



# DESIGNING A CLOUD COMPUTING DATA ACQUISITION SYSTEM FOR THE MARITIME SECTOR

**CANADIAN CONSULTING  
ENGINEERING AWARDS 2021**

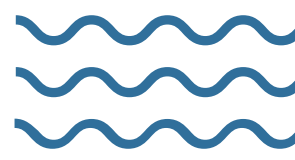


CANADIAN CONSULTING  
**engineer**



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A FLEXIBLE, SIMPLE  
AND INEXPENSIVE SOLUTION  
BASED ON CLOUD TECHNOLOGY.

## INNOVATION

**Based in Québec City, Marentrack offers a range of energy efficiency services for the maritime sector. The company called BBA to design a data acquisition device to meet the specific needs of fishing vessels.**

### MODERNIZING PRACTICES

The use of data acquisition systems in an industrial setting is not new. However, developing such a system for the fishing industry, a traditional sector where operational technologies are not widely used, is a first. And yet, data acquisition and analysis offer many benefits for this industry, particularly in terms of fuel management, an important profitability component.

### A CUSTOM SOLUTION

Although similar data acquisition applications exist on the market in sectors such as mining and transportation, Marentrack wanted to offer its clients in the fisheries sector a solution that was both affordable and capable of meeting their needs in terms of instrumentation, work methods and performance criteria.

### COMBINING EFFICIENCY AND SAVINGS

And that's where BBA's expertise made all the difference: rather than buying an expensive and poorly suited market solution, our experts used "open source" tools to build a customized cloud infrastructure for the platform. Environment, profitability, efficiency and safety: the solution addresses all the client's performance

objectives, but at a fraction of the cost of systems available on the market.

### NAVIGATING THE CLOUD

The comprehensive solution includes dashboards, an Internet of Things (IoT) platform, an equipment management platform, a data acquisition system and an alarm management system. During sea trips, the data is buffered and stored on the vessel throughout the journey. When the vessel returns to the dock, the data is transmitted over the cellular network and stored in the cloud infrastructure, where it can be accessed and analyzed in depth.

// The experts at BBA perfectly understood our needs and were very resourceful in meeting them. They developed a user-friendly tool for raising awareness of best practices among fishing vessel owners."

- Gaétan Simard, President and founder of Marentrack

## COMPLEXITY

### ON THE WATER AND IN THE CLOUD

The challenge was to design a system to continuously monitor vessel performance indicators throughout their journey and to buffer data locally when the vessels lose communication with the cloud. Because Marentrack had no IT infrastructure, BBA's experts used cloud computing to create a rugged and flexible system. They designed a platform to receive data from unconventional equipment, analyze it based on specific criteria, and present it on web-based dashboards.

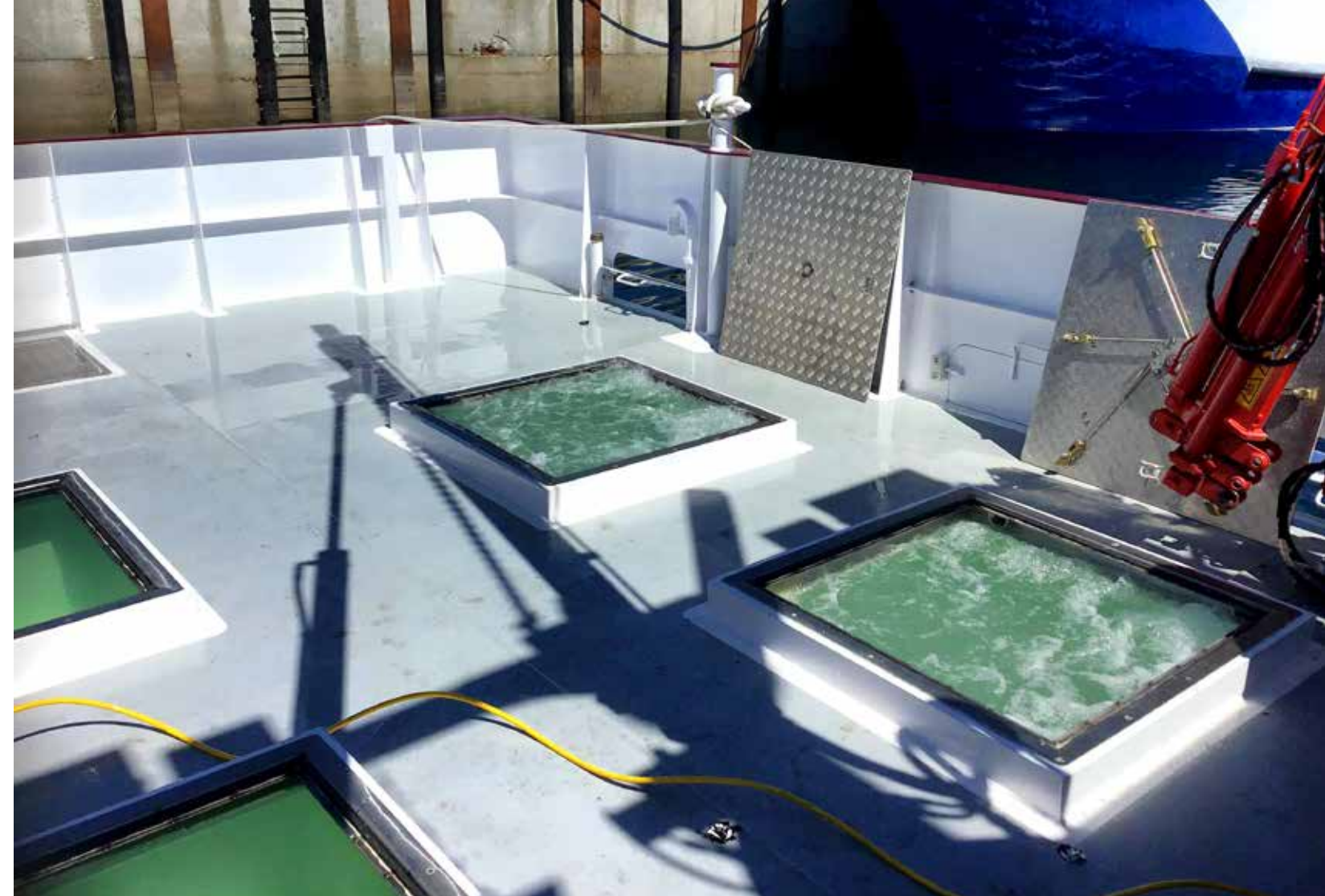
### INTEGRATING DATA FROM VARIOUS SOURCES

While taking budget constraints into account, BBA succeeded in designing a system that could convert the various types of marine data and the NMEA 2000 protocol as well as analogue values so the different types of data could communicate with one another. The experts made sure to develop a rigorous cybersecurity protocol with an SSL certificate and end-to-end encryption. It should be noted that the platform supports the acquisition and instrumentation of measurements from various sources: weather stations, airflow transmitters, power, water sensors in the holds, temperatures and others.

### A SCALABLE SYSTEM

Even better, the system is designed to evolve with client needs. There are many options available to the client:

- Temperatures (water, oils, live wells, machines, systems)
- Motor (RPM, load)
- Fuel consumption
- Weather conditions (wind, atmospheric pressure, temperature, humidity)
- Navigation (position, speed, trim)
- Electricity (generator, batteries)



## SOCIAL AND ECONOMIC BENEFITS

### TANGIBLE SAVINGS

Crew and vessel behaviours can be better understood and continuously improved through data acquisition and analysis. Since fuel costs are a major expense for fishing vessel operators, the solution could create significant savings and help reduce fuel costs by up to 15%. In addition to improving the economic performance of fishing activities, the data collected informs fishers of their practices and could be used in training programs for marine personnel.

### PROTECTING CARGO BETTER

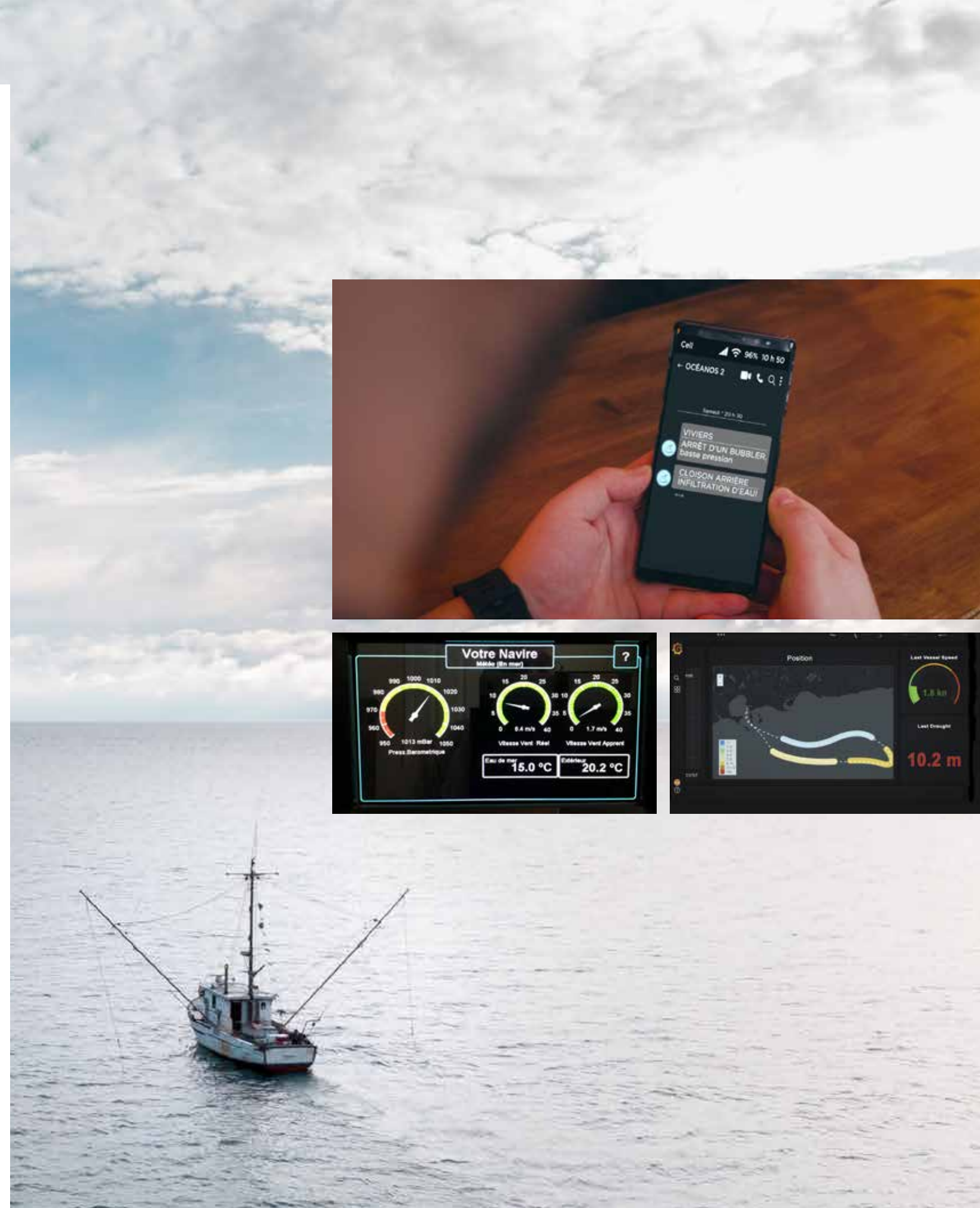
The data control system protects vessel contents and maintains the cold chain, which is important when you consider that a shipment of crab can be worth as much as \$200,000. If a vessel is docked and there is no one on board, the system sends a text message notification to the captain about any problems such as loss of power, flooding or fire.

### PREVENTIVE MAINTENANCE

Every year, dozens of rescues at sea are made when ships encounter mechanical problems. Keeping a history of mechanical data helps detect equipment deterioration before there are any failures and allows targeted maintenance, thereby increasing personnel safety and reducing repair costs.

# 15 %

POTENTIAL REDUCTION  
IN THE FUEL BILL  
THANKS TO NAVIGATION  
DATA ANALYSIS



## ENVIRONMENTAL BENEFITS

### KNOWLEDGE IS POWER

They say you only improve what you measure. And that's the objective of this innovative project, which helps analyze navigation data and target behaviours leading to fuel overconsumption. By becoming aware of their behaviour, the crew can adopt more environmentally responsible practices and reduce vessel GHG emissions.

### SMART NAVIGATION

The data analysis revealed that, in general, fishers who go to their fishing site to put their traps in the water navigate at a speed that is too high for vessel architecture, owing to hull resistance. After a certain threshold, the speed peaks and the vessel consumes fuel unnecessarily. Sitting at the dock with the engines running for no good reason is another source of GHG emissions.

### REVEALING DATA

After the data has been analyzed, the information is communicated to the captain through an easy-to-understand visual dashboard with trend graphs. Captains can quickly see the impact of their behaviour on the environment and adopt more environmentally responsible practices.

### OPTIMIZING THE GLIDE

The instrumentation is used to collect data about the impact of the vessel's trim, a maritime term that refers to its inclination. A vessel that tilts forward or backward glides less easily and consumes more fuel. With the data collected, the crew can better distribute the weight of the cargo to ensure an optimal vessel inclination and reduce its environmental footprint.

## MEETING CLIENT NEEDS

### A COMPELLING MAIDEN VOYAGE

On May 30, 2020, the system was tested on the maiden voyage of a fishing vessel that left from Newport (Gaspésie) and travelled to Natashquan on Québec's North Shore. Throughout the journey, the data acquisition system fully lived up to its promise and transmitted 24,000 messages containing 40 telemetry tags; that's nearly one million data points that were later analyzed.

### AN INNOVATIVE SOLUTION FOCUSED ON CONTINUOUS IMPROVEMENT

In BBA, Marentrack has found a partner capable of offering an innovative and low-cost solution for improving energy efficiency while adapting to the constraints of the maritime sector. The cloud computing solution the firm provided will help fishers significantly reduce their environmental footprint, lead to significant savings on fuel and promote continuous improvement in their practices. The client was thrilled with the many possibilities the system offers for data collection and analysis.

### FOCUS ON SUSTAINABLE DEVELOPMENT

BBA, which has eco-mindfulness as one of its corporate values, is proud to have contributed to this project that concretely supports sustainable development and reduces the environmental footprint of the fishing industry.

"This mandate clearly demonstrated that it's possible to design low-cost data acquisition, processing and analysis systems for any market."

- Harlem Ahua, P.Eng., Project Manager, BBA

# 6 TONNES

ESTIMATED GHG REDUCTION  
PER FISHING VESSEL



## ABOUT BBA

### BROADER THINKING. ON-POINT ENGINEERING.

**BBA** has been providing a wide range of consulting engineering services for over 40 years. Engineering, environment and commissioning experts team up to quickly and accurately pinpoint the needs of industrial and institutional clients. Recognized for its innovative, sustainable and reliable solutions, the firm stands out for its expertise in the fields of energy, mining and metals, biofuels, and oil and gas. BBA has 12 offices across Canada to provide local support and offer clients increased onsite presence.



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