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A Global Value Chain Perspective

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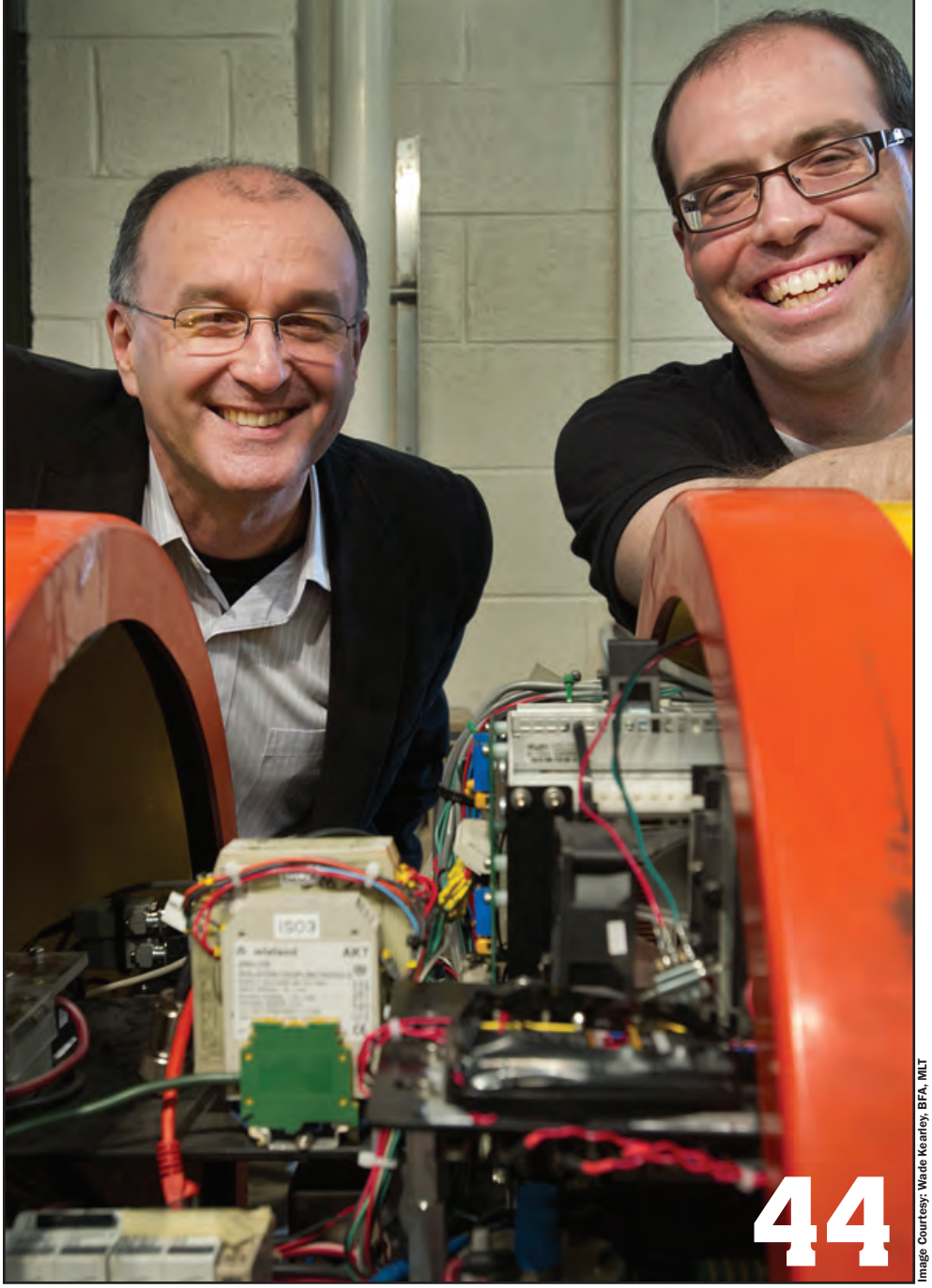

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ROVs: A Global Value Chain Perspective

By Lukas C. Brun

Introduction

The Duke University Center on Globalization, Governance and Competitiveness (CGGC) recently completed a study on three ocean technologies, including ROVs, for a consortium led by Nova Scotia's Department of Economic and Rural Development and Tourism (ERDT). Excerpts from the report on the ROV value chain, and Nova Scotia's position within the chain, are provided in this article.

The ROV Value Chain

The ROV value chain (Figure 1) consists of the supply chain and supporting organizations. The ROV supply chain contains raw material suppliers, component manufacturers, product manufacturers, distributors, and operation/sales. Supporting organizations for the ROV value chain include educational institutions, industry associations, publications and professional conferences. Details on each segment of the value chain are provided below.

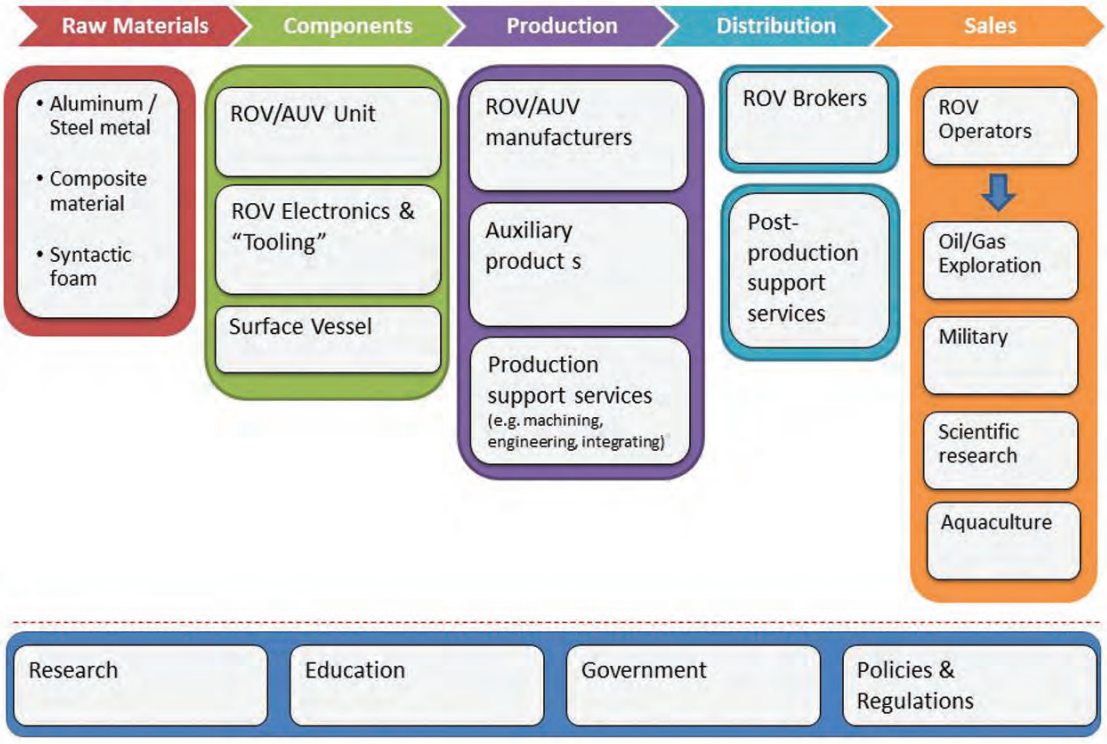
[See Figure 1: ROV Value Chain, below]

Production

The manufacturing portion of the ROV value chain consists of ROV manufacturers, auxiliary product suppliers, and production support services.

ROV manufacturers: Branded firms, like Saab Seaeye and iRobot, who design, manufacture, and sell their vehicles to end-users. ROV manufacturers typically manufacture products in-house, often in close association with members of scientific research networks and their customers to develop innovative products suitable to a variety of uses. The global production for ROV is concentrated in a very few countries. Leading ROV manufacturers are located in the U.S. and U.K.

Figure 1: ROV Value Chain



Source: Duke Center on Globalization, Governance and Competitiveness (CGGC)

producing 70% of all units sold.

[See Figure 2: ROV Production, by country, below]

ROV subcomponent and auxiliary product manufacturers: Subcomponent manufacturers produce the hardware and software components used in ROVs. Many of these companies are located in the USA and UK, but companies in Norway, France, and Germany also supply many components for ROVs.

Auxiliary product suppliers manufacture systems used to launch, control and recover the ROV. These include manufacturers of tethers, tether management systems, LARS, and control rooms needed to operate ROVs. Table 1 lists a few of the leading subcomponent and auxiliary product manufacturers for ROVs.

[See Table 1: Lead ROV component manufacturers, pg. 18]

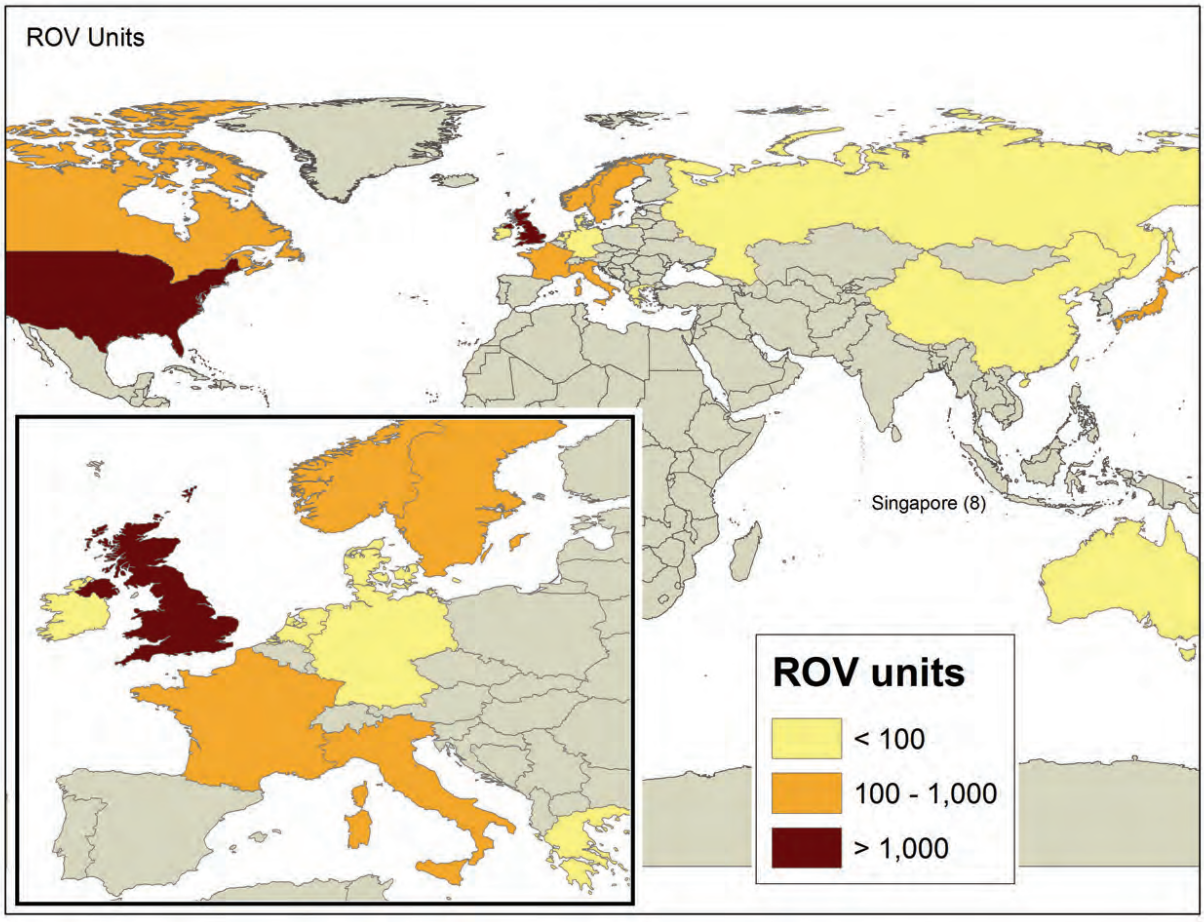
ROV production support service providers: Engineering services, machining services and integrators used on a contract or spot-transaction basis by the product manufacturer to solve specific product-line problems. According to interviews of product manufacturers conducted by CGGC, these services are high-value added activities because of the highly specific knowledge needed to integrate hardware and software into ROVs. The distribution of value among the production segments of the ROV value chain is approximately 40% in platform manufacturing and 60% in instrumentation manufacturing.

Distribution

ROV Brokers: ROV brokers and sales representatives are generally small companies in the local market with rights to distribute and sell ROVs. The industry norm is for the manufacturer to maintain direct sales in its home country or region, while exclusive distributors are used to sell in countries outside the manufacturer's direct sales territory.

Post-production support service providers – Post-production support services for ROVs include repair, maintenance, and training services. The brand manufacturer typically conducts service-after-the-sale at its manufacturing facilities. The component manufacturer may conduct the repair of specific parts, such as servovalve (ROV hydraulics) and electronics. In some markets, the vehicle brand manufacturer may develop authorized service representatives that provide local support to the end-user. Three value-adding activities are related to service after the sale: 1) providing the customer with needed product maintenance and support, which includes performing necessary maintenance service and delivery or installation of replacement parts); 2) maintaining close contact with the cus-

Figure 2: ROV Production, By Country



Source: Duke CGGC Ocean Technology Database

Category Description	Company Name	Country	2010 Sales ($US M)	2010 Employees
Buoyancy & Flotation	Cuming Corporation	USA	n.a.	200
	Balmoral Offshore Engineering	UK	76.4	125
	Flotation Technologies	USA	13.4	74
Cables & Connectors	Leoni Kabel GmbH & Co KG	Germany	3,916.9	49,822
	Nexans Norway AS	Norway	835.5	1,344
	Norddeutsche Seekabelwerke	Germany	143.6	500
	Divex Ltd	UK	130.5	300
	Tronic Ltd	UK	71.2	270
Cameras & Imaging	Northrop Grumman Corp	USA	34,757.0	117,100
	ATLAS ELEKTRONIK	Germany	508.9	1,915
	Divex Ltd	UK	130.5	300
	Amron International	USA	87.1	80
	Imenco AS	Norway	42.0	79
Handling Systems & Related Equipment	Liebherr-Werk Nenzing GmbH	Austria	1,089.3	1,422
	Palfinger Europe GmbH	Austria	319.9	627
	Huisman-Itrec	Netherlands	268.4	1,399
	HATLAPA Maschinenfabrik	Germany	218.6	288
	Aquanos Ltd	UK	79.3	109
Lighting Systems	Divex Ltd	UK	130.5	300
	Amron International	USA	87.1	80
	Imenco AS	Norway	42.0	79
	OceanOptics Inc.	USA	34.8	253
	Carmanah Technologies	Canada	33.9	65
Manipulators & Tools	Divex Ltd	UK	130.5	300
	Sonsub A/S	Norway	52.9	45
	Cybernétix SA	France	42.3	154
	Imenco AS	Norway	42.0	79
	Bennex AS	Norway	33.7	125
Motors & Thrusters	Voith Turbo Marine GmbH	Germany	1,562.9	4,800
	SMD	UK	68.9	137
	MacTaggart Scott & Co Ltd	UK	49.6	270
	Imenco AS	Norway	42.0	79
	Saab Seaeye Ltd	UK	23.3	120
Navigation, Tracking, Sonars & Acoustics	Sonatech Inc	USA	n.a.	475
	Teledyne Benthos Inc	USA	n.a.	119
	Northrop Grumman Corp	USA	34,757.0	117,100
	KVH Industries Inc	USA	112.2	390
	Amron International	USA	87.1	80
	Kongsberg Maritime	Norway	n.a.	859
Software, Control Systems & Monitor-ing Systems	SubCom	USA	n.a.	1,200
	Kongsberg Maritime	Norway	n.a.	859
	ATLAS ELEKTRONIK	Germany	508.9	1,915
	SMD	UK	68.9	137
	Cybernétix SA	France	42.3	154

Source: CGGC Ocean Technology Database; Sales and Employment figures from Hoover's

tomer to identify additional needs; and 3) receiving information about product performance. Companies interviewed by CGGC consider post-production support services as a profit-center for the business.

Operator training companies offer training in operating ROVs. Some brand manufacturers provide operator training for vehicles produced by the company.

Sales

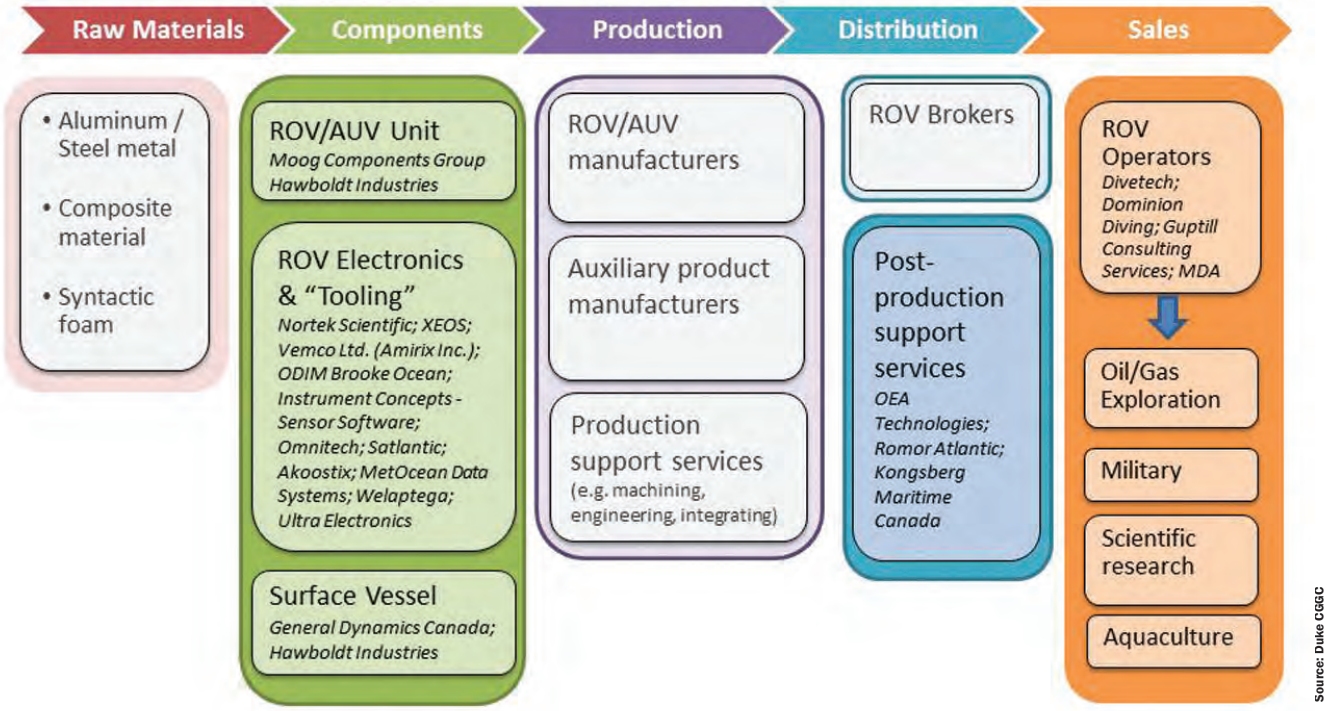
The key end-markets for ROVs are oil and gas, military, and scientific research. The oil and gas industry uses ROVs for pipeline inspection and burial, underwater construction and repair, and detailed ocean mapping. The military uses ROVs for detecting and neutralizing underwater mines. ROVs also are used for a variety of security applications, including port security (hull inspections) and water rank inspections at nuclear facilities. Scientific applications of ROVs include ocean data gathering, mapping, and exploration. Oil and gas sales account for roughly 50% of ROV sales, while defense & security and scientific research markets account for about 25% each.

In the offshore oil and gas sector, ROVs scan the ocean floor to develop precise maps before drilling occurs. Offshore platform construction requires the use of ROVs to grasp and manipulate pre-constructed portions of the platform to the correct place. Once platforms are constructed, ROVs are used to monitor the well site for correct placement of the drill and to identify any leaks of oil that may occur. Oil and gas companies also use ROVs to trench, bury, inspect and monitor underwater pipelines.

Most oil companies use specialized oil service providers to conduct ROV operations. Oil service providers purchase ROVs from manufacturers, integrate tools and instruments needed for the job, and hire ROV operators, often on a contract basis. However, large ROV service providers maintain in-house technical and operational expertise, and even build their own ROVs. Among the largest ROV service operators in the offshore oil and gas sector are SubSea 7 (U.K.), Oceaneering International (U.S.), CNOOC Engineering (China), Halliburton (U.K.), and McDermott International (U.S.). According to industry interviews, ROV services makeup more than half (52.4%) of the global ROV market.

The military/security market uses ROVs for forward observation, reconnaissance, and mine counter-measures. Coast guards, and organizations charged with ocean rescue and port security, use ROVs as scanning and observation tools. For ex-

Figure 3: Nova Scotia's Position in the ROV Value Chain



ample, ROVs are used in port security operations to inspect whether hulls of incoming vessels are leaking, or whether contraband or explosive materials are attached. This "inspection" function is a common use of ROVs. Water tanks used at industrial sites and nuclear energy production sites can be inspected using ROVs rather than placing a diver at risk. In some applications, ROVs perform better than do human divers, independent of the hazardous environment. For example, mini and small ROVs are capable of entering spaces too small for humans. They are able to enter the space and use their onboard cameras to relay video back to the operator station, or deploy small cameras to relay the information.

Gathering ocean data is a key function for ROVs in the scientific market. The data are used for mapping the ocean floor, conducting ocean life surveys, and measuring properties of the ocean water, including its salinity, temperature and depth. Scientists also use ROVs for underwater archeology and geology.

Supporting Institutions

Supporting organizations and institutions are key actors in the global value chain for ROVs. Many of the most important supporting institutions in the ROV global value chain are located in advanced industrialized countries, particularly in the U.S. These include the MIT Sea Grant College Program, Woods Hole Oceanographic Institution (WHOI), the Scripps Institution of Oceanography, and the Monterey Bay Aquarium Research Institute (MBRI). Other prominent institutions are located in Europe, Australia, and Japan. Developing counties, particularly China and India, are rapidly developing advanced research and development capabilities in ROV technology.

As in many high technology areas, spreading knowledge among members of professional and academic research networks leads to product innovation and development. Scientific and industry associations, trade publications, and professional conferences are important in developing and disseminating the latest advances in ROV platform and instrumentation technologies. Notable among professional organizations are the Institute of Electrical and Electronics Engineers (IEEE) and the Marine Technology Society (MTS). Oceans and Oceanology International are major professional conferences for the ROV industry.

Nova Scotia's Position in the ROV Value Chain

Nova Scotia commands a significant presence in the ROV value chain. A particular strength of Nova Scotia's companies in the value chain is in the production of specialized electronic equipment used on ROVs. Figure 3 illustrates the companies in Nova Scotia participating in the ROV value chain and their associated product or service.

[See Figure 3: NS value chain, above]

Notable companies in ROV electronics and communication are Ultra Electronics Marine Systems, producing a wireless non-Radio Frequency communication device for underwater vehicles. Advances in underwater communication devices are critical components for advancing the range and data gathering capabilities of unmanned underwater vehicles. MOOG Components Group (d.b.a. Focal Technologies), part of a major multinational defense and ocean technology corporation, produces rotary joints ("slip rings") and harsh environment

fiber optics for ROVs. Specialization in harsh environment technology is particularly important in the ROV value chain because of the increased demand by governments, natural resource companies, and scientists for Arctic mapping, mining, and exploration.

In addition to producing ROV electronic components, Nova Scotia's firms design and manufacture shipboard systems used for ROVs. For example, Hawboldt Industries manufactures large winches used to house the ROV tether. Their product and service offerings to the industry have expanded from winch manufacturing to loading the tether cable on the winch spool, which requires specialized knowledge and equipment to do properly. Furthermore, Hawboldt designs and builds sophisticated launching and recovery systems (LARS).

Firms in Nova Scotia also provide post-production services. Kongsberg Maritime, a leading manufacturer of ROVs, has its Canadian sales and service facility in Halifax. The company is a global lead firm in unmanned underwater vehicles, and ocean technologies more generally. ROV operators providing services to a number of end-markets also are represented well in Nova Scotia. Dominion Diving is a leading provider of diving and mapping services using ROVs for a range of national and international customers.

Overall, our research identified more than twenty companies in Nova Scotia providing products and services to the ROV global value chain. These companies, both large and small, add to Nova Scotia's strengths in the ocean technology sector, which include excellent universities, transportation infrastructure, geographic location, quality of life, and skilled workforce.

Full report available at http://www.cggc.duke.edu/pdfs/2012-03-05_Nova%20Scotia%20OTReport.pdf

About the Author

Lukas Brun is a senior research analyst at the Duke University Center on Globalization, Governance & Competitiveness (CGGC), and author of the ROV chapter in the Nova Scotia Ocean Technology report from which excerpts were taken for this article. He has more than 10 years of experience in economic analysis and economic development-related contract research. Brun can be contacted at [lukas.brun@duke.edu].