The NSPS Shipbuilding Value Chains

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Center on Globalization, Governance & Competitiveness
Duke University
January 25, 2013
Source: http://cggc.duke.edu/
Recent Clients

- World Health Organization
- Walton Family Foundation
- USAID
- CORFO
- OECD
- EDF
- Foreign Affairs and International Trade Canada
- RTI International
- Robert Wood Johnson Foundation
- Industry Canada
- The World Bank
- Inter-American Development Bank
- World Economic Forum
Agenda

Part 1
• Project scope and objectives
• Shipbuilding GVC

Part 2
• Value chain mapping of two NSPS vessels

Part 3
• Opportunities & Challenges
Project Scope

Value chains of:

- Arctic/Offshore Patrol Ships (AOPS)
- Polar Icebreaker & Science Vessels (OOSV/OSFV)
- Joint Support Ships (JSS)
Research Objectives

• Discover the value chain position of Nova Scotia’s companies;
• Identify innovation and technology trends in the shipbuilding value chains;
• Make recommendations to industry and government about:
  – Regional value chain development activities
  – Supporting Nova Scotia companies
  – Moving into higher value-added activities
ANALYSIS OF SHIPBUILDING GVC
Shipbuilding Production System

- **Prime Contractor** (project management; IRB management)
- **Platform system integrators** (propulsion & auxiliary systems)
- **Mission systems integrators** (command, surveillance & armament systems, outfit & furnishings)
- **Shipbuilder** (hull, outfit & furnishings)
- **Sub-system manufacturers** (HVAC, Sensors, Communications, Winches...)
- Suppliers to Tier 1
- **Sub-system components**
- Suppliers to Tier 2
- **Raw materials and subcomponents for sub-systems**
- Suppliers to Tier 3

Decreased firm size & increased specialization
Ship Systems

- Propulsion system
- Electric plant
- Auxiliary systems
- Command & surveillance systems
- Outfit & furnishings
- Armament systems (if relevant)
- Hull
Ship Systems & Subsystems

Propulsion system
- Engine
- Generator
- Control unit
- Electric motor
- Thrust block
- Propeller shaft
- Propeller

Electric plant
- Electric power generation and distribution
- Lighting systems

Auxiliary systems
- Ship steering system
- Climate control, fire extinguishing & water systems
- Anchor handling & stowage systems
- Replenishment-at-sea
- Berthing, mooring & towing systems
- Fluid, fuels handling & storage
- Auxiliary boats & stowage system
- Aircraft handling, servicing & stowage
- Environmental pollution control systems

Command & surveillance systems
- Command system
- Integrated Platform Management System (IPMS)
- Navigation system
- Communication systems
- Electromagnetic environmental effects (E3) & radiation control
- Meteorological & oceanographic system
- Surveillance systems

Outfit & furnishings
- Ship fittings
- Deck machinery
- Living spaces
- Hull compartments
- Preservatives & coverings

Armament systems (if relevant)
- Weapon systems
- Small arms & ammunition stowage/handling

Hull
- Steel plates (“skin”)
- Keel
- Girders
- Frames
- Beams
ARCTIC/OFFSHORE PATROL SHIP (AOPS)
Ship Overview

- **Purpose:** “constabulary” mission in Canada’s EEZ, including Arctic
- **Design principle:** commercial ship design modified for military purposes
  - flexible mission packages
- **Features:**
  - Ice-classed (PC5: 1m of 1-yr ice + PC4 bow: some multi-year)
  - Range: 6800 nm @ 14-17kts. 120 days endurance
  - Capabilities: helicopter, small landing & work boats, cargo handling, 25mm gun
  - Accommodations for 85 personnel: 45 crew, 40 others
~10 pers Multi Purpose ops space – serves as Ship’s Operational Work space

Integrated Bridge
(Ship Control Centre)

20 pers mess deck and land force storage spaces

Vehicle storage – ATV, etc...

20 pers training/conference/air briefing room

20 man Boarding Party briefing/changing room

6 pers diving locker

Source: RCN
• Helo capable – normally light helo/ Cyclone if reqd
• Boats – mix of arrangements to support RCMP ERT, SOF, SAR.
• Landing craft (Coast Guard type barge)
• Space for deck cargo and up to 6 containers – flexible arrangement for boats or cargo or containers as required

Source: RCN
## AOPS Subsystems

### Steel

<table>
<thead>
<tr>
<th>Company</th>
<th>Steel Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essar Steel Algoma (ON, Canada)</td>
<td>Steel</td>
</tr>
<tr>
<td>Gerdau Amersteel Corporation (ON, Canada)</td>
<td>Steel</td>
</tr>
<tr>
<td>Industeel (Belgium)</td>
<td>High Strength/High Tensile Steel (EH 50 or higher)</td>
</tr>
<tr>
<td>JFE Steel Corporation (Japan)</td>
<td>High Strength/High Tensile Steel (EH 50 or higher)</td>
</tr>
<tr>
<td>Kobe Steel Co (Japan)</td>
<td>High Strength/High Tensile Steel (EH 50 or higher)</td>
</tr>
<tr>
<td>Nippon Steel Co (Japan)</td>
<td>High Strength/High Tensile Steel (EH 50 or higher)</td>
</tr>
<tr>
<td>SSAB EMEA AB (Sweden)</td>
<td>High Strength/High Tensile Steel (EH 50 or higher)</td>
</tr>
</tbody>
</table>

### Cranes, Winches, A-Frames

<table>
<thead>
<tr>
<th>Company</th>
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<tbody>
<tr>
<td>Dynacon Inc. (U.S.A.)</td>
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<tr>
<td>Hawboldt Industries (Canada)</td>
</tr>
<tr>
<td>Liebherr (Switzerland)</td>
</tr>
<tr>
<td>Palfinger (U.S.A.)</td>
</tr>
<tr>
<td>Rapp Marine Group (Norway)</td>
</tr>
<tr>
<td>Rolls Royce (U.K., U.S.A.)</td>
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<tr>
<td>Wartsila (Finland)</td>
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</tbody>
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### Propulsion System

<table>
<thead>
<tr>
<th>Company</th>
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</thead>
<tbody>
<tr>
<td>ABB (Switzerland, U.S.A.)</td>
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<tr>
<td>G.E. (U.S.A.)</td>
</tr>
<tr>
<td>MAN Diesel and Turbo (Germany)</td>
</tr>
<tr>
<td>Rolls Royce (U.K., U.S.A.)</td>
</tr>
<tr>
<td>Wartsila (Finland)</td>
</tr>
</tbody>
</table>
OFFSHORE FISHERIES SCIENCE VESSEL (OFSV)
Ship Overview: OFSV

• Purpose: Gather information on fish populations
• Design principle: large commercial trawler with research instruments
  – Multiple winches, focus on trawling activities
  – Noise dampening technology
• Features:
  – Range: 6000 nm @ 13 kts. 31 days endurance
  – Capabilities: trawling, acoustic sampling, biological research, mapping
## OFSV Subsystems

### Dynamic Positioning System
- Kongsberg (Canada)
- Navis Engineering Oy (Finland)
- Converteam (UK)
- Rolls Royce (UK/USA)
- L-3 (Germany)

### Noise Reduction Technology
- J&A Enterprises (USA)
- Gerb (Germany)
- Noise Control Engineering (USA)
- Mitsubishi Heavy Industries (Japan)
- SoundDown Corp. (USA)

### Acoustic Instruments
- Teledyne (USA)
- Kongsberg Maritime (Norway/Canada)
- Atlas Elektronik (Germany)
- Sercel (France)
- Vemco (Canada)

### CTD Sensors
- Odim/Rolls Royce (Canada - NS)
- Sea Bird (USA)
- MetOcean (Canada)
- Teledyne (USA)
- Kongsberg Maritime (Norway)
Maintenance & Repair

Technical Training & Customer Support

**Mission Systems**
- Acoustic instruments
- CTD system
- Deck equipment
  - Winches
  - A-Frames
  - Trawling net

**Platform Systems**
- Noise Canceling System
- HVAC

**Platform System Components**
- Propulsion distributors

**Mission System Components**
- Navigation, communications, research instrument, deck equipment distributors

**Hull Construction Components**

**Platform System Integration**
- Research instrument solutions providers

**Hull Assembly and Outfitting**

**Mission System Integration**

**Hull Fabrication**
- Machined components

**Design**
- Preliminary Design
- Contract Design
- Basic Design
- Detailed Design

**Production**
- Platform Systems
- Mission Systems
- Hull Fabrication

**Distribution**
- Platform System Components
- Mission System Components
- Hull Construction Components

**Assembly & Integration**
- Platform System Integration
- Mission System Integration
- Hull Assembly and Outfitting

**Post Production Services**
- Maintenance & Repair
- Technical Training & Customer Support

**Materials Planning & Procurement**

**Production Planning & Engineering**

**Production Support Services**

- Research
- Education & Training
- Government
- Policies & Regulations

**Nova Scotia capability**
Design Trends

- Multifunctional and modular design
- Systems integration
- Signature reduction
- Fuel economy and ballast water management
- Unmanned vehicles
OPPORTUNITIES & CHALLENGES
Opportunities for Nova Scotia

• Direct sales
• Access the multinational firms’ supply chains
• Upgrading skills and technology
• Develop niche areas in the shipbuilding value chain
Challenges

- Building Relationships
- Public Regulations & Certifications
- Limited Horizons
Supplier Standards

• What do shipyards and systems integrators look for in potential suppliers?
  – Ability to meet technical specifications
  – Controlled Goods Program / ITAR
  – Price competitiveness
  – Ability to help offset IRBs
  – Management capability
  – Patent experience
  – Capability Maturity Model Integration (CMMI)
  – ISO 14000 Environmental Management
Thank you for your attention!

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