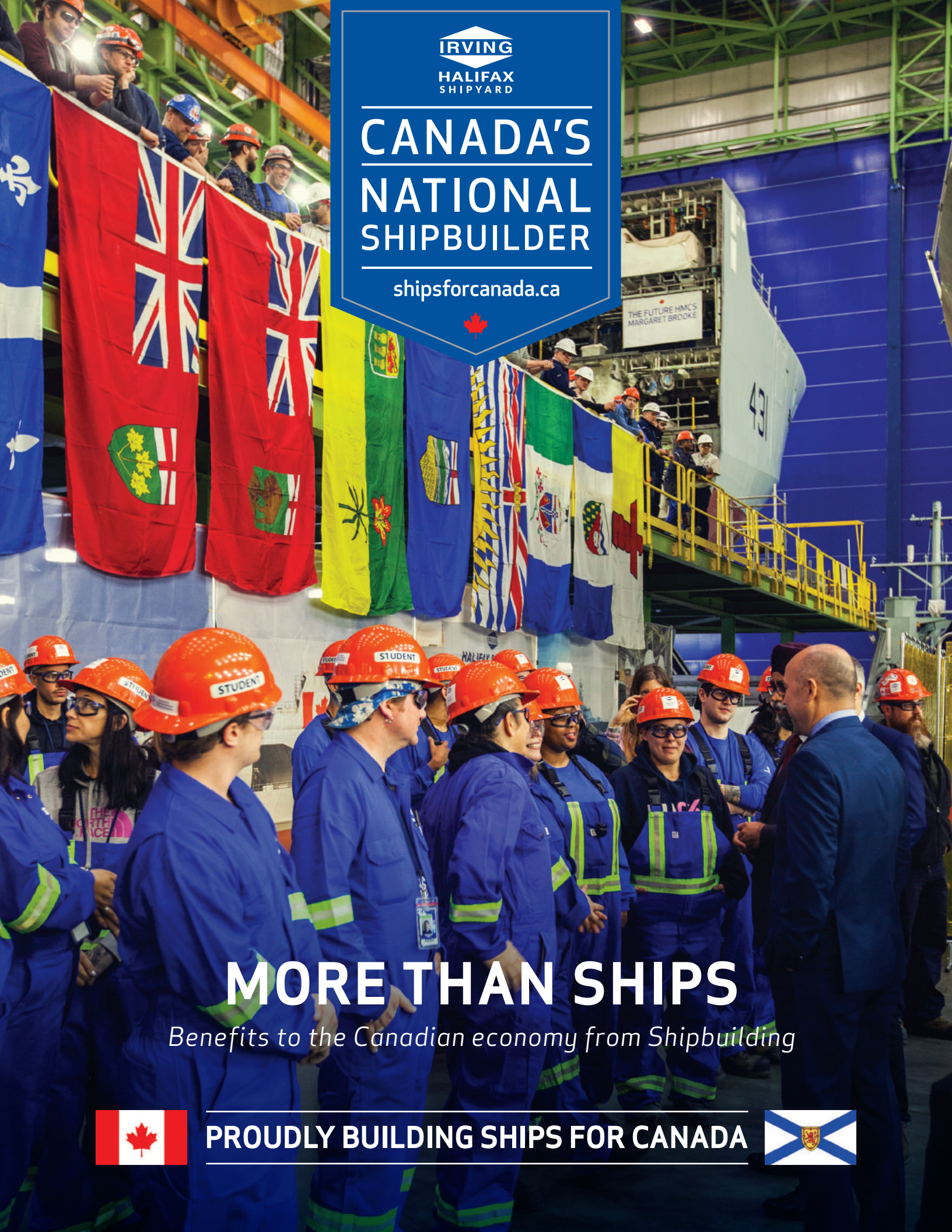
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THE FUTURE HMCS
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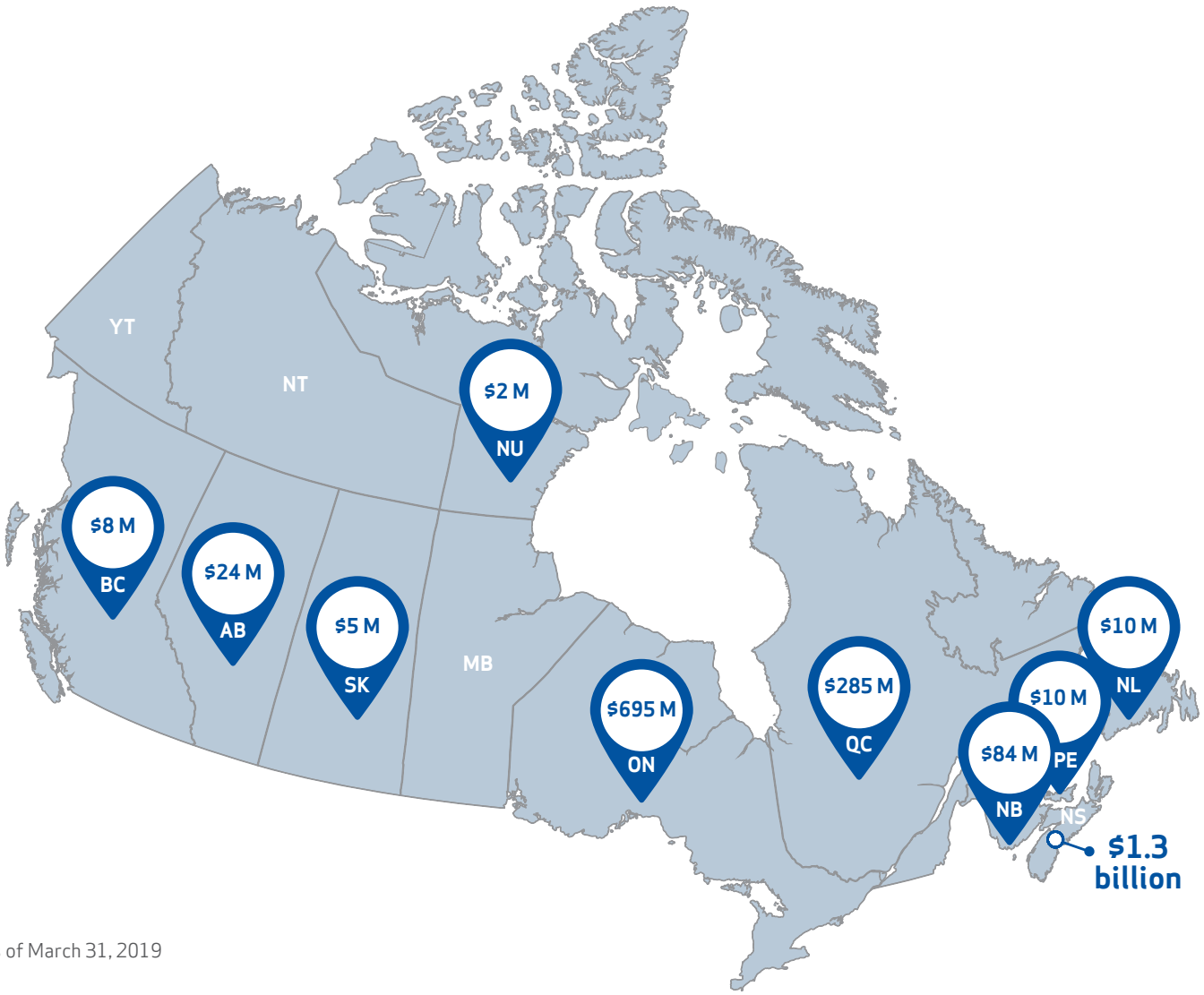
43
STUDENT
MORE THAN SHIPS
Benefits to the Canadian economy from Shipbuilding
PROUDLY BUILDING SHIPS FOR CANADA

# Over $2.5 billion in spending commitments with more than 300 organizations across Canada




As of March 31, 2019

AOPS construction and Halifax Shipyard facility modernization will generate $3.26 billion in economic activity between 2013 and 2024.

Source: Conference Board of Canada, Economic Impact of Canada's Arctic and Offshore Patrol Ship Program.
Based on construction of six AOPS at Halifax Shipyard.

# Maximizing Canadian content and benefits

Irving Shipbuilding is committed to maximizing Canadian content and economic benefits through our construction of the Royal Canadian Navy's Arctic and Offshore Patrol Ships (AOPS). There are three main ways that Canada's economy benefits:

**I. Direct Industrial and Technological Benefits (ITBs):** Work that a Canadian supplier does with us directly related to the AOPS program. Our AOPS contract requires us to achieve at least 50% of Canadian Content Value (CCV) in direct work, recognizing in some instances, we must procure material for the ships internationally.

**II. Indirect Industrial and Technological Benefits (ITBs):** Offsetting any work performed outside of Canada by making investments in Canada to ensure that 100% of the value of the AOPS contract is spent here at home. Indirect ITB transactions create opportunities for all Canadian industries to benefit from defence procurement, help to grow our overall economy and make Canada more innovative.

**III. Value Proposition:** These are investments focused in the areas of workforce development, technology, and commercialization to strengthen Canada's greater marine industry.

The following pages provide an overview of some of our Direct, Indirect and Value Proposition commitments. For more information on our work maximizing CCV visit, www.ShipsforCanada.ca.

Increase in employment by an average of 3,871 jobs per year over the core AOPS build phase (2017-2021).*

Source: Conference Board of Canada, Economic Impact of Canada's Arctic and Offshore Patrol Ship Program. Based on construction of six AOPS at Halifax Shipyard.

*Includes direct, indirect and induced jobs.



IRVING HALIFAX SHIPYARD

# I. Direct Industrial and Technological Benefits

Any work a Canadian supplier does with Irving Shipbuilding and major subcontractors directly related to the AOPS program is a Direct Industrial and Technological Benefit.


## **MODEST TREE** | NOVA SCOTIA

Nova Scotia-based simulation and training software developer, Modest Tree, has been selected to develop a virtual reality training solution for the engines onboard AOPS. The virtual reality training solution, the first of its kind in the marine sector, will train the men and women of the Royal Canadian Navy to operate and maintain the ship's engines. Modest Tree is a small business and this is the largest contract they have received to date.


## **L3 MAPPS** | QUEBEC

Irving Shipbuilding contracted Quebec-based L3 MAPPS to provide the Integrated Platform Management System (IPMS) for each AOPS. The L3 MAPPS IPMS provides comprehensive monitoring and control of the ship's propulsion, electrical, ancillary, auxiliary, and damage control machinery systems. With advanced functionality, such as the Battle Damage Control System, Onboard Team Training System, Equipment Health Monitoring System, and CCTV, as well as integration with the ship's combat management and navigation systems, the IPMS allows the crew to safely and effectively operate the ship for all mission requirements.

## Employment forecast to peak in 2019 with 4,000 jobs across Canada.

Source: Conference Board of Canada, Economic Impact of Canada's Arctic and Offshore Patrol Ship Program.
Based on construction of six AOPS at Halifax Shipyard.

### **ABCO INDUSTRIES** | NOVA SCOTIA

Nova Scotia-based ABCO Industries Limited was awarded a $8.9 million contract for the design and construction of one 12 metre landing craft for each AOPS.

### **BRONSWERK GROUP** | QUEBEC

Quebec's Bronswerk Group was awarded a $50 million contract to provide heating, ventilation, air conditioning, and refrigeration systems for AOPS.


### **B3CG INTERCONNECT** | QUEBEC

B3CG Interconnect, located just outside of Montréal, in St-Eustache, specializes in cable assembly and electrical systems integration. Through a contract with L3 MAPPS, B3CG will produce 14 Remote Terminal Units (RTU) for each AOPS. The RTUs are assembled and wired by B3CG, then delivered to L3 MAPPS for testing and integration with the rest of the Integrated Platform Management System equipment.



IRVING HALIFAX SHIPYARD

## **OSI MARINE SYSTEMS** | BRITISH COLUMBIA

Headquartered in Burnaby, BC, OSI Marine Systems is providing integrated navigation and bridge subsystems for each AOPS. OSI is the only Canadian company that produces this high-tech navigation system.

## **TOOLCOMM** | BRITISH COLUMBIA

Toolcomm will provide specialized VoIP (Voice over Internet Protocol) and high frequency radios for the AOPS. Based in North Vancouver, with facilities on the Capilano First Nations Reserve, Toolcomm is a 100% Aboriginal-owned business.

## **ROSBOROUGH BOATS** | NOVA SCOTIA

Third-generation Nova Scotian boat builder Rosborough Boats will provide Rough Water™ 8.5 metre Rigid Hull Inflatable Boats (RHIB) for each AOPS. When deployed, the RHIBs primary roles will be as a fast rescue boat, for marshalling and towing lifeboats and deploying and supporting the Royal Canadian Navy's Enhanced Naval Boarding Party.

# II. Indirect Industrial and Technological Benefits

In some instances, Irving Shipbuilding and major subcontractors must procure material for AOPS internationally. For example, large marine engines are not manufactured in Canada. Any work performed outside of the country is offset by making investments in Canada to ensure that 100% of the value of the AOPS contract is spent right here at home. These are called Indirect Industrial and Technological Benefits.

**NANOWAVE** | ONTARIO

In a state-of-the art manufacturing facility outside of Toronto, Nanowave Technologies' team of over 200 engineers, scientists, and technicians working on innovative solutions for some of the world's top defence and aerospace platforms, including Terma, Denmark's largest defence and aerospace manufacturer. Terma is providing a radar system to Lockheed Martin Canada for AOPS. To offset Terma's work in Denmark, Nanowave was selected as a research and development partner for Terma, who have historically done all innovation work in-house.

For every $1 billion spent on shipbuilding inside Canada, an additional $0.8 billion to $1.3 billion in economic benefits are realized in the Canadian economy.

Source: PwC: Value for Canada – National Shipbuilding Strategy.

All three levels of government will benefit as the lift to economic activity boosts tax revenue by $927 million.

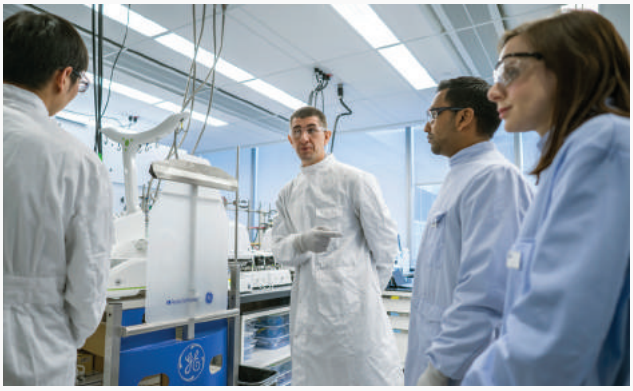
Source: Conference Board of Canada, Economic Impact of Canada's Arctic and Offshore Patrol Ship Program.
Based on construction of six AOPS at Halifax Shipyard.


## **IRCO AUTOMATION** | ONTARIO

IRCO Automation, a small Ontario-based business, has been selected by BAE Systems to design, fabricate, and install a complete line of mechanized welding and positioning systems to help make submarine missile tubes for the United States Navy's Virginia class submarines. This contract is a result of Irving Shipbuilding selecting BAE Systems to supply the gun system for each AOPS.

## **CENTRE FOR ADVANCED THERAPEUTIC CELL TECHNOLOGIES** | ONTARIO

GE Canada has invested $20 million through GE Healthcare Canada in the Centre for Advanced Therapeutic Cell Technologies (CATCT), accelerating the development of cell manufacturing technologies to improve regenerative medicine-based therapies. The investment is to offset General Electric procuring the engines for AOPS outside of Canada.



The Canadian Press Images/J.P. Moczulsk

It is 29%–42% less costly for Canada to build ships in Canada rather than Europe after taking into account tax revenue.

Source: PwC: Value for Canada – National Shipbuilding Strategy

# Irving Shipbuilding Centre of Excellence

## In 2014, Irving Shipbuilding committed $250,000 per year for the duration of the National Shipbuilding Strategy to the Nova Scotia Community College (NSCC) to create the Irving Shipbuilding Centre of Excellence.

*The Centre's mandate is to provide pathways and equitable access to opportunities, programs, and training for Nova Scotians, particularly from under-represented communities, to effectively work in the shipbuilding industry.*

PATHWAYS TO SHIPBUILDING AFRICAN NOVA SCOTIAN STUDENTS

PATHWAYS TO SHIPBUILDING INDIGENOUS GRADUATES

PATHWAYS TO SHIPBUILDING WOMEN UNLIMITED STUDENTS

### PATHWAYS TO SHIPBUILDING

In partnership with NSCC, industry organizations, and community partners, the Pathways to Shipbuilding program has supported four classes of 20 students from under-represented groups in shipbuilding as they study trades at NSCC with the goal of working at Halifax Shipyard. Two classes of women, one of Indigenous students, and one of African Nova Scotians are in various stages of their careers—from studying at NSCC, to working at Halifax Shipyard as apprentices or certified Red Seal shipbuilders.

## SHIPBUILDING SUMMER CAMPS

The Irving Shipbuilding Centre of Excellence supports week-long shipbuilding summer camps with SuperNOVA, a not-for-profit initiative of Dalhousie University that provides youth in Atlantic Canada with fun, educational, and inspiring experiences in science, engineering, technology and mathematics (STEM). Camps are free of charge and have been held on First Nations reserves and in low-income areas throughout Nova Scotia. A shipbuilding activity is included in all of SuperNOVA's camps and over 2,500 kids have participated since 2015.

## MARINE PROGRAM BURSARIES

Twenty-four deserving students at NSCC have received Irving Shipbuilding Centre of Excellence bursaries since 2015. The renewable bursaries cover the full cost of tuition for students entering shipbuilding related programs like welding, metal fabrication, or pipe-fitting at NSCC.

## TECHSPLORATION

Techsploration provides young women from grades nine through twelve opportunities to explore science, trades, and technology occupations. The Irving Shipbuilding Centre of Excellence has supported teams from five junior high schools in rural Nova Scotia to participate in Techsploration Goes to School for the past four years. Students are partnered with a woman in a STEM career to visit her workplace and learn about job opportunities.

# III. Value Proposition

Irving Shipbuilding has committed to invest 0.5% of contract revenues under the National Shipbuilding Strategy Value Proposition to strengthen the greater marine industry in Canada. These investments will focus in the areas of workforce development, technology, and commercialization.  As of 2019, over $12.5 million dollars has been committed to recipients across Canada.


### **COVE** | NOVA SCOTIA

The Centre for Ocean Ventures and Entrepreneurship (COVE) is a collaborative facility for applied innovation in the ocean sector located on the waterfront in Dartmouth, Nova Scotia. Irving Shipbuilding's Value Proposition investment will provide $4.52 million over five years to support operations and programs at COVE and represents the largest private sector contribution COVE has received to date.

### COVE – SKILLS AND WORKFORCE INITIATIVE

Irving Shipbuilding has committed $950,000  to the Marine People Partnership's work at COVE over the past five years. Research and program development have focused on strengthening the current and future workforce in Canada's marine industry. Projects have included extensive surveys around the intentions and perceptions of students, ocean workshops for teachers, and the creation of an Ocean Toolkit of classroom activities available across the country.

## Real GDP will rise by $3.92 billion from 2013 to 2024.

Source: Conference Board of Canada, Economic Impact of Canada's Arctic and Offshore Patrol Ship Program. Based on construction of six AOPS at Halifax Shipyard.

### MARINE ADDITIVE MANUFACTURING CENTRE OF EXCELLENCE (MAMCE) | NEW BRUNSWICK

MAMCE is the first centre in Canada to combine research, commercialization, and workforce development related to the use of Additive Manufacturing, or 3-D printing, as a method for manufacturing certified parts for the marine industry. Irving Shipbuilding has committed $750,000 to the University of New Brunswick and Nova Scotia Community College through MAMCE for research and testing.

### ROYAL CANADIAN SEA CADET EDUCATION FOUNDATION

Irving Shipbuilding has committed $100,000 to the Royal Canadian Sea Cadet Education Foundation to support entrance scholarships for Canada's Sea Cadets entering programs at colleges and universities across Canada related to the marine industry.

### DEEPSENSE | NOVA SCOTIA

DeepSense is an ocean research partnership between industry, academia, and government that will enable Atlantic Canadian companies to commercialize research and lead the way in the development of big data analytics products and services. Irving Shipbuilding has committed $750,000 to DeepSense analytics projects.

## DALHOUSIE UNIVERSITY RESEARCH CHAIR
| NOVA SCOTIA

In 2017, Irving Shipbuilding committed $500,000 to establish the Irving Shipbuilding Chair in Marine Engineering and Autonomous Systems at Dalhousie University. Dr. Mae Seto currently holds the Chair position and is leading research in the areas of autonoumous under-water vehicles, navigation and communication, and search and rescue technology.

## ST. FX UNIVERSITY RESEARCH CHAIR
| NOVA SCOTIA

Irving Shipbuilding has provided $1 million in funding for two Research Chair positions at St. FX University. Dr. Adam Lajeunesse and Dr. Peter Kikkert are the Irving Shipbuilding Chairs in Arctic Policy as part of the Mulroney Institute of Government, studying national and international Arctic security and policy.

## MARINE MANUFACTURING INITIATIVE
| NOVA SCOTIA

To prepare the existing workforce for increased shipbuilding in Canada, Irving Shipbuilding committed $850,000 to the Nova Scotia Community College to develop training programs including online courses like Shipbuilding 101 and invest in equipment to train and upskill the trades workforce.

## **MEOPAR** | NEWFOUNDLAND AND LABRADOR, NOVA SCOTIA, PRINCE EDWARD ISLAND, ONTARIO, ALBERTA, BRITISH COLUMBIA

Irving Shipbuilding provided $1 million to The Marine Environmental Observation Prediction and Response (MEOPAR) network to help fund nine research projects across six Canadian universities focused on strengthening Canada's ability to anticipate marine risk. The selected projects were:

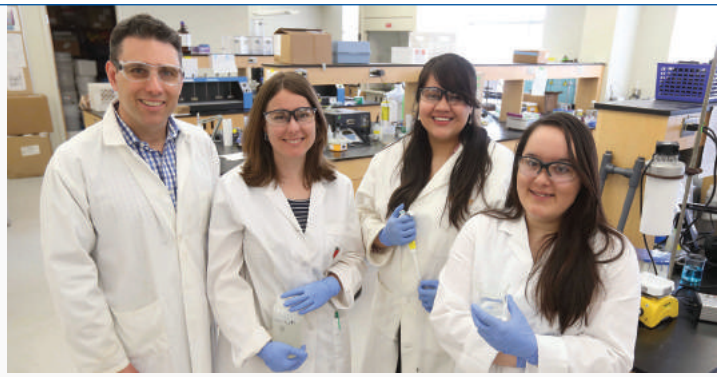
- Prioritizing Threat Management Strategies to Ensure Long-term Resilience of the Fraser River Estuary—Julia Baum, University of Victoria
- Assisting Fisheries Management by Integration of Data from Non-Specialized Assets, Ferries, Citizens & Satellites—Maycira Costa, University of Victoria
- Arctic Marine Activities Integration & Synthesis Project (AMAIS): Enhancing Ocean Governance Through the Northern Marine Transportation Corridors—Jackie Dawson, University of Ottawa
- Observing and Responding to Pressures on Arctic Marine Ecosystem Services—Brent Else, University of Calgary
- Testing New, Innovative & Affordable Technologies for Monitoring & Visualizing the Impacts of Sea Level Rise, Erosion & Storm Surges on Coast Environments—Adam Fenech, University of Prince Edward Island
- Ocean Observation using Microbial Genomics: A new Baseline tool for Environmental Effects Monitoring of Marine Pollution—Casey Hubert, University of Calgary
- Continuous Assessment of Plankton Abundance and Community Structure in Canadian Coastal Waters with a Novel, Flow-Through, High-Throughput Holographic Microscope Operated on Volunteer Observing Ships—Julie Laroche, Dalhousie University
- Monitoring Marine Plastics in Canada's North—Max Liboiron, Memorial University of Newfoundland
- Safer Shipping through Summer Sea Ice: New Synthetic Aperture Radar (SAR) Based Tools for Monitoring and Predicting Sea Ice Conditions—Randy Scharien, University of Victoria

For every $1 billion spent on building modern frigates in Canada about 8,000 person years of employment are created.

Source: PwC: Value for Canada – National Shipbuilding Strategy

## UNIVERSITY OF BRITISH COLUMBIA

The University of British Columbia has one of the few Naval Architecture programs in Canada. Irving Shipbuilding committed $180,000 to support internships for Naval Architecture Masters students to gain valuable work experience in the shipbuilding industry.



## NUNAVUT RESEARCH INSTITUTE | NUNAVUT, NEWFOUNDLAND AND LABRADOR, NOVA SCOTIA, PRINCE EDWARD ISLAND, ONTARIO, BRITISH COLUMBIA

Irving Shipbuilding is investing $2 million with the Nunavut Research Institute to fund eight applied Arctic research projects focused on Canada's Arctic communities and the marine industry. The projects receiving funding are:

- Enhancing Capacity for Arctic Oil Spill Response —Thomas Puestow, C-Core
- Improving and Monitoring Water Quality in Nunavut—Graham Gagnon, Dalhousie University
- Developing capacity for monitoring the effects of climate change and industry on Arctic Wildlife health—Susan Kutz and Sandie Black, University of Calgary
- Developing Governance Best Practices for Arctic Shipping—Jackie Dawson, University of Ottawa
- Improving Community Communication around Marine Environmental Assessments—Kevin Hanna, University of British Columbia
- Creating Resources for Safe Marine Travel in Nunavut—Sean Guistini and Helena Craymer, Nunavut Arctic College
- Establishing a Nunavut Weather Station Network to Support Safe Travel—Brent Else, University of Calgary
- Tracking Trends in Ringed Seal Health in a Changing World—Pierre-Yves Daoust, University of Prince Edward Island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