, classification societies must be ready to answer the question of returning safely. “We are used to icebreakers being strongly and heavily built, but with climate change, do they need so much reinforcement? [All that] extra weight could be cargo,” he pondered.

MUN is also home to The Launch, a cutting-edge living lab operated by the university’s Marine Institute. Located in Holyrood, a bay where the North Atlantic collides with the rugged coast, **The Launch** serves as the ideal setting for technology testing, training and ocean research in a safe, near-Arctic environment. “It’s an amazing facility and community,” said Parsons. “It’s bringing the world’s harshest cold-ocean environment to the client. [They deal] with ocean tech through R&D, testing and demonstration—taking everything together and putting it to the test.”

Research focuses on ocean mapping, habitat delineation, forecasting, modelling, management,



The Ocean Engineering Research Centre (OERC) tow tank.

Images courtesy Celia Konowe

Inside the Structures Lab they can test the impact of ice on ship panels.

and operational decisions, while long-standing partnerships with industry, government agencies, and Indigenous communities offer a truly collaborative and inclusive environment. Facilities include an autonomous testbed, a subsea observatory, remote operations center and workshop, training and meeting spaces. The Launch offers a toolkit that provides shared access to an extensive range of autonomous surface vehicles (ASVs) for train-

ing or marine applications and is home to NATO's Defence Innovation Accelerator for the North Atlantic network (DIANA) and SmartAtlantic, the largest applied ocean-observatory system in Canada, and data provider to the Canadian Integrated Ocean Observation System (CIOOS).

Government Contributions

St. John's is also home to the NRC's Ocean,

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The Launch is a cutting-edge living lab operated by the university's Marine Institute. Located in Holyrood, a bay where the North Atlantic collides with the rugged coast, The Launch serves as the ideal setting for technology testing, training and ocean research in a safe, near-Arctic environment.

Photo courtesy the office of Minister Andrew Parsons



Kelly Santos,
President,
The Launch



Images courtesy Greg Trauthwein



Coastal and River Engineering Research Centre, which specializes in understanding the safety and performance of systems and infrastructure in harsh aquatic environments. “We have the world’s largest ice tank,” proudly said David Murrin, General Director of the site. It measures 90 meters long with temperatures that range down to -25 °C that helps to stimulate Arctic conditions. It’s been used to study a variety of challenges, including navigation and model tests of ice structure interactions. “We also have a 200-meter towing tank that’s fast enough to test high speed vessels and evaluate the performance of various marine systems like bulk carriers and patrol vessels, icebreakers, and submarines,” he added.

In addition to physical modeling, the NRC provides numerical modeling and full-scale field testing to optimize ship design and offshore and coastal structures. “We’re now at a point where we’re looking to leverage these large data sets to train AI models to help with decision support tech-

nologies and make ships safer and more efficient,” said Murrin. There are gaps, of course, like ship operations in the most extreme conditions. “We identified an opportunity to leverage our decades of data sets, and most importantly, our rich network of academic and industry researchers to kind of solve this limitation and try to fill in these gaps.” The solution is a collaborative approach between MUN and Virtual Marine, a company that specializes in maritime training simulations.

Collaboration and innovation are not a singular experience for the NRC. “We’re uniquely positioned in the intersection of industry, academia and government. Each year, our scientists, engineers and business experts work closely with thousands of Canadian firms tackling these important problems and bringing these technologies to market,” explained Murrin. “We’re also a steward of very important and unique scientific facilities and equipment, and that really helps us align science and innovation.”

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The Tow Tank @ NRC is a 200m (656 ft.) towing tank.

Oceans Advance Bridges Industry

Collaboration in the NL maritime industry is facilitated by organizations to connect and unify the industry. **Oceans Advance**, born out of the concept for an ocean technology cluster in NL, has a network of partners, collaborators and buyers across Canada and around the world. It leads national and international export trade initiatives and offers support to bring technology solutions to a global audience. “We facilitate collaboration through targeted events, and we advocate for support from our provincial and federal funding partners for our members,” noted Executive Director **Shelly Petten**.

Member companies benefit from the vast network of partners and collaborations, trade opportunities for export growth, and continuous improvement initiatives like sales training and direct access to funding. Moreover, anyone outside of the province can benefit from Oceans Advance as an associate member. “We routinely connect folks from outside NL with our local community players,” added Petten. “We have the most amazing infrastructure here for R&D in the ocean space, too.”

The group is looking forward to this fall’s ABCMI Business Conference in Vancouver, marketing the initiative as a gateway to the Asia market. “We are also supporting the Atlantic Canadian trade show space at Ocean Business in Southampton in April 2025—a major export activity for our NL companies,” said Petten.

Co. Innovation Centre Removes Barriers

A new player in the NL maritime sector is the Co. Innovation Centre, a multi-sectoral space for established and growing companies to converge, collaborate and co-create. The facility was created to ameliorate silos between industries, missed partnerships, a lack of infrastructure or warehouse space for bigger projects and low visibility of new, local technologies. “And the companies had a really interesting desire that I haven’t seen in other places, to collaborate,” explained Kay-Fowlow. “Businesses here want to work together and they didn’t have a place to do that.” A group of core partners helped the Centre reach its current stage, including techNL, Energy NL, Canada’s Ocean Supercluster, Energy Research and Innovation Newfoundland and Labrador (ERINL), and Econext, she cited.

The total space is about 54,000 square feet, split into different sections. About 20,000 square feet is office and collaboration space, while another 20,000 is light-industrial space that provides businesses with the technology and equipment they need for prototyping and testing. “We’re trying to make sure we have a really unique combination based on the conversations we’ve been having around needs and removing the barriers to access for these businesses,” said Kay-Fowlow.

The rest of the facility houses a café, public space and meeting rooms. “And then we’re also in the planning stage for—and this is my favorite piece

right now—a large-scale demonstration showcase space in the light industrial area, giving businesses or industry the option to rotate through and set up unique exhibits, whether it's for upcoming installations or new projects.” “People love to say you're going to collaborate, but that's something that you actually have to curate and work actively to create the conditions for success,” she added. “And so we're going to be focusing on that piece. So, are we full? Are we dynamic? Do we have the great mix of the businesses that are operating across the province? Are we representing a variety of industries?”

New Horizons

Common themes across the conversations above—climate change, green marine transportation, maritime cybersecurity, automation and au-

tonomy, digitalization, and the growing use of AI. The Rock may not be alone in facing challenges in these opportunities, but Newfoundland and Labrador should be poised for success. “If it works here, it will work anywhere. So that's why you need to come to this province,” said Parsons. “

The technology we use here can be adapted to anywhere else in the world. And this is just a little corner of the world that can supply some of the strategies and solutions that will help us on a global basis.”

“I heard a great quote one time about Newfoundland and Labrador,” Hearn added. “It has a landscape that makes you want to live up to it, but it doesn't provide you the resources to do it. We've had more than 500 years of living here. It's in our DNA; it's part of what we are.”



The World's Largest Ice Tank: The world's largest ice tank is 90m (295 ft.) long, and has been used to study dozens of challenges, including navigation and Arctic conditions and model tests of ice structure with temperatures that range to -25°C (-13°F).

Images courtesy National Research Council of Canada / Conseil national de recherches du Canada

Spaces & Places

The 'Crown Jewels' of St. John's, Newfoundland & Labrador

The Co. Innovation Centre came to life earlier this year. It's a multi-sectoral space for established and growing companies to converge, collaborate and co-create. The total space is about 54,000 square feet, split into different sections, including office and collaboration space, a light-industrial space, as well as a café, public space and meeting rooms. A group of core partners helped the Centre reach its current stage, including techNL, Energy NL, Canada's Ocean Supercluster, Energy Research and Innovation Newfoundland and Labrador (ERINL) and Econext.

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Profile

Laurie Balan, COO, Genoa Design International



FIRE & ICE

Genoa Design Excels in Government, Military, Icebreaking Markets

Image Courtesy Genoa Design International

Genoa Design International has been providing production design and 3D modeling services to shipbuilding and offshore industries from Newfoundland and Labrador for nearly 30 years. With a team of more than 200, **Laurie Balan**, COO, Genoa Design International, sees ample opportunity for future growth, with defense budgets booming around the world and the recently signed Icebreaker Collaboration Effort (“ICE PACT”) between the Canada, Finland and the U.S. which is a trilateral arrangement to collaborate on the production of polar icebreakers and other capabilities.

By Greg Trauthwein

Can you give us your history with insights on your responsibilities today?

I’ve spent the majority of my career, over 20 years now, in shipbuilding, primarily in Canada. That’s where we’ve seen a significant resurgence of ship design and shipbuilding over the last couple of decades. I graduated from Memorial University in Newfoundland & Labrador as a mechanical engineer, and I thought at the time I was going to spend my career in the offshore oil and gas industry because it was booming at the time. After a short stint overseas, I returned to the Atlantic provinces and was introduced to the working world of naval architecture and marine engineering. Over the next decade or so, I was engaged in design work, engineering changes for ships in operations, so the maintenance of ships in service support programs, mainly for the Canadian Navy, the Canadian patrol frigates.

After that [I transitioned] to newbuilds, as the national shipbuilding strategy took off and we started designing and building ships that were desperately needed in Canada.

Today at Genoa, as the chief operating officer, I’m responsible for, of course, all the operations and the business performance of the company. That includes everything, from customer delivery where make sure that we execute quality products with constant schedule certainty, to market and business development, communications, human resources and talent development. I really get to touch the entire organization, which I absolutely love. I also get

to work really closely with a pretty tight executive team as well as our board of directors to develop the strategy for the company. At a time when geopolitical pressures are putting a lot of pressure on the industry, it’s an exciting time to be here and to be the COO of a company that is thriving and innovative.

How about a ‘by the numbers’ look at Genoa Design today?

I think it’s worth looking at Genoa over the last 10 years or so to get a true picture of our growth. When Canada entered an era of rebuilding, the industry that had been essentially dormant for a couple of decades, meaning there were new and exciting programs to work on, and it gave companies like Genoa an opportunity to work on engineering projects that were design-related, problem-solving. We were fortunate to have joined forces with Seaspan and other supply chain partners from the early days, and that’s where we grew and matured as a company. We grew from about 20 employees to about 240 across Canada and the US today. Our revenues grew exponentially as well over that timeframe.

Please give insight to your work today, with insight on where you see growth?

Most of our work today is government and navy contracts. We still do commercial work from time to time when it aligns with our strategic direction, but for the most part, we work on major large programs in Canada and the US, mostly for the US Navy, US Coast Guard,

Profile

Laurie Balan, COO, Genoa Design International



Looking out over the next five to 10 years, we will see more growth in the US, building on a base that we have started. We've built relationships there, we know the culture, we're part of the culture, and that's where the significant backlog of government work resides at the moment in the shipbuilding industry.



– LAURIE BALAN, COO, Genoa Design International

or Canadian Navy and Canadian Coast Guard.

In terms of numbers, about 70% of our work is defense related. About 75% of that right now is currently in Canada. Looking out over the next five to 10 years, we will see more growth in the US, building on a base that we have started. We've built relationships there, we know the culture, we're part of the culture, and that's where the significant backlog of government work resides at the moment in the shipbuilding industry. Hopefully, the ICE Pact that's recently been announced between Canada, Finland and the US will promote opportunities for companies like Genoa to export our expertise and continue that growth and development in Canada, but also outside of Canada.

There's a lot of investment in defense globally. How big is this bump?

I don't know how big I expect it to get, but certainly the problem is massive now. There's not enough infrastructure, shipyards, design companies, people and innovation in one country to develop it and do it all in-house. We've been fortunate along the way to have worked successfully with US companies. We have all the security requirements and defense requirements to be able to partner. That demand is obvious. There's so much work to be done, there's so many new ships to be designed and to be built that we need expertise from more than just inside the US and more than just inside of Canada. Even under the national shipbuilding strategy, while the intent of that program was to build up the Canadian industry, that too is beyond ourselves and our expertise and we've reached out to other companies

with expertise from the likes of Finland to be able to accomplish it all. I think there's a lot of opportunity for multiple companies, whether they're Canadian based, US based or elsewhere, to answer the call and stand up to the challenge and be innovative.

Looking at recent projects, is there one or two that stand out?

Right now there are two major concurrent projects that we're working on: the icebreakers for Canada and the icebreakers for the US. Both countries are replenishing their heavy icebreaker fleet, as the current vessels in operation went into service before I was born. An opportunity to contribute to the designs of those complex vessels highlights Genoa's expertise in icebreaker design. While we typically ramp up our teams later in the functional design phases, our designers have to be intimately familiar with ice class rules and detail the design in a way that meets those rule sets, as well as the build strategy and processes. Working on those two programs, north and south of the border, two different designs, materials, shipyards, organizational structure, technical stacks, tools, you name it, the list goes on. That really speaks to Genoa's adaptability and agility that we show our clients.

Looking at the Newfoundland & Labrador cluster, can you discuss what your company puts into it, and what your company gets out of it?

More so than any other province, Newfoundland & Labrador's history is linked to the sea. We are

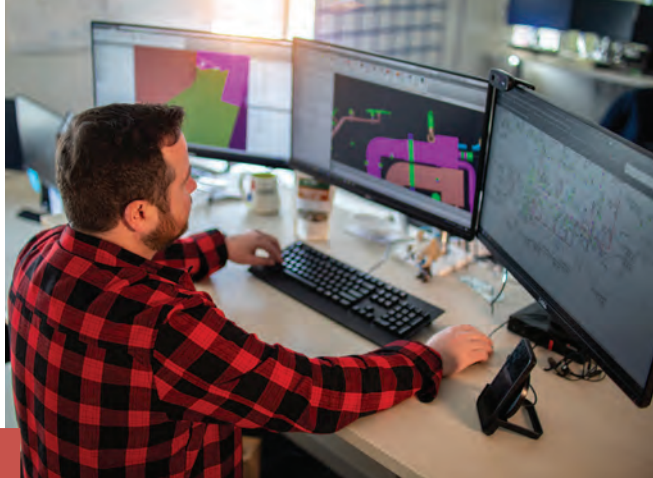


“An opportunity to contribute to the designs of those complex vessels highlights Genoa’s expertise in icebreaker design.”

uniquely positioned as the gateway to the Arctic as well as to Western Europe. Our schools are noteworthy in terms of how they support the industry. Our schools are second to none, whether it’s MUN, the Marine Institute, College of the North Atlantic or other private colleges in the province. Graduates are recognized as top in their field and are ready to work anywhere in the world when they graduate. We have outstanding companies here, and you don’t have to look far to find locally grown companies like Genoa, Kraken and Virtual Marine – to name a few – at the forefront of innovation. We have research & development, simulation and innovation centers here that are developing leading edge solutions that are being used across the globe.

If anything, our province could do a better job of promoting ourselves. We’re a bit humble as a community, as a province, and maybe we need to toot our own horns a little bit more to share our knowledge and our expertise with the world. There’s a real sense of cooperation and camaraderie here in the province of Newfoundland & Labrador that I don’t think you see everywhere. There is something special about Newfoundland and Labrador, for sure; there’s something special about Genoa, and the local supply chain here, too. Those are some of the reasons that I’m still so passionate about this industry, which is typically viewed as a ‘traditional’ industry. [Part of my job] is to share those stories and attract younger professionals [to fuel] the next generation of the industry. We’re innovative, we’re fun, and we apply new tools and technologies to make this industry better.

All images courtesy Genoa Design International



“We’re innovative, we’re fun, and we apply new tools and technologies to make this industry better.”



Watch the full interview with Laurie Balan, COO, Genoa Design International, on **Maritime Reporter TV:**



Profile

Chris Hearn, Director of the Center for Marine Simulation, Fisheries & Marine Institute, Memorial University



**IS IT REAL OR IS IT
SIMULATION?**

**Inside the Center for
Marine Simulation
Fisheries & Marine Institute,
Memorial University**



Watch Maritime Reporter TV's full video interview with Chris Hearn here: <https://youtu.be/bApOHx1HcD4>



Image courtesy Memorial University Maritime Simulation Center

Memorial University in St. Johns, Newfoundland & Labrador, Canada, is a microcosm of how this unique regional cluster has parlayed its geographic locale and harsh, unique operating conditions into world leadership in the maritime, offshore energy and subsea tech spaces. An alumnus, a professional mariner and now the Director of the Center for Marine Simulation, the Fisheries & Marine Institute at Memorial University, **Chris Hearn** has his hand on the pulse of the tectonic changes reshaping maritime and offshore energy simulation training today. From artificial intelligence to autonomy to fuel transition, Hearn and the Center for Marine Simulation are invested to help train the current and new generation of seafarers.

By Greg Trauthwein

While Chris Hearn is a graduate of the Memorial University nautical sciences program, he never anticipated being back at his alma mater as the Director of the Center for Marine Simulation. His post-graduation career took him to sea, at first as a third mate on through to captain, sailing domestically and abroad under a variety of flag states on a variety of ships, from operating ships in the Arctic to tankers to cable layers.

"I came ashore first as Marine Superintendent, which was interesting in that when you're on board, you're always wondering, "Why are we doing this?" said Hearn. "When you're on shore and dealing with all the other sides, you get to [literally] see a [the many pieces that make up the other side], helping to understand why decisions are being made."

Coming ashore put Hearn in touch with all aspects of marine operations, and he gravitated toward the training side. "Coming from Newfoundland, I can tell you there was nothing worse than getting off the ship and trying to make your way home, only be diverted to go fly somewhere for training," said Hearn. "So when an opportunity came for a change, I came back to the

Profile

Chris Hearn, Director of the Center for Marine Simulation, Fisheries & Marine Institute, Memorial University



“What has happened is we’ve grown this tech sector to be primarily focused on the maritime and oceans industries because we needed to. There were opportunities to grow it here because a lot of technology that was available – or not available – didn’t reflect, or couldn’t deal with [our unique] operational challenges, the reality of our conditions: this mixture of weather, ice, sea state and isolation, as well as the variability and quick change in the weather patterns here.”

– CHRIS HEARN,
Director of the Center for Marine
Simulation, Fisheries & Marine
Institute, Memorial University

institute to take over as a director at the [simulation] center, and I had the mindset that we can do anything here in terms of training and simulation. Nobody needs to leave here [to get training], and in fact, people can come here to obtain job training.”

With his education plus his career experience at sea and on shore, Hearn saw the new opportunity as the perfect chance to leverage the investment already made in the simulation center with the cumulative experience of the Newfoundland & Labrador cluster, which has a unique proximity to the ocean and the Arctic that has given generations of seafarers and companies firsthand experience working directly in some of the world’s harshest conditions. “I saw the opportunity to leverage that into more special type applications that really reflected the operating conditions that we face here in Newfoundland in terms of harsh environment, the challenging conditions, and how people react in really high stressful situations,” said Hearn. “I

always say that anybody with the time and money can buy all this [simulation equipment], but it’s how people use it, how they overcome the shortcomings that are inherent to simulation to make it more compelling.”

With that, the center has a fairly modest 400 students coming through in a given year, but that doesn’t count the companies that come in and rent the entire facility to prepare for a complex project.

“Some might say that [number is] a bit small, but for our facility, given what we’re doing, that’s a pretty good number,” said Hearn.

Simulation Technology Evolves

Since Hearn started his position more than 15 years ago in 2008, there have been “several waypoints in terms of [simulation technology] improvements that I’ve seen,” said Hearn. “Simulation technology vendors generally have a lot of similarity between them, what they’re delivering and



their customer service. There's a lot of parity there. You have some new people coming from the gaming technology and gaming background, because they've seen this opportunity now to bring some of the really interesting stuff. I've certainly seen improvement in the visual engines, making the visuals richer and more realistic; like the cloud shadowing and the way the water curls, for example."

As in most aspects of business and life, the details matter, and the inclusion of small points that closely mimic nature are critical to keep trainees establish presence and believe that they are in fact on a vessel.

"I can also say that there have been improvements in the fidelity of the modeling of ships, the modeling tools themselves have dramatically increased," said Hearn. "The ability to produce full 3D models is quite a powerful thing. Now we have the ability to build a 3D hull and include the tanks and be able to adjust fluid levels in the tank, and then adjust the trim and draft. That's a powerful tool, because it

not only reduces the [number] of ships you actually have to build, but it also improves the fidelity of the ship you are building."

Another improvement has been with the fidelity of controls in the instructor station, who have now more than ever the ability to make small, nuanced changes to adjust something as simple as daylight, for example, "and to make changes that would reflect what people would actually see, and be able to interact closer inside the model itself is much better," said Hearn. "To have the ability to swing and maneuver cranes and ship's equipment that people would be expected to use on board, that's tremendous too."

Images on this spread courtesy
Memorial University Maritime Simulation Center

Profile

Chris Hearn, Director of the Center for Marine Simulation, Fisheries & Marine Institute, Memorial University



Chris Hearn

Director Maritime Simulation Center

Not only can the center combine its cumulative simulation assets into one project, it can connect too to a facility remotely, to dramatically enhance the scope and realism of a given operation.

“The big simulation vendors recognize that their clients are giving a lot of feedback, and they’ve also recognized that they can distribute simulation now,” said Hearn. “They can do simulation on the cloud. The engine is essentially on the cloud, you can pull data down to a laptop and have a very good high-fidelity simulation. That was unheard of 10 or 15 years ago, but it’s there now, which makes it a much more distributed system. So you and I can be here pulling a simulation event out of the cloud to run on our laptops and be in the same scenario. That’s pretty profound.”

Hearn’s simulation center is comprised, simply put, of a lot of equipment.

“The center’s main focus is around three Class A ship’s bridges: the Full Motion Bridge, the Offshore Operation Simulator, and the Heritage Bridge,” said Hearn. “The Full Motion Bridge and the Offshore



Greg Trauthwein

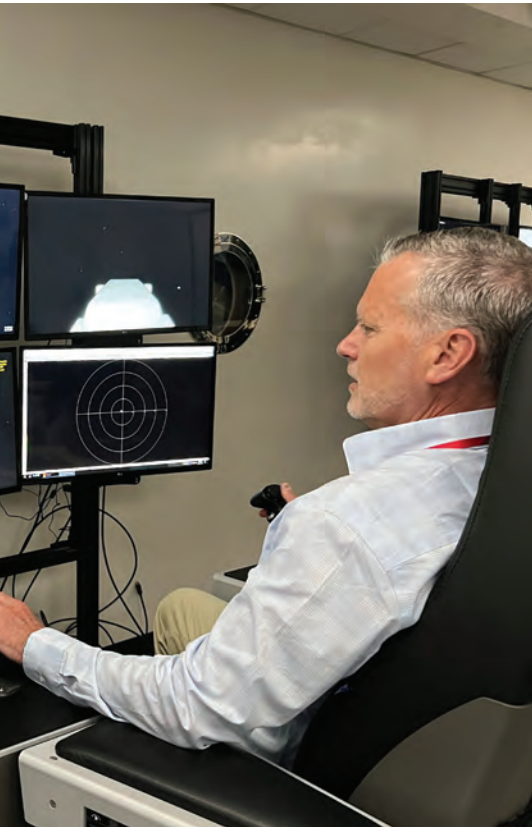
@ ROV Simulator

Operation Simulator are both sitting on six-degree motion beds; it moves just like the ship will move, whether it’s in a storm on the Grand Banks or you’re battering your way through Lancaster Sound in ice, everything is replicated there. The Heritage Bridge is very specialized towards the shuttle tankers which serve the offshore industry, and the big three bridges are interconnected.”

Hearn and his team can also connect additional simulators, such as the full mission engine room simulator, the full mission ballast control simulator for an offshore drilling rig and several additional smaller units to deliver the most realistic training scenario.

“One of the unique things about that interoperability, that connectivity, is that we run large multi-party exercises all in the same scenario,” said Hearn, “which [is a big assist when planning big offshore structure] tow-out projects.

Ship to ship operations, with tankers coming alongside to load, utilizes multiple bridges, too.”



Maritime Simulation Center

Planning Ahead

Though somewhat remote and unique in experience, the maritime and subsea professionals in St. Johns, Newfoundland & Labrador face the same megatrends driving maritime: energy transition; digitalization; automation and autonomy. When Hearn looks at the landscape around him, he sees artificial intelligence and the increased use of autonomy as pervasive trends that will continue to evolve and change not only the role of mariners on ships but the training they receive. That said, with those two, he sees maritime cybersecurity “as the gorilla in the room.”

“With AI, it’s finding out how it’s going to be used and when it’s going to be used,” said Hearn, noting that as of now there are far more questions than answers. “Does AI assist with collision avoidance? Does AI assist with cargo preparation and cargo loading? Does AI work with weather routing and navigation or voyage planning? How do those things actually look? Where is the AI sitting to? Is

it onboard the ship? Is it a tool? Or is it almost like another crew member not under articles, but it’s there to be used? I’m very interested to see how that plays out.”

When it comes to autonomy, Hearn points out that there is autonomy onboard already: “the good old autopilot versus autonomy 101, and unmanned engine rooms and these sorts of things.”

“[To be clear], I am absolutely not advocating for replacement of people onboard the ships, and I don’t think that’ll happen realistically,” said Hearn. “We may get to a point where you have a combined scenario where we have the smaller MASS operating in areas where there are people onboard; I think that’s the more likely scenario. But autonomy is present

Images on this spread courtesy
Greg Trauthwein

Profile

Chris Hearn, Director of the Center for Marine Simulation, Fisheries & Marine Institute, Memorial University

and it is growing. So here at the Marine Institute, we're interested in how autonomy is played out in terms of remote operations." To that end the Marine Institute is setting up an autonomous test zone at one of its facilities to help test the use of MASS in different crewed and uncrewed environments.

As he mentioned, the 'gorilla in the room' is cybersecurity with an inextricable link to automation and digitalization. "As I said to somebody the other day, a rudder angle indicator doesn't care where the information is coming from, its job is just to report what the rudder is doing," said Hearn. "Using the simulators as part of the training to allow people to experience that is a really interesting opportunity. We're playing our way into this bigger thing around the cybersecurity, maritime cybersecurity, and how we can participate with other agencies or entities."

Last, but certainly not least, is the fuel transition and the inclusion of new fuels – LNG, ammonia, hydrogen, among others – to the shipboard environment. "Again, for the propulsion plant, for the marine engineering program, how do they deal with changing fuel sources, preparing for effects of power management onboard the ship, and that interconnection between what the bridge is asking to have done and what the propulsion plant needs to do." To keep pace, Hearn and his team will add components or new engine models that can represent – whether it be ammonia or hydrogen, or a combination fuels, how that works. And again, how do the skills of the people coming into the industry now [and for the ones that are already here] ... how do their training need to be changed?"

It Takes a Village

The Newfoundland & Labrador maritime, subsea and offshore energy community is truly unique in its collective experience and collaboration, a fact hammered home time and again when you visit leaders and companies where they live and work or at trade events globally. Memorial University sits as a central hub, and world-class facilities like its Center for Marine Simulation an indispensable driver.

The reason that the province developed such an array of unique maritime expertise is actually fairly simple: they had to be.

"We have a long history of maritime trade, including the fishery and through to what we have now [with a long-established offshore energy industry],"

said Hearn. "We have this in our DNA, it's part of what we are. So there's this connectivity between all these different entities.

What has happened is we've grown this tech sector to be primarily focused on the maritime and oceans industries because we needed to. There were opportunities to grow it here because a lot of technology that was available – or not available – didn't reflect, or couldn't deal with [our unique] operational challenges, the reality of our conditions: this mixture of weather, ice, sea state and isolation, as well as the variability and quick change in the weather patterns here."

"We had a provincial government that recognized that very early, but again, it reflects life here. We are innovative by nature because we had to be. I heard a great quote one time about Newfoundland & Labrador: it has a landscape that makes you want to live up to it, but it doesn't provide you the resources to do it! We've had more than 500 years of living here, and because we're isolated, we had to grow something here in order to be able to deal with things."

When people first think of Newfoundland & Labrador, it's a good bet that the first thing they think of is not technology. But with a proven track record and leaders like Chris Hearn, that is changing fast.

"The companies that grew out of research projects, that are either at the university or here at the institute, whether they be in the ocean tech or whether they be in fisheries and resource gathering or they're in maritime or offshore," said Hearn. "Radar systems [like Rutter's] that are able to do an amazing job in ice, came out of projects and then grew into companies that are now very successful and doing work all over the world. You have this self-sustaining circle of the education and training pieces, like we would do here at the institute or at the university, spilling out these really bright minds of these people who are working with the industry, and see a really good idea and say, "I have to do that."

Then, to support all of that you have the groups like Oceans Advance and the techNL's and these other associations that are really blowing air into this fire that's growing here all the time for the tech sector. It's this combination of the need to do it and the want to do it that sustains it in an isolated place with a small population. We're not that far away, but we're far enough that it drives the spirit of "let's find a way to do this."



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Interview

Meagan Kay-Follow, President of the Co. Innovation Centre



CO. INNOVATION CENTRE OPENS IT'S DOOR TO NEWFOUNDLAND & LABRADOR



The Co. Innovation Centre is a multi-sectoral space for established and growing companies to converge, collaborate and co-create. **Meagan Kay-Fowlow**, President of the Co. Innovation Centre, discusses how this unique facility will engage with organizations and technologists – both inside and outside of Newfoundland & Labrador – to positively impact work in the maritime, offshore energy and subsea sectors.

By Greg Trauthwein

A native of St. John's and a graduate of Memorial University, Meagan Kay-Fowlow, President of the Co. Innovation Centre, had built a career outside of the province focused on innovation related to governance mechanisms at the global level.

But the pull of her native Newfoundland & Labrador plus its proximity to the ocean, and the investment in technology in the recently opened Co. Innovation Centre was a strong draw to bring her back to lead the new facility. The Co. Innovation Centre was created to ameliorate silos between industries, missed partnerships, a lack of infrastructure or warehouse space for bigger projects and low visibility of new, local technologies. "And the companies had a really interesting desire that I haven't seen in other places, to collaborate," said Kay-Fowlow. "Businesses here want to work together and they didn't have a place to do that."

A group of core partners helped the Centre reach its current stage, including techNL, Energy NL, Canada's Ocean Supercluster, Energy Research and Innovation Newfoundland and Labrador (ERINL) and Econext.

By the Numbers

The Co. Innovation Centre received about \$9.6 million in funding: \$7.1 million from the Government of Newfoundland and Labrador, through the Department of Industry, Energy, and Technology; and \$2.5 million from the Atlantic Canada Opportunities Agency (ACOA).

Collaboration at the Co. Innovation Centre.

© JAC Marketing Agency

Interview

Meagan Kay-Fowlow, President of the Co. Innovation Centre



“My mantra is to connect, collaborate, and co-create, and that’s not isolated to Newfoundland and Labrador; this is a global approach.”

– MEAGAN KAY-FOWLOW,
President of the Co. Innovation Centre

It boasts a total space of about 54,000 square feet, split into different sections. Approximately 20,000 square feet is office and collaboration space, while another 20,000 is light-industrial space that provides businesses with the technology and equipment they need for prototyping and testing. As of this writing, the additive manufacturing facility is in place, with Atlantic XL’s team fully up and running with a unique 3D printer among other equipment. “We’re trying to make sure we have a really unique combination based on the conversations we’ve been having around needs and removing the barriers to access for these businesses,” said Kay-Fowlow.

The rest of the facility houses a café, public space and meeting rooms. “And then we’re also in the planning stage for—and this is my favorite piece right now—a large-scale demonstration showcase space in the light industrial area, giving businesses or industry the option to rotate through and set up unique exhibits, whether it’s for upcoming installations or new projects.”

“People love to say you’re going to collaborate, but that’s something that you actually have to curate and work actively to create the conditions for success,” she added. “And so we’re going to be focusing on that piece. So, are we full? Are we dynamic? Do we have the great mix of the businesses

that are operating across the province? Are we representing a variety of industries?”

Serving Multiple Markets

“When we were originally envisioned, one of the biggest gaps in the ecosystem was related to remote operations, which is a broad kind of catch-all space,” said Kay-Fowlow. “We’re working hard to have conversations, and that’s going to be our priority for the fall, with these groups on where are the challenges? Where are the opportunities? Where are the gaps related to remote operations?”

In terms of the maritime, offshore, subsea industry spaces, Kay-Fowlow admits that it’s advantageous that the province already has sizable and mature players, as well as a strong group of public and private facilities to help develop new technologies. Kay-Fowlow said the key for the Co. Innovation Centre is identifying and filling gaps. “We have a lot of businesses that are already doing work in those areas, so it’s about identifying them, identifying opportunities to work with them, and to support them. So we’re either trying to connect the ecosystem better or we’re trying to support what they’re already doing. That can be through showcasing, telling their stories, introducing them to other companies, or filling the gaps.



The new light industrial space at the Co. Innovation Centre features many new pieces of equipment to help technologies and companies develop.



L to R: John Lidstone and Pascal Milord of additiveXL in front of the unique 3D printing unit housed in the light industrial space at the Co. Innovation Centre.

Images courtesy Greg Trauthwein

“We’re not going to duplicate anything: St. John’s, Newfoundland & Labrador have great maritime and offshore energy facilities,” stressed Kay-Fowlow. “We’re not going to enter into competition for that space. But if anything, we want to make sure we can help support them and get businesses access to those spaces.”

Welcoming the World

As the Co. Innovation Centre develops and grows, Kay-Fowlow sees it playing a complementary role to other assets in the region, leaning first on the unique people and cumulative technical talent that has built up over its history, then too on its unique location and geography.

“When you live in a harsh environment, you have

limited resources, you’re isolated, you have to be really good at coming up with solutions,” said Kay-Fowlow. “You don’t have a choice. Problem solving on demand is in the bones of the people and the businesses they’re building in Newfoundland & Labrador.”

It is intended to be a spot where companies from inside and outside the province, inside and outside the country can come to collaborate and mutually build tech solutions and business. “We want to partner, we want to collaborate, we are not in this to do it alone,” said Kay-Fowlow. “There’s a lot of great potential partnerships and affiliations that I’m looking to develop.”

“My mantra is to connect, collaborate, and co-create, and that’s not isolated to Newfoundland and Labrador; this is a global approach.”



START

ME UP!

Giving a Leg Up to Ocean Tech Startups

Paula Mendonça came to St. Johns, Newfoundland & Labrador more than two decades ago from her native Portugal, and never left. Today, the energetic Mendonça serves as Executive Director of the Ocean StartUp Project, a national group that aims to “inspire, initiate & invest in early stage ocean technology startups.”

Paula Mendonça left her native Portugal more than two decades ago to move the St. John’s, Newfoundland & Labrador to pursue her PhD. Today she leverages both her love of the ocean with her background in Marine Biology and her career in “building around entrepreneurship, research commercialization, and innovation. So, thrilled to be doing this role right now,” she said.

Ocean StartUp Project, as it reads on its website:



Under three pillars – inspire, initiate and invest – our approach is clear: with an ocean-centric vision, we seamlessly bridge the gap from concept to market, providing support that integrates perfectly with the broader innovation network of accelerators, incubators, and support entities. Our mission extends beyond our borders, attracting international startups to Canadian shores to build their oceantech ventures, while simultaneously propelling Canadian startups onto the global stage. This dual focus enriches Canada’s innovation landscape, transforming the ocean from just a frontier into a global hub for technological advancement.

The Ocean Startup Project is relatively new, brought together in 2020, and since then “we have supported 184 startups and we have awarded more than 3.2 million in funding through all of our programs. That number is going to raise really quickly, because we [recently announced] the next 25 startups that are participating in the Ocean Idea

Challenge,” said Mendonça.

But that is simply the tip of the iceberg, and Mendonça continued “In terms of job creation, 350 jobs national-wise and the challenge winners have raised about 19 million in equity investment and 14 million in non-dilutive funding.”

Important numbers that apply directly to the Ocean Startup Project are telling, too, as Mendonça boasts: “Ocean Startup Project was also recognized as the top five accelerator incubator in North America and top 10 globally in the blue economy sector!”

Watch the full interview on **MTR TV** with **Paula Mendonça** and learn more about:

- **Lab2Market**, a nation-wide suite of programs, with the purpose of fostering an entrepreneurship mindset and entrepreneurial competencies in academics. The purpose is for researchers to look at what they’re doing in the lab, [and look at it with a] commercialization lens.
- **Her favorite start-ups** that have come into their own, including one that use AI and blue carbon credits to manage marine protected areas; and a company developing a “co-pilot” to help shipping companies better optimize fleet operations.
- The importance of having support from the local **Newfoundland & Labrador cluster**.



<https://youtu.be/XO9NTy1a6IY>



MARINE
TECHNOLOGY
TV



Watch the full interview with David Molyneux, Director, Ocean Engineering Research Center, Memorial University on **Marine Technology TV**:



<https://youtu.be/aq9BEEB2dLM>

OERC HELPS TO ADVANCE UNDERSTANDING OF VESSELS OPERATING IN ICE



David Molyneux,
*Director,
Ocean Engineering
Research Center,
Memorial University.*

Image courtesy Greg Trauthwein

David Molyneux, Director, Ocean Engineering Research Center (OERC), Memorial University, discusses the assets and expertise under his guise, with a look inside the center and its experience of exploring and enabling operations in and around ‘iceberg alley.’

By Greg Trauthwein

David Molyneux has been the director of the Ocean Engineering Research Center (OERC) since 2016 when he made the jump from the private sector to academia. “One of the reasons for my move from industry to the academia late in life was that freedom to investigate things in a bit more detail than you have [time to do] in the commercial world.” OERC was set up when Memorial University started granting engineering degrees in the late 1960s, and the idea was to make university research and resources available to industry, said Molyneux. Under his guise are university facilities and tools that enable researchers to develop technology and technique to operate in the harsh environs directly around Newfoundland & Labrador.

One asset is a tow tank with a wavemaker, used for hydrodynamic studies into ships and offshore structures. “We’ve even put synthetic ice into it so that we can look at the changing hydrodynamics with ice on the water surface or iceberg-like shapes in close proximity to an offshore structure,” said Molyneux. The other assets are more related to ship structures.

“We have some large structural testing equipment where we can test almost full-scale ship panels with ice, so that we can impact ice into these steel panels,” said Molyneux. “There’s a related piece: instead of looking at crashing loads, we look at sliding loads where a piece of glacial ice comes into contact with the side of a ship and is pushed into the side, because that actually changes the maximum load.”

The last asset, but certainly not least, is the bridge simulator. [See related interview with Captain Chris Hearn] on page 48.

Harsh Environment Research Center

Investment in research and development is constant, and opening in 2025 will be a lab site, one of three with research tied to the Harsh Environment Technology Center.



OERC's tow tank with a wavemaker, which is used for hydrodynamic studies into ships and offshore structures.

Images courtesy Greg Trauthwein



OERC has large structural testing equipment where it can test almost full-scale ship panels with ice, impacting 'ice' into the steel panels which represent a ship.



"The lab part of it [will open in 2025], and there will be three labs within the facility," said Molyneux. "One [lab] is to study freezing spray impacts on ships and offshore structures where, if you get the right atmospheric and ocean conditions, the water from the wave impact will freeze onto the structure. This is a concern for safe operation in that climate."

In addition, OERC are permanently locating its sliding load equipment for measuring ice impacts on ships in that facility. The third part will be for mechanical testing of material properties of ice. "Ice from a materials point of view is fascinating because it has a wide range of properties depending on temperature, salinity and loading rate," said Molyneux.

OERC is a strong force in helping to bring together the local community as well as inspire collaboration from organizations outside the province and country, particularly those studying maritime and offshore energy operations in an ice-infested environment.

"Going back to the formation of OERC in the 1960s, some of the very early projects were on

iceberg towing, as this was about the time that the early exploration for oil production off the coast of Newfoundland was taking place, and people were concerned about Iceberg Alley and all the icebergs that were coming down the Labrador current," said Molyneux. "It was a very simple question: can you move these things out of the way of something moored?"

That started research, and then other companies and local organizations developed that further. C-CORE, for example, is a university offshoot with an extensive ice research history, particularly supporting the oil and gas industry. The National Research Council has its own ocean engineering laboratories here too, it has a large ice tank, Molyneux points out, "But these facilities are only as good as the people who can use them."

The experience working on, in and around ice has made the Newfoundland & Labrador cluster of particular interest given the interest in maritime companies traversing the Northwest passage, for instance, generating the need for intelligence on the environment and its impact on ships at sea.

"Within the university many of my colleagues are

working on projects regarding ship structures in ice. How resilient is a ship structure, particularly one that wasn't specifically built for ice?," said Molyneux. "There was another conversation going on here regarding change in the Arctic climate and how it is more accessible to shipping. There's pressure to understand how a ship that wasn't initially reinforced for ice, how much capacity that structure has if it should accidentally run into a piece of ice."

In 2018 OERC signed a collaboration agreement with National Research Council (NRC) which allows students and professors to work with NRC and use its facilities for research projects.

But in assessing the tools of OERC, Molyneux said that ultimately, "as a gateway to the Arctic, we have a full scale laboratory right on our doorstep."

Safety of Life @ Sea

Ultimately, much of the work being conducted by Molyneux at OERC, and really across Newfoundland & Labrador, boils down to a single point: Safety of Life at Sea.

"There's always been a certain level of risk with going to sea to earn a living, whether it's fishing or transportation or oil and gas exploration and production," said Molyneux. "In order to make that environment as safe as possible, there's been a long history of research into ship safety and offshore structures. Our focus lately has been on Arctic and related environments because the Arctic's a very sensitive environment; it's a remote environment; and it's an environment with a

unique set of hazards."

With an increase of shipping activity and interest in the Arctic, it's paramount to ensure that people and organizations are well-armed with knowledge to ensure that whatever goes in can come out safely. "Technology and engineering knowledge have a role to play in that," said Molyneux. "In the naval architecture world, classification societies have been the go-to organization for certifying our ships and making sure that they meet the best standards. As ships move into new environments and new areas, the classification societies in particular have to be ready for them, to be able to answer their client's questions of, "Can I go there safely and come back?"

It's been a really good fit for

us with ABS and like-minded organizations where we are looking at ships going into new areas for shipping."

While safety of life is paramount, efficiency of operation is not small matter either, as the ability to carry freight – whether it's cargo or passengers – is also a driving force.

"We are used to icebreakers being strongly and heavily built, but with climate change, do they need so much reinforcement, because all this is cost extra weight that could be cargo?," asks Molyneux. "It's a long-term horizon that we're working on, and the things we are doing now we hope we'll see implementation in the next generation of the IMO Polar Code or the International Association of Classification Societies Rules for shipbuilding."

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Meet the CTO

David Shea, Kraken Robotics

A portrait of David Shea, CTO of Kraken Robotics. He is a man with short, light brown hair and a beard, smiling slightly. He is wearing a dark jacket over a dark shirt. The background is blurred, showing what appears to be an office or industrial setting with some lights.

“Innovate or Die”

is the

Kraken Robotics’ Way

All images courtesy Kraken Robotics

Since its founding in 2012, Kraken Robotics has operated by the succinct motto: **“Innovate or Die.”** Fast forward to 2024, and it is a global powerhouse, publicly traded with 250 employees and revenues fast approaching the \$100m mark. **David Shea** has been with the company since the start and today serves as its Chief Technology Officer. He discusses the technologies and trends that will power his company’s growth into the future.

By Greg Trauthwein

Dave, to start us off can you give a ‘by the numbers’ look at Kraken today?

Kraken is a relatively young company, starting the business in 2012, and headquartered in St. John’s, Newfoundland & Labrador. Back then we only had six employees: myself, our founder Karl Kenny, and a handful of other folks. Since then we’ve grown, and today we’re about 250 people worldwide. We have offices in Nova Scotia, Scotland, Germany, Brazil, Denmark, and in the U.S. We are publicly traded, and our 2023 revenues were about 70 million, reflecting an approximate 70% growth over 2022. We’re anticipating being somewhere between 90 and 100 million in 2024.

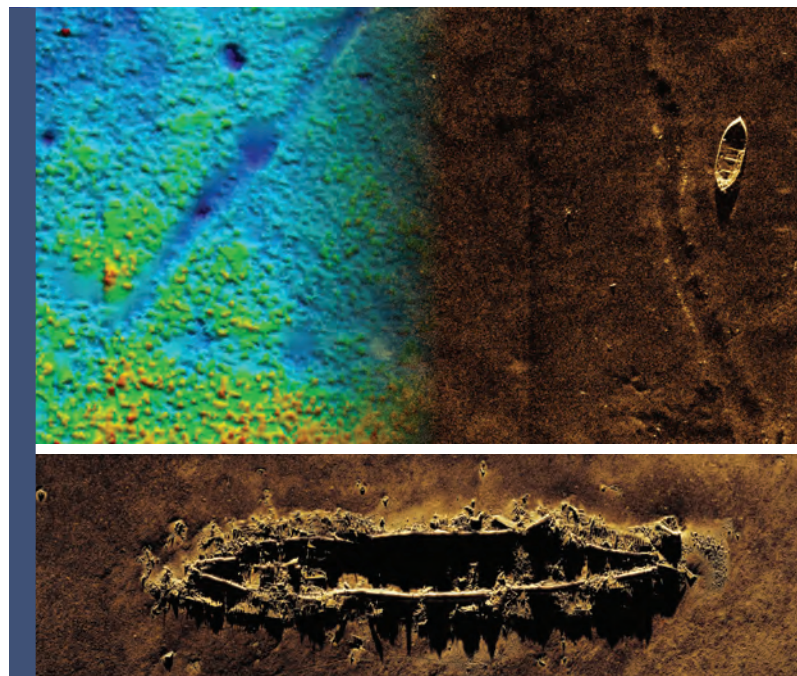
What about the tech development in that 12-year span?

In the beginning, we were building sonar systems, putting those sonar systems onto other people’s underwater vehicles. Since then, we moved up market into building other components for underwater vehicles. For example, we have pressure tolerant batteries now, coming out of our facilities in Germany.

We have underwater laser scanners, we have launch and recovery systems, and as we started delivering complete solutions. Mine hunting and mine countermeasures are our bread and butter, and we deliver a complete mine hunting solution for NATO navies around the world.

We have moved, too, beyond delivering products, now also delivering services. We’ve been running

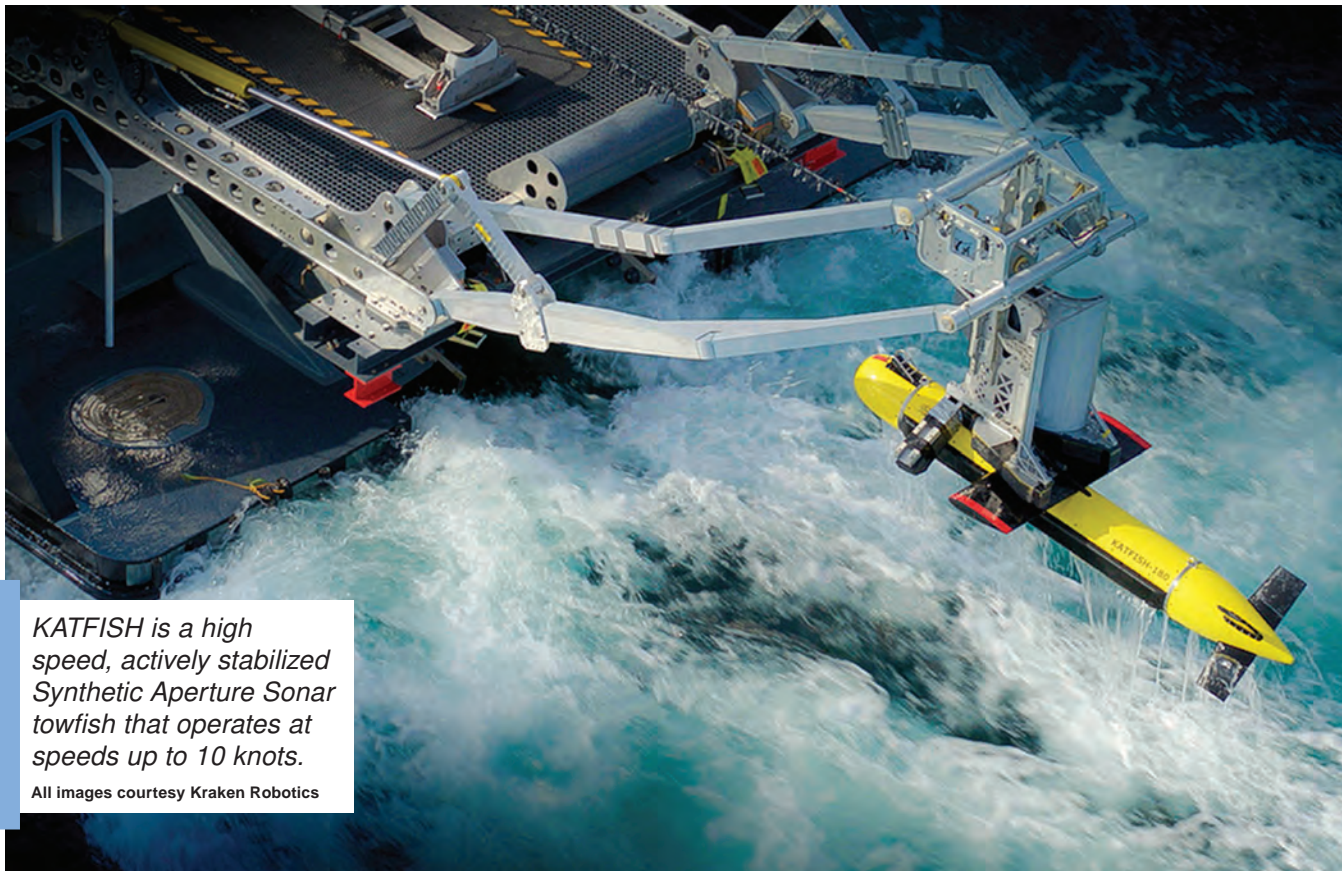
a robotics as a service (RaaS) business for the past few years, which helps to support the commercial business. Take for example offshore wind, where they may not be looking to acquire a bunch of equipment, and they may not be looking to manage the life cycle of that equipment. They simply have a job that needs to be done – a pipeline to be surveyed or a cable route where they need data. We can go in, get and deliver the data, and get out.



IMAGING: “The synthetic aperture sonar, which is our core technology, is focused on higher quality, higher resolution, longer ranges, but also achieving a lower cost.”

Meet the CTO

David Shea, Kraken Robotics



KATFISH is a high speed, actively stabilized Synthetic Aperture Sonar towfish that operates at speeds up to 10 knots.

All images courtesy Kraken Robotics

What are the prevailing trends and technologies that you see today driving your business in the future?

Continued improvement on size, weight and power (SWAP) is one of the big drivers across the industry, and it's been that way for a long time. We're seeing underwater vehicles both getting much bigger in terms of XL vehicle programs, which require more batteries and more power. We also see vehicles getting much smaller, lower cost platforms.

On the sensing side the synthetic aperture sonar is our core technology, focused on higher quality, higher resolution, longer ranges, but also on achieving a lower cost.

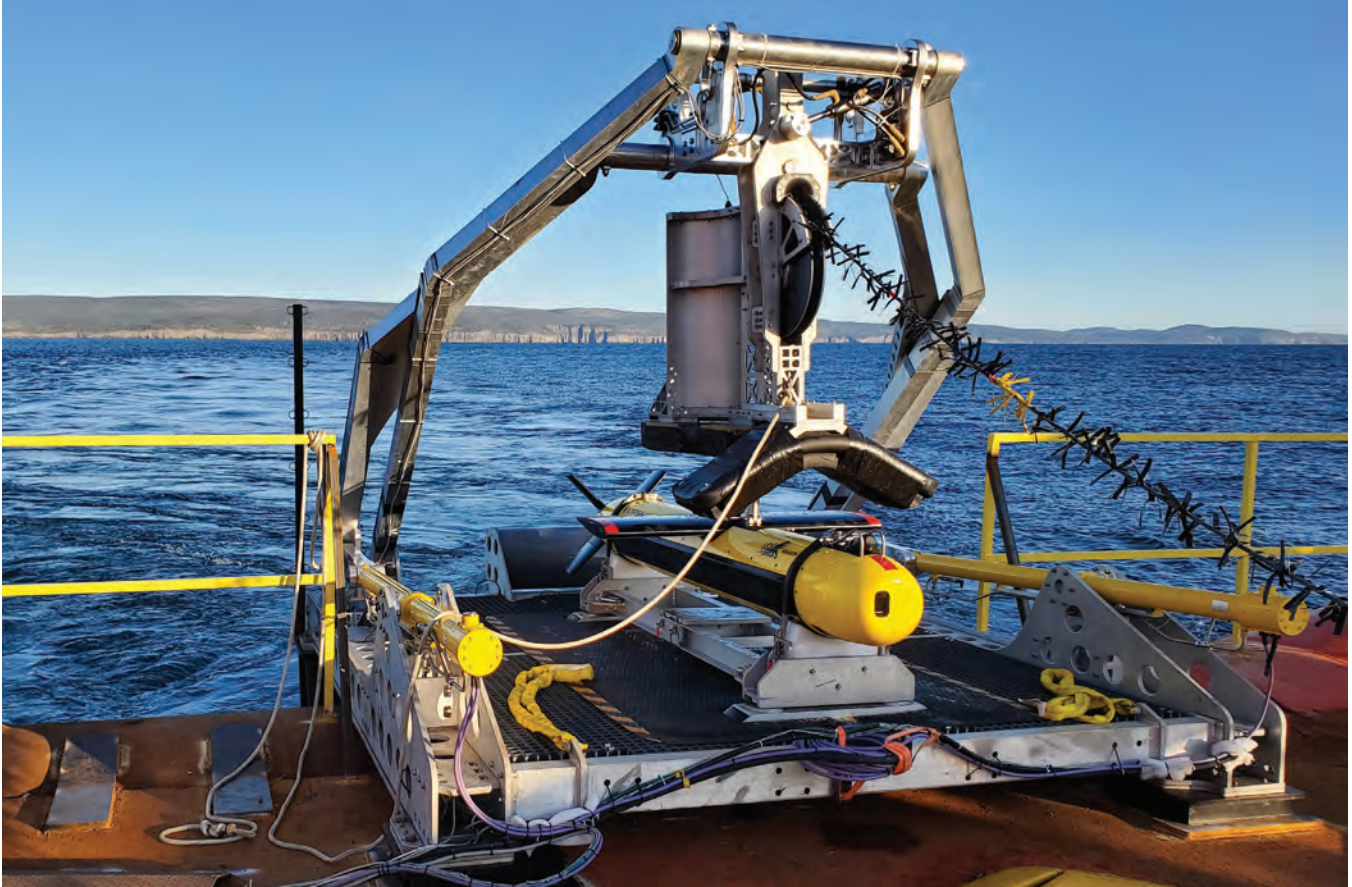
Our target has always been to compete against existing legacy technologies and educating customers about the benefits of the technology, showing them that synthetic aperture is not just reserved for very expensive, exotic military applications. It's an affordable tool to give you a higher area of coverage at a lower cost.

And of course, there's artificial intelligence (AI). Not

just getting better data, not just getting more data, not just running systems for longer, but what do you do with all that data? How do you process it? How do you perceive it? Things like automated target recognition, being able to comb through a large volume of data and automatically pick out objects of interest, but also improving quality control, automated quality metrics, allowing the robots themselves that we put in the water to make decisions.

Can you discuss one recent or ongoing project that you believe highlights the capabilities of Kraken Robotics?

We wrapped up a survey for a defense customer in Australia, where we were using our technology, our vehicles, and our personnel, operating those systems as a service; not to replace what that defense customer was doing, but to augment those capabilities. We were doing port and harbor security, doing route survey, using this technology to provide critical information in a timely manner, and showing them that you don't have to go through a long complicated



acquisition process and train up all your sailors.

The customer actually owns some of our technology already, but that technology was deployed in another mission and they asked for help. We operated for about six months around the clock, non-stop collecting data, and passing that off to the customer on regular intervals. Once the job was done, we packed up all our kit, shipped it back up to our main facility in Canada, where we clean and polish it, and get it ready for the next mission.

When you look at the region where you live and work – the Newfoundland & Labrador Cluster – what do you count as the leading benefits?

One of the things that everybody talks about when they travel to Newfoundland and Labrador, and when they travel to the east coast of Canada, is the people. The connections that people build, the relationships that they have. They talk about how friendly the locals are, how warm and welcoming they are, that sense of community. From a technology perspective and a tech industry perspective, we have a similar value. It's truly the people behind the companies, the people behind the technologies, the people behind the products, and that capacity for collaboration that we have, especially on the East coast where we

have one of the harshest environments in the world, being the Atlantic Ocean.

Canada is a country surrounded by three oceans. We have the longest coastline in the world, and yet we have this concentration of technology happening out here on this rock in the middle of the North Atlantic. Part of that is because the people are resilient and innovative, willing to try and solve some of these difficult problems. Partly it's because we have this fantastic testing environment where if you can make something work in the North Atlantic off of Newfoundland, you can make it work anywhere.





Watch the full, uncut video interview with David Shea on Marine Technology TV:



TECHNOLOGY TIME



Collaboration at the Co.
Innovation Centre.

© JAC Marketing Agency

In the market for innovative maritime, offshore and subsea technology? If so, it's a good bet that your colleagues in Newfoundland and Labrador already have it ... or will create it!

By Celia Konowe

Newfoundland and Labrador (NL), Canada's easternmost province, is a hub of maritime activity, befitting its 29,000 km (about 18,000 mi) of coastline and rich history of seafaring and fishing. Your reporter, MTR's Halifax bureau chief, made the quick trip to St. John's, NL's capital, to explore the diversity and innovation of maritime companies that call the province home. techNL is a not-for-profit membership association that enables a thriving innovation-driven economy in NL, providing visibility, business growth services and a collective influential voice. The maritime sector offers immense potential for technological

advancement and innovation, supported by the Marine Institute, Canada's Ocean Supercluster, Genesis, Launch and more recently, Co. Innovation Centre, said CEO Florian Villaumé. "What excites me most," he noted, "is the collective drive within this ecosystem to foster collaboration and accelerate technological development." He sees the future of the sector being influenced by climate change and AI, with techNL playing an important role to integrate innovations.

SubC Imaging specializes in creating modular, scalable and adaptable underwater optical im-



A SubC Imaging technician prepares a Tow Camera System for sea trials, ensuring it can withstand the harsh marine environment.

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The latest software from SubC Imaging enables live, real-time data transfer and automatically embeds footage with EXIF data.

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aging systems for precise and efficient inspections and surveys, even in the most challenging environments—some of which are right at its doorstep. “This region’s rich maritime heritage and proximity to some of the world’s harshest and most complex marine environments drive us to innovate,” explained Chad Collett, cofounder and CEO. “Being here means we’re constantly inspired and challenged by the conditions that our technology is designed to thrive in, and it’s incredibly rewarding to see our solutions making a real impact globally, all while staying rooted in the community that shaped us.” This environment becomes even more important, Collett added, as the industry shifts towards durable, efficient and data-driven operations, as well as increased collaboration within NL and beyond.

Nditive3D specializes in real-time gas detection and predictive analysis using an AI-powered monitoring system and patent-pending sensor technology. Ideal for high-risk industrial environments, Nditive3D serves chemical plants, manufacturing facilities, offshore energy, the mining industry and marine transportation.

Kraken Robotics provides complex subsea sensors, batteries and robotic systems, with a focus on seabed intelligence. The company is driven not only by NL’s dynamic and unpredictable weather—“As we often say, ‘If you can make it work here, you can make it work anywhere,’” said David Shea, executive vice president and chief



Kraken KATFISH towed synthetic aperture sonar system and autonomous launch and recovery system.

© Kraken Robotics

technology officer—but also by the culture of innovation and resiliency amongst the people. The future, he added, is defined by fostering and growing innovative capabilities: “The maritime sector in NL needs to be focused not just on what we can consume domestically, but what can be exported to customers across the globe, to leverage and sustain our oceans.”

Technology Talk

New Products & Systems



NavSim's ARGUS Portable Pilot Unit (PPU) software system.

© NavSim Technology Inc.



Virtual Marine Fast Response Boat Simulator.

© Phil St. Aubin

NavSim Technology is an electronics company that offers an advanced suite of portable navigation systems and services to marine piloting and other specialized commercial and government clients. NavSim is focused on the future as the industry moves towards integration into cloud, quasi-cloud, and network-based interconnectivity, said James E. Locke, vice president of marketing and finance. Locke takes personal pride in the growth of NL's maritime industry to meet industry and government goals: "The successes in marine technology that has occurred here in the province underscores dramatically that the larger marine centers and regions around the world have no monopoly on vision, innovation or excellence."

Virtual Marine specializes in maritime training simulators for lifeboats, fast-response craft and ice management, offering hands-on and realistic training. The harsh environment of the North Atlantic builds the confidence and competence of seafarers, explained President and CEO Randy Billard. Partnering with the National Research Council of Canada and Memorial University of Newfoundland builds expertise for multiple markets, including defense, oil and gas, as well as shipping. Looking ahead, Billard foresees an increasingly digital world requiring technology access anytime, anywhere. "Maritime businesses will have to formulate solutions that can be accessed remotely while still providing high value," he said. Virtual Marine appears well poised to meet these demands through its implementation of artificial

intelligence and machine learning.

BioLabMate targets plastic pollution, utilizing seaweed-derived materials to create sustainable labware, which are typically derived from petroleum and quickly disposed of after one use. Being based in NL, cofounder and CTO Sanjay Dubey and cofounder and CEO Sarika Kumari explained, allows the company to draw inspiration from the region's connection to the ocean. "The proximity to abundant natural resources, particularly seaweed, is a unique advantage," they added. Additionally, as the global focus shifts towards minimizing environmental impact, it's crucial for companies to explore and integrate sustainable solutions and practices.

eDNAtec leads in environmental genomics, providing standardized environmental DNA (eDNA) solutions that empower stewardship across marine, terrestrial and offshore ecosystems. The company should be well poised as the maritime industry moves towards sustainability, explained CEO Steve Barrett, who expressed pride in eDNAtec's locally made solutions. "This environment is not just where we work; it's where we innovate," he shared. "Our customers demand robust, reliable solutions that can withstand the toughest conditions, and NL provides the perfect proving ground to refine and harden our technology."

Duxion Motors Inc. is an advanced motor design and manufacturing company offering an integrated



Local seaweed and its bioplastic potential.

© Econext



eDNAtec team members working in the lab.

© eDNAtec

motor/generator with split gearbox for maritime vessels that saves fuel, increases generator capacity and horsepower, has rapid dockside installation, and provides backup propulsion. The patent-pending design clamps onto a ship's existing propeller shaft, allowing for quick conversion from diesel to hybrid electric.

eSonar Inc. improves access to subsea environmental data with sonar and underwater acoustics knowledge, including an Extended Development Team service that helps companies develop subsea technology, continuous marine vessel noise measurement capabilities, and an Autonomous Underwater Vehicle (AUV) perception sensor. At home, "NL-based companies get great exposure to commercial marine activities like offshore oil and gas support, cargo shipping, ice breaking, fishing (inshore and high seas)," said CTO Gary J. Dinn. "We have access to many world-class research facilities," he added. As with many other NL companies, eSonar Inc. looks to further integrate into international supply chains.

From monitoring and navigation to electrification and bio-solutions, Newfoundland and Labrador companies are well-versed in emerging maritime technology challenges. The future of the industry, as many executives noted, will be driven by sustainability, innovation and collaboration. With that prediction and with businesses poised to meet evolving demands, all eyes should look to Canada's north and east.



eSonar staff Matt Dinn and Cory Parsons preparing a hydrophone array mooring prior to deployment onboard the RV Lucy Pudluk at "The Launch" facility of Marine Institute (Memorial University).

© Gary J. Dinn

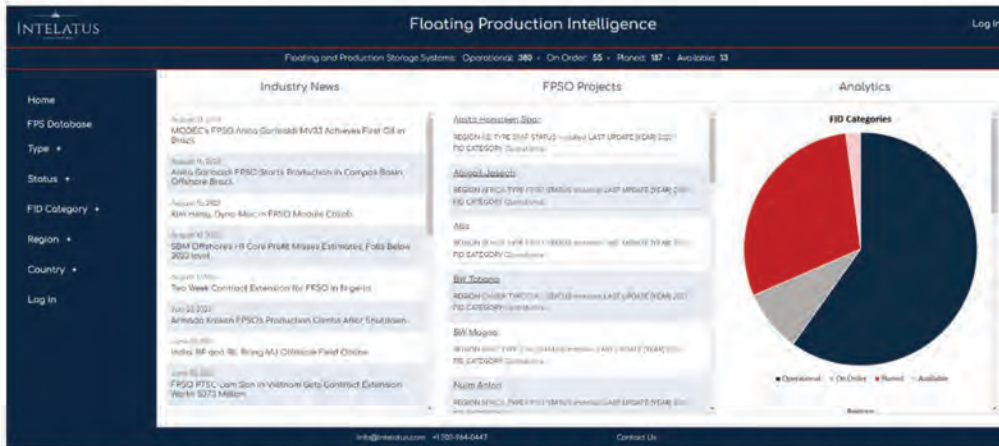


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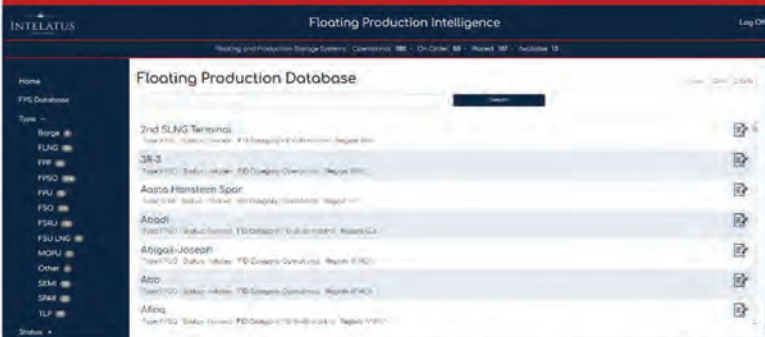


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