REPORT

Process Automation in Seafood Processing Workshop

MAY 2017

CANADIAN CENTRE FOR FISHERIES INNOVATION
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**Cover Illustration:** Robotic crab butchering cell developed by the Canadian Centre for Fisheries Innovation
EXECUTIVE SUMMARY

Increasingly, fish processing operations in Atlantic Canada are caught between two prevailing market forces. On one side are low-cost, low-value products that are processed with minimal labour expense. On the other are high-value products that rely upon advanced, automated methods that require significant upfront investment. Canadian businesses, which are facing mounting labour supply challenges, can no longer compete through a low wage model and have not sufficiently incorporated automation to effectively enter the high-value market.

The urgency within the processing sector as a result of the labour supply issues in Atlantic Canada prompted the organization of the Process Automation in Seafood Processing Workshop by the Canadian Centre for Fisheries Innovation under the auspices of the Seafood Value Chain Round Table in November 2016. This event, which brought together a wide array of stakeholders from industry, academia, and government, sought to inform participants on relevant subject matters and to engage them in dialogue toward solutions.

Facing stiff and intensifying competition globally, workshop participants noted that the Canadian fish processing sector is at a crossroads. This is especially true for three important subsectors that produce groundfish, pelagic, and shellfish products. Currently these species are processed through labour-intensive methods, but labour is costly and difficult to obtain due to a variety of factors. A choice could be made to intervene with the adoption of greater automation – this would largely mitigate the labour shortage issue – however, this option immediately raises a subsequent question of how to accomplish this transition.

It is important to note that the automation options are not uniform among the sectors. As smaller players in the global marketplace, Canadian groundfish and pelagic processors could purchase automation equipment that has already been developed and proven elsewhere. In contrast, Canada is a global leader for shellfish, meaning that the onus would remain with its producers to create automation solutions.

Despite these differences, agreement remains that Canadian processors do not currently operate in circumstances that allow them to make automation investments. A number of factors, including a fragmented industry structure, uncertain access to fish harvested, poor quality of raw materials, and a shrinking abundance of some species, among many other reasons, increase the overall risk and preclude this kind of outlay.

While automation is a challenge, it is also true that if action is not quickly taken then the Canadian processing sector could decline and soon resemble others throughout the world, such as in Norway. This outcome would alter the sector significantly so that Canada would only supply unprocessed or semi-processed raw materials to other countries for processing. The value of product leaving Canada would be greatly diminished.

If automation is successfully adopted it will require a holistic approach, not only among the entire processing sector but the harvesting sector as well. Both sectors, which are closely connected in the fishery’s value chain, should be on the same page. This has been difficult in the past, but an across the board focus on maximizing output value could provide the necessary motivation to make significant and widespread changes.
BACKGROUND

The Process Automation in Seafood Processing Workshop was sponsored under the auspices of the Seafood Value Chain Round Table and organized by the Canadian Centre for Fisheries Innovation. The impetus for the event was the increasing urgency associated with labour supply for the Atlantic seafood processing industry and the need to explore automation options as a response to this challenge and to improve the competitiveness of the sector.

Attendance at the event, including presenters and exhibitors, totalled 130, which equated to the full capacity of the venue (Prince George Hotel in Halifax, Nova Scotia) from November 15-16, 2016. Participants included seafood processors, equipment manufacturers, engineering firms, academics, researchers, consultants and public sector officials from both federal and provincial governments. Seafood processing representatives represented the majority of the attendees, most of whom came from Canada’s six eastern provinces.

The program for the workshop (attached as Appendix A) was designed to fully inform participants on relevant subject matters and to engage them in dialogue, seeking direction as to policy and program supports needed to improve or expand automation within each of the three major industry sectors: shellfish, groundfish, and pelagics.

The Process Automation in Seafood Processing Workshop was organized with financial assistance from a number of sources, including: Agriculture and Agri-Food Canada (Government of Canada); the Atlantic Canada Opportunities Agency (Government of Canada); Department of Agriculture, Aquaculture and Fisheries (Government of New Brunswick); Department of Fisheries and Aquaculture (Government of Nova Scotia); and Innovation, Science and Economic Development Canada (Government of Canada).
PROGRAM

The first day of the workshop was designed to provide context for the motivation and requirements for automation, experiences in other competing/compatible jurisdictions, automation capabilities in Atlantic Canada, and relevant case study experiences of seafood processors and engineering/equipment providers.

It also included a comprehensive overview of the evolution of the Icelandic industry by Dr. Ogmundur Knutsson from the University of Akureyri in Iceland. This talk elaborated the dramatic structural shifts that have occurred in the Icelandic industry in recent decades and the resultant value added impacts.

The second day of the workshop provided an outline of relevant federal funding programs and policies that influence the development and acquisition of process automation technology for the fish processing industry.

Most important, the second day provided an opportunity for a focused engagement of all participants in three discussion groups targeting the case for automation in the fish processing subsectors of shellfish, groundfish, and pelagics. These discussions were facilitated by conference leaders and included rapporteurs who brought the views and advice of each group back to a plenary session.

KEY INSIGHTS

The presentations and discussions during the workshop brought out a number of key points.

MARKETS

- The market for fish and seafood is expanding rapidly, due to global population growth and changes in lifestyles.
- The output value that Canada obtains from its fish resources depends on how much processing can be done to add value to fish after they are harvested.
- Canadian fish products face stiff competition in both export and domestic markets from products that originate in low-cost developing countries with labour-intensive industries and/or higher-cost developed countries that focus on high-value markets and use advanced technologies to produce high quality products and reduce labour costs.

CANADIAN BUSINESS MODEL

- The Canadian fish processing industry operates with a labour-intensive business model, but:
  - pays low wages by Canadian standards, because of the competitive pressures;
is increasingly being challenged by demographic issues that are steadily decreasing the supply of labour as aging baby boomers move into retirement; and has difficulty attracting younger workers to replace those leaving the industry, because of uncertainty, seasonal work, low wages, dependence on EI, and migration from small rural communities to larger urban centres.

- The Temporary Foreign Workers Program has helped fill the gap in labour supply but it is intended to be temporary and access to the program has become increasingly restrictive.
- Without an adequate supply of low-cost labour, the Canadian fish processing industry is facing increasing difficulty as it produces labour-intensive products and is interested in finding ways to automate processes, so it can do more with fewer people.

AUTOMATION OPTIONS BY SECTOR

- Advanced automation technologies are available for groundfish and small pelagic species, because other countries have those species in greater supply than Canada and have developed the technologies needed. The challenge for Canadian industry is to adapt these technologies to its specific circumstances and to justify the investment.
- Similar automation technologies are not available for lobster and snow crab, which are the large shellfish species that account for most of the sector’s output value. This is because Canada is the largest supplier of those species to world markets and no other region has greater incentive to develop the technology.

CHALLENGES TO AUTOMATION

- Processing sector participants noted that they often operate in circumstances that do not allow them to justify investment in advanced technologies for any of the main species groups, because of shrinking abundance of some species, industry seasonality, uncertain access to fish harvested, raw materials that are often poor in quality, and inability to take advantage of economies of scale, due to a fragmented industry structure.
- Most industry participants want to buy off-the-shelf automation solutions; they are reluctant to invest in risky projects to develop such solutions.
- The shrinking supply of labour, combined with the inability to adopt advanced technologies, mean that industries within the Canadian fishery are doing less and less processing of fish harvests and are increasingly becoming suppliers of unprocessed or semi-processed raw materials for others to process elsewhere (which allows them to capture much of the value from Canadian resources).
- Upscale, higher value products are almost always branded. There is no mechanism to brand unprocessed or semi-processed products. Similarly, many of the seafood industry benefits expected from the pending Comprehensive Economic Trade Agreement will not be realized by an industry focused on supplying raw material.
SECTOR ANALYSIS

GROUNDISH

The discussion group dedicated to groundfish noted that there is a recovery underway in the biomass of these species. The likely reopening of large scale commercial fishing within the next five to ten years will require careful consideration. Operation of this revitalized fishery will need to be balanced with dramatic changes that have occurred in the global whitefish markets. Growth has occurred in wild fisheries such as Alaskan pollock and Barents Sea cod as well as aquaculture species such as tilapia and pangasius/catfish.

The operations of other large groundfish suppliers were reviewed in order to identify a path forward for Canada. Iceland’s experience of selling large volumes of fresh fish and producing high quality and high value products, while seen as a possible model, was regarded as highly challenging given the fragmented and seasonal structure of the Atlantic Canadian industry. In other cases, large volumes of groundfish, particularly cod, is frozen at sea and shipped to Asia for processing. Norway is a leader in this regard, with significant financial and technical capacities.

Participants noted the need for fewer, larger plants that should operate substantially year-round with consistent supply of high quality raw material. It was also noted that the current industry structure does not lend itself to development strategies along these lines.

PELAGICS

Members of this group provided a consistent message in noting that the Canadian industry does not have the scale to support automation. There are large numbers of independent harvesters which causes supply to be sporadic, of inconsistent quality and landed in short, intensive periods. This material is then supplied to a large number of independent, mostly small-scale processors. The seasons are restrictive as well.

Technology for automation of pelagic species is readily available but costly and scaled to much larger volumes than are available to Atlantic Canadian processors. Some suggestions were offered as to the need to find means of reducing the number of harvesting and processing operations and improving collaboration among remaining participants. Participants also suggested developing strategies and technology for adapting automation across multiple pelagic species.

SHELLFISH

Discussion at the shellfish group identified similar issues as other groups and reported a great deal of agreement on the status of the sector. The realities of labour shortages are top of mind and pose very real challenges. The structural challenges of seasonality, inconsistent supply and quality are ever present; however, the intrinsic and biological characteristics of shellfish species,
particularly crab and lobster, which require live processing, mean that onshore processing is considered essential.

The shellfish sector is comparatively unique in that Atlantic Canada is a major global participant for American lobster, snow crab, and to a lesser extent, Northern shrimp. As a result, shellfish requires a “made in Canada” automation solution to a much greater extent than the groundfish and pelagic sectors. Inability to automate in the shellfish sector will continue to dictate increasing use of foreign workers.

COMMON THEMES

The fish processing sectors in Atlantic Canada are facing huge challenges that threaten to jeopardize their future as an integral, value added component of Canada’s fishery. The most significant focus for the industry is the increasing challenge of attracting and retaining workers, leading to a dependency on temporary foreign workers and a search for automation in order to maintain a competitive position with other seafood regions. The demographic profile of the industry is daunting, primarily consisting of older workers and limited prospects in most regions of attracting younger workers.

All three sector groups outlined common challenges, including the relative small scale of the industries, their high level of seasonality, large numbers of small harvesting and processing units, and the absence of a co-ordinated or integrated approach to the harvesting, processing and marketing of Atlantic Canada’s fish and seafood products. The high level of participation and engagement of seafood processing attendees speak to the sense of urgency in finding solutions to the intensifying labour shortage and growing competitive challenges in global seafood markets.
Specific differences were noted among the three industry sectors.

- The recovery of groundfish and shifts in global markets were of interest to this sector group. However, even with a full recovery of groundfish, Atlantic Canada will remain a comparatively small supplier of groundfish to world markets. Continuity of supply, consistent quality, and competitive pricing are significant concerns. With respect to automation, other regions that have dominated the groundfish industry in recent decades have invested heavily in automation, meaning that the technology needed to be competitive is readily available; however, it is not likely to be affordable given the groundfish sector’s scale, seasonality and quality profile.

- The pelagics sector has similar challenges and opportunities as groundfish. The structural issues are very similar, as is the opportunity to purchase ‘off the shelf’ solutions globally.

- Shellfish is distinguished from the other sectors in that Canada is a leading global supplier of lobster and crab, meaning that the need for automation as a response to declining labour supply, while equally intense, requires Canadian investment and innovation. The financial viability issues arising from the industry’s structure are comparable to the groundfish and pelagics sectors.

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**Focus and targets in automation process**

- Reduce labor costs per kg
- Increase capacity with less people
- Improve yields and reduce end-away
- Minimize operational risks
- Reduce cleaning costs
- Reduce maintenance costs
- Reduce no of sick days
- Minimize space consumption
- Increase flexibility
- Facilitate future expansion
- Improve hygienic standards
- Minimize bacteria growth
- Improve ergonomics
- Etc
- Etc

\*OVERALL TARGET IS TO BE COMPETITIVE!\*

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*Slide excerpt from presentation by Chris Bjerregard (Pescatech).*
The information presented and the discussions that took place at the workshop helped bring several issues into focus.

1. **The Canadian business model is under threat.**
   The business model that has characterized the Canadian fishing industry in recent decades is under severe threat, due to forces both outside and inside Canada – most notably from:
   - increasingly intense competition in our export and domestic markets,
   - changes in abundance and availability of our fish resources,
   - a diminishing supply of labour, and
   - technological change.

2. **The changes occurring in three chief sectors of the fishery will have an impact.**
   Due to the above mentioned forces, the fishery is changing and will continue to change, with significant implications for both the harvesting and processing sectors, as well as the industry’s contribution to Canada’s GDP and employment in rural communities.

3. **The Canadian fishery cannot compete with low-price commodity products.**
   The Canadian fishery cannot compete in markets for low-priced commodity products, due to its cost structure, but Iceland’s example could be followed by focusing on high-value markets, achieving full utilization of raw materials, and adopting advanced technologies to enable these things to be accomplished with a diminishing labour supply.

4. **Only limited tools are available to resolve sector issues.**
   The tools available to processing companies to adapt in response to the forces at work are very limited and unlikely to lead to an adequate solution, so they cannot solve the problem without strong collaboration with the harvesting sector and, very likely, public sector support, as well.

5. **The need for change is becoming increasingly urgent.**
   There is an increasingly urgent need for something to be done, if the industry is to survive and thrive in the future.
CHOICES

Recognizing that the fishery is changing and will continue to change, there are some fundamental public policy choices that must be made with respect to future direction.

The first decision is whether to take action or to let economic forces follow their course. If economic forces are allowed to continue, the most likely outcome will be an industry that mainly supplies unprocessed or semi-processed raw materials to others for processing – consistent with the recent trend. It is worth noting that this has been the main model in Norway, which enjoys rich resource abundance and has a large aquaculture industry but mostly sends its fish harvests to lower-cost countries for processing. Alaska has followed a similar model in its capture fishery.

If it is decided that there should be intervention to change the current trend, the second public policy choice is to decide which steps should be taken. Based on the information presented and discussions held at the workshop, it is clear that the processing sector must adapt to having a smaller workforce. To increase output value or even maintain output value at current levels, it will be necessary to increase labour productivity – the output value per person employed. In part, that can be done by changing the industry’s operating pattern (to lengthen the season), so a smaller workforce can work for longer periods. But another part will require greater use of process automation technologies.
These changes cannot be implemented by the processing sector alone. Enabling the processing sector to do more processing and add more value to our fish harvests will require changes in how the harvesting sector operates and how the two sectors collaborate to serve markets for fish products.

Currently, the two sectors have difficulty finding ways to collaborate for mutual benefit. One possibility for improving the situation is to work toward adoption, as an industry-wide goal, the objective of maximizing output value per kilogram of catch. In Iceland, widespread acceptance of that goal has motivated major changes in their fishery and facilitated large increases in output value. The Seafood Value Chain Round Table believes adopting that goal in Canada can lead to similar results.

**NEXT STEPS**

CCFI has posted the conference presentations and this report on its webpage to better expand the discussion among public and private sector interests in the fish processing sector. It is evident that the harvesting sector needs to become engaged and seized of the inherent challenges to the fish processing sector and the implications for the harvesting sector. A solution and strategy for optimizing the value and benefits of Atlantic Canada’s fish resources necessitates a holistic and integrated approach that reflects the realities of resource volumes, industry structure, and global markets. The dialogue needs to become more inclusive among industry, government and community stakeholders.
Appendix A – Workshop Program

PROCESS AUTOMATION IN FISH PROCESSING
Halifax, November 15-16, 2016

DAY 1

Setting the Scene (8:30 - 10:00 am)
- Welcome (10 min) Carey Bonnell, SVCRT, confirmed
- Workforce demographics, by province (20 min) Jamie Ward, MUN, confirmed
- Industry challenges and potential solutions (it's not just about labour) (20 min) Robert Verge, CCFI, confirmed
- KPMG report on automation in the Canadian fish processing industry (20 min) Sylvie Verdon, ISED, confirmed
- Discussion/Q&A (20 min)

Break (10:00 - 10:20 am)

How Others Have Dealt with Process Automation (10:20 am – 12:15 pm)
- Processing of seasonal food crops in Canada (20 min) Michel Casgrain, Bonduelle, confirmed
- Process automation in Iceland (30 min) Saemundur Eliasson, Matis, confirmed
- Processing of groundfish, small pelagics, farmed salmon in Europe (40 min) Chris Bjerregaard, Pescatech, confirmed
- Discussion/Q&A (25 min)

Buffet Lunch (12:15 - 1:00 pm)

Availability of Automation Solutions in Canada (1:00 - 2:30 pm)
- Cube Automation – automation solutions (20 min) Roch Chiasson, confirmed
- Enginuity – lobster processing (20 min) Alastair Trower, confirmed
- TechCold International – automated refrigeration controls (20 min) Brad Watts, confirmed
- Discussion/Q&A (30 min)

Break (2:30 - 3:00 pm)

Case Studies (3:00 - 5:00 pm)
- Automation in processing farmed salmon (15 min) Chris Bjerregaard, Pescatech, confirmed
- Automation in processing small pelagics (15 min) Dave Giddens, Connors, confirmed
- Automation in processing groundfish (15 min) Alberto Wareham, Icewater, confirmed
- Development of process automation technologies (15 min) Dennis Schreiber, Baader, confirmed
• CCFI – Filling gaps in Canada’s technological development capacity (15 min)  
  Robert Verge, confirmed  
• Discussion/Q&A (15 min)  

Dinner - Evening  
• Speaker Ogmundur Knutsson, Evolution of the Icelandic Industry, A Case Study, confirmed

DAY 2

Availability of Funding for Process Automation (8:30 - 9:15 am)  
• Representatives of funding agencies  
  ○ ACOA (10 min) Hugh Hicks, confirmed  
  ○ BDC (10 min) Mark Tanner, confirmed  
  ○ NRC IRAP (10 min) Steve Owen, confirmed  
  ○ Springboard Atlantic (10 min) Jonathan Barrett, confirmed

Government Policies and Process Automation (9:15 - 10:00 am)  
• Representatives of government departments  
  ○ SVCRT (15 min) Carey Bonnell, confirmed  
  ○ ISED – Innovation capacity study, follow-up to KPMG (30 min) Samuel Marleau Ouellet, confirmed

Break (10:00 - 10:20 am)

Discussion Groups (10:20 - 11:30 am)  
• Automation of shellfish processing  
• Automation of pelagics processing  
• Automation of groundfish processing

Discussion questions  
  a. Are we losing output value now, due to a shortage of labour?  
  b. Why do we not use more automation now?  
  c. How important will it be to adopt automation technologies over the next 5-10 years?  
  d. How much do you think we will need to invest?  
  e. What are the main barriers to adopting automation technology?  
  f. What must we do to overcome the barriers? Facilitator – Alastair O’Rielly, confirmed

Plenary (11:30 - 12.15 pm)  
• Reports from discussion groups  
• What does it all add up to?

Where Do We Go From Here? (12:15 - 1:00 pm)
# Appendix B – List of Participants

## SPEAKERS

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Hardy       Gregg   Quin Sea Fisheries Limited
Hawkins     Joseph   DFO
Heighton    Ralph    NS Department of Fisheries and Aquaculture
Hughes      Susan    University of PEI
Hunka       Roger    Mime’j Seafoods Ltd.
Ingraham    Shawn    Agriculture Canada
Jarding     Simon    Quin Sea Fisheries Limited
King        Stephen   Marine Institute
Krogsdale   Larry    Connors Brothers Limited
LaFortune   Katherine (Kat)   DFO
Lanteigne   Jean    Federation Regionale Acadienne des Pecheurs Professionnels (FRAPP)
Large       Cory     DFO
LeBlanc      Jules    Ocean Pride Fisheries Ltd.
LeBlanc      Leon     Comeau's Sea Foods Ltd
LeBlanc      Gilles   Captain Dan's Seafood
LeBlanc      Denis    P&E Manufacturing
Letteo      Steadman   Quin Sea Fisheries Limited
Linstead    Gilbert   LFUSCL
Losier      Doris    Cape Bald Packers Limited
MacDonald    Shelley  Fisherman's Market International Inc.
MacDougall   Shawn    Holland College
MacNutt      Alexandra Agriculture Canada
Martell      Krista   Clearwater Seafoods
Martin       Tim      Mime’j Seafoods Ltd.
McGuire      David    PEI Dept. Agriculture & Fisheries
Mfoumou      Etienne  NSCC
Misener      Wilfred  ADM Systems Engineering
Molloy       Bill     Quin Sea Fisheries Limited
Morrison     Ruth    Beach Point Processing Company
Ngo          Trung    University of PEI
Nickerson    John    Woods Harbour Lobster Co. Ltd.
Noël         Mathieu  L'Association Cooperative des Pecheurs de l'Ille
Perrot       Pam      Beach Point Processing Company
Rayner       Lynn    Acadian Supreme Ltd.
Reeves       James   Charlottetown Metal Products
Richard      Marcel   B A Richard Ltd
Richard      Nat      Westmorland Fisheries Ltd.
Robichaud    Laurie   Pecheries Belle Ile Fisheries Ltd.,
Roy          Mike     Clearwater Seafoods
Scanlan      Dale Christopher Lobsters R Us/Atlantic Automation
Schnare      Andy     Northern Lights Seafood Inc.
Sheen        Kent     Holland College
Sheppard     Mark     Green Seafoods Ltd.
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