National Shipbuilding Procurement Strategy: Charting the Course

Maritime Security Occasional Paper No. 17

Edited by Ian Wood
Prepared by Tim Dunne

Cover photo: A Canadian submarine manoeuvring in the vicinity of the Halifax Naval Dockyard. Photo courtesy of Department of National Defence

Table of Contents

List of Acronyms

AAW	Anti-Air Warfare
ADM	Assistant-Deputy Minister
ADM(Mat)	Assistant-Deputy Minister (Materiel)
AOPS	Arctic Offshore Patrol Ship
AOR	Auxiliary Oiler Replenishment Ship
ASUW	Anti-Surface Warfare
ASW	Anti-Submarine Warfare
AWD	Air Warfare Destroyer
BMD	Ballistic Missile Defence
BRIC	Brazil, Russia, India and China
C2	Command and Control
CAF	Canadian Armed Forces
CANEWS	Canadian Naval Electronic Warfare System
CANSEC	Canadian Defence and Security Exhibition
CANTASS	Canadian Towed Array Sonar System
CCG	Canadian Coast Guard
CCV	Close Combat Vehicle
CFDS	Canada First Defence Strategy
CFPS	Centre for Foreign Policy Studies
CMDO	Chief of Maritime Doctrine and Operations
CPF	Canadian Patrol Frigate
COTS	Commercial Off-the-Shelf
CSC	Canadian Surface Combatant
CSI	Combat Systems Integrator
DAI	Defence Analytics Institute
DDE	Escort Destroyer

DGMEM	Director General Maritime Equipment Management
DGMEPM	Director General Maritime Equipment Programme Management
DND	Department of National Defence
DPS	Defence Procurement Strategy
DRDC	Defence Research and Development Canada
FMF	Fleet Maintenance Facility
FMG	Fleet Maintenance Group
FMI	First Marine International
FWSAR	Fixed-wing Search and Rescue
FY	Fiscal Year
GAO	Government Accountability Office
GDP	Gross Domestic Product
HCM FELEX	*Halifax*-class Modernization Frigate Life Extension
ICEAA	International Cost Estimating and Analysis Association
IP	Intellectual Property
IRB	Industrial Regional Benefit
ISS	In-Service Support
ILS	Integrated Logistics Support
ISSCF	In-Service Support Contracting Framework
JSS	Joint Support Ship
KIC	Key Industrial Capability
MATCALS	Marine Air Traffic Control and Landing System
MARCOM	Maritime Command
MARSS	Maritime Surface and Sub-Surface
MOTS	Modified Off-the-Shelf
NGS	Naval Gunfire Support
NRC	National Research Council
NSPS	National Shipbuilding Procurement Strategy
O&M	Operations and Maintenance

OAG	Office of the Auditor General
OEM	Original Equipment Manufacturer
OGD	Other Government Department
OSI	Open Systems Interconnection
PMO	Project Management Office
PWGSC	Public Works and Government Services Canada
RCAF	Royal Canadian Air Force
RCN	Royal Canadian Navy
R&D	Research and Development
RFP	Request for Proposal
SAR	Search and Rescue
SHINCOM	Shipboard Integrated Communications
SHINMACS	Shipboard Integrated Machinery Control
SHINPADS	Shipboard Integrated Processing and Display System
SME	Small and Medium Size Enterprise
SOIQ	Solicitation of Interest and Qualifications
SOR	Statement of Requirements
SPA	Single Point of Accountability
SR&ED	Scientific Research and Experimental Development
SRU	Ship Repair Units
SSM	Surface-to-Surface Missiles
TB	Treasury Board
TBS	Treasury Board Secretariat
TRUMP	*Tribal*-class Update Programme
UAV	Unmanned Aerial Vehicles

Introduction

The purpose of this workshop was to bring together invited representatives from industry, academia and government to identify, discuss and share their perspectives on the potential challenges and issues as the National Shipbuilding Procurement Strategy (NSPS) proceeds through the various phases in the procurement process. In order to have a comprehensive discussion it was important to have representation from all these groups. We were very pleased to have good academic and industry attendance. As well, the federal government representatives included the Royal Canadian Navy (RCN), Department of National Defence (DND), Public Works and Government Services Canada PWGSC, Canadian Coast Guard, and officers of Parliament, and representatives of the government of Nova Scotia were also present. Chatham House rules were in effect so this report will not contain the private question and answer session details. However the presentations given by speakers are available on the CFPS website (www.cfps.dal.ca).

Up to this point, the National Shipbuilding Procurement Strategy (NSPS) has focused on contractor selection and design. There has been criticism but recently the Office of the Auditor General concluded that "[t]he NSPS should help the government to procure federal ships in a timely, affordable manner, consistent with the build-in-Canada shipbuilding policy." However the broader environment may not be as favourable – leading the Auditor General also to note that "a gap appears to be developing between the CFPS [Canada First Defence Strategy] level of

ambition, the evolving naval capabilities, and the budgets." As a result of this concern over funding the Maritime Security Programme Research Fellows at CFPS felt that this was an opportune time to examine the current progress of the NSPS and the challenges ahead.

Media were not invited but some follow-up academic research and articles emanating from the discussions are anticipated, again with non-attribution in effect per the Chatham House rules. The biographies of all of the speakers and panel chairs are available at the end of this report.

The event organizers would like to thank the generous sponsors for making this workshop happen. We would also like to thank the CFPS staff along with Centre Fellows, faculty and student volunteers for their role in the successful completion of this well-attended workshop.

Upcoming Events

CFPS is already in the planning stages for the second installment in this series of NSPS Workshops at Dalhousie University. The next workshop is entitled "National Shipbuilding Procurement Strategy Part II – 'Human Capital' and the NSPS." It will take place on Friday, 14 November 2014 at University Hall, MacDonald Building, Dalhousie University.

If you are interested in attending, sponsoring or presenting, please contact the Centre for Foreign Policy Studies.

Executive Summary

The opinions discussed here are derived from the presentations given at the workshop. Let us begin by understanding where we are today with the NSPS. On 3 June 2010, the government of Canada announced Canada's National Shipbuilding Procurement Strategy. It stated as follows:

- for large ship construction, Canada will establish a strategic relationship with two Canadian shipyards, selected through an open and fair national competition, and designate them as sources of supply, one for combat vessels and the other for non-combat vessels.
- for smaller ship construction, Canada will set aside the individual projects for competitive procurements amongst Canadian shipyards other than the shipyards selected to build the large ships and their affiliated companies.
- for ship repair, refit and maintenance, these requirements will be competed through publicly announced request for proposals.

The pillars of the strategy are:

- to build a long-term, strategic relationship with two Canadian shipyards to build a series of ships to a maximum contract value of $36 billion. Halifax's Irving Shipbuilding will build the Combat Vessels Package, consisting of the Arctic Offshore Patrol Ships and the Canadian Surface

Combatant;
- In British Columbia Seaspan will build the Non-Combat Vessels Package, consisting of Offshore Oceanographic Science Vessels, Offshore Fisheries Science Vessel, Joint Support Ships, Polar Icebreaker, Offshore Patrol Vessel and Medium Endurance Multi-Tasked Vessels.
- there will be a further $2 billion worth of smaller vessels through competitions among other (smaller) shipyards; and,
- repair, maintenance and refit contracts will be negotiated to sustain the needs of the government's new fleet of ships.

As with other major capital contracts, elements of the NSPS work that is sourced offshore will be matched dollar for dollar by Industrial Regional Benefits (IRBs). Furthermore, under the conditions listed in the federal government's Value Proposition, shipyards are committed to invest in Canada to enhance the marine industry.

The shipyards are modernizing their infrastructure to build the ships efficiently. These improvements have been done at no cost to the government of Canada. Vancouver Shipyards Modernization is estimated to cost $200 million and is on track for completion in October 2014. All production shops and equipment will be commissioned and ready to commence the building of the Coast Guard's Offshore Fisheries Science Vessel in late 2014.

Irving Shipyards Modernization is estimated to cost $300 million and involves two sites: Halifax Shipyard and Dartmouth Steel Manufacturing Facility. Upgrades will be complete to coincide with the beginning of construction of the Arctic Offshore Patrol Ships in the fall of 2015.

The designs for the first projects in both Combat and Non-Combat packages are being finalized for production of the vessels. The readiness of the shipyards and the completion of the

designs should lead to the start of cutting steel over the course of the next year.

In addition, an independent third-party expert has defined a future Target State requirement for each shipyard and will assess the progress of the shipyards in attaining it. The assessment covers every aspect of shipyard operations and is designed to assess the shipyards against an international benchmark to provide confirmation that they have the capability (processes), and the technology to successfully accomplish their objectives under the NSPS.

Next let us look at the challenges, opportunities and uncertainties over the horizon with the NSPS.

Challenges

Many of the presenters commented on how the 2014 federal budget marked the fourth time in five years that the Department of National Defence (DND) has been subjected to budget cuts. Although the 2008 Canada First Defence Strategy (CFDS) pledged long-term, sustained budgetary growth for defence and a stable funding level to facilitate planning for major capital programmes acquired over decades, reductions since that policy pronouncement have erased in real terms the promised budget increases. At the same time, DND remains unable to spend all of the funds provided by Parliament for procurement. Consequently, billions in DND capital funding has been deferred until it can be spent at an unknown point in the future. Budget restraint at DND has also provided the government of Canada with a fiscal windfall, making a major contribution to erasing the deficit. Moreover, there is increasing evidence CFDS was underfunded from the beginning.

Several presenters noted that there are serious concerns

about the affordability of the NSPS, leading a number of people to ask how many platforms can actually be built, with what capabilities and at what cost? Projects have big aspirations and the NSPS is setting requirements for the next 30 years. With increasing inflation, the cost of steel and the prices of equipment, sensors and weapons continue to rise. The effects of inflation may challenge the capacity of the shipyards to deliver the proper number of ships with the requisite components on time.

As a share of the defence budget, capital spending has also dropped to the lowest level since 1977/1978. Despite having $26 billion assigned to construct the Canadian Surface Combatant, the Auditor General noted in the 2013 report on the NSPS "[w]e found that $26.2 billion is insufficient to replace Canada's 3 destroyers and 12 frigates with 15 modern warships with similar capabilities." A *Halifax*-class ship delivered in 1994 cost approximately $519 million to build. Today it would cost roughly $1.4 billion. In essence, DND's budget is short approximately $1 billion annually for capital projects and this is a situation not likely to change soon.

The centrepiece of the CFDS was also the inclusion of a 2% defence escalator to provide long-term, real budgetary growth. This was supposed to lay the groundwork for a 20-year period of stable funding for the recapitalization of the Canadian Armed Forces (CAF). However, most experts agree that defence inflation is running at approximately 6% and with the escalator so far below that amount the department is experiencing significant erosion to the purchasing power of the funds committed to the CFDS.

There are also concerns over the human capacity available to execute the demands of the NSPS. At its peak, the *Halifax*-class Project Management Office (PMO) was approximately 500 personnel strong while at this stage the PMO for the Canadian Surface Combatant numbers only 50. When the *Halifax*-class

was being delivered, full-time naval strength was about 18,000, including both coasts, and the navy had the Ship Repair Units (SRU), the maritime requirements staff, and the naval central drawing office in Montreal. Today, total naval strength is about 9,000, Fleet Maintenance Facilities have far fewer resources and the Naval Central Drawing Office no longer exists. The department is also unable to increase its personnel numbers, putting significant pressure on its already limited project management staffs.

In addition, a much greater percentage of the work is now being undertaken at the front end of the shipbuilding process to create full models of the ships in order to resolve the many issues that can arise during design and to avoid discovering them during the build phase. The net effect is an increased cost of the design in order to generate savings during the much more expensive construction process. This mandates a three-step contracting approach: (1) understand the design; (2) complete the design; and (3) build the ships. This process reduces design uncertainties up front and also reduces risk for the Canadian taxpayer over the long term. But with such a protracted period of design and no contracts yet in place to build the ships, the Canadian public and the labour market are not seeing the opportunities that the NSPS was supposed to bring to the national economy.

Opportunities

The NSPS recognizes the strategic importance of a strong domestic shipbuilding industry, and it supports sustainable development through a long-term approach to federal procurement. As well, it seeks long-term benefits over short-term fixes and it is designed to deliver value for money for taxpayers.

The large ship portion of the NSPS is based on the need for

Canada to renew the federally-owned and operated fleets. As well, the vessels will be procured, repaired and refitted in Canada and there is a need to eliminate the project-by-project management resulting in inefficient boom-and-bust cycles. This is a 30-year programme of ship construction that officials are saying should foster and build on the long-term nature and strong foundation of strategic industrial relationships.

At present the RCN is at the lowest level of ship availability in the last decade due to unfinished fleet modernization programmes and delays in the planned construction and delivery dates of the new classes of ships. However, under the NSPS there is a goal to undertake a more regularized approach to fleet renewal that should avoid concerns such as block obsolescence and cyclic low fleet availability. Under the NSPS there is an opportunity to build ships for the navy that possess innovative designs and modern weapons and sensors. By having a navy with modernized ships at higher readiness the government should have available a greater range of maritime policy response options.

Not surprisingly, the boom-and-bust cycle of past Canadian shipbuilding efforts has left the industry dramatically short of the personnel required to design and build these new classes of ships. By institutionalizing a more regular approach to shipbuilding in this country, Canadian industry should be able to develop plans for a more stable labour supply and skilled workforce. The ship construction projects will also provide work for Canadians in a broader spectrum of the marine industry. Shipyards will need to include partners and suppliers in the opportunities that lie ahead, which will increase the overall Canadian participation in these projects.

Lastly, the method used to select the shipyards under the NSPS was considered to have been efficient and successful, and was carried out in an open and transparent manner. It worked so

well, in fact, that Public Works and Government Services Canada (PWGSC) could consider using the NSPS as a model approach in future procurements.

Uncertainty Over the Horizon

There are some areas of interest, particularly related to organizational design, that bear watching as the NSPS strategy becomes operational.

The first area to watch is the development of Key Industrial Capabilities (KICs). These are intended to derive potential economic benefits from industrial procurements to increase the competitiveness of Canadian firms in the global marketplace. The list of KICs that has been established is very thin and needs to be better defined before it can be of workable value to the industry at large in Canada and internationally.

Second, an independent, third-party validation function is being established within DND for the assessment of military operational requirements. How this is to be done is yet to unfold but there are signs that the government is seeking third-party technical and design assistance to offset its lack of capacity.

Third, the role and impact of the independent, third-party Defence Analytics Institute (DAI), which is to provide expert analysis to support the objectives of the Defence Procurement Strategy and its evaluation, is still being designed. The interim board, selected by government, has been charged with developing the institute's mandate and scope of activities. The government estimates that a permanent DAI will be established in 2015, a potential election year and perhaps a decision year for CSC.

A final point on this topic of organizational design is the establishment of a Defence Procurement Secretariat within

PWGSC. The intent is to ensure close coordination across affected departments. One has to wonder how this mandate is different from that of DND's Assistant Deputy Minister (ADM) (Materiel) and PWGSC's ADM Procurement. Is this a coordinating bureaucracy that could lead to a more rapid delivery of future capabilities or simply more duplication of effort leading to further delays?

It is essential to remember that defence procurement is a complex and bureaucratic enterprise. The government's basic objective is rapid, reliable and efficient delivery of the best equipment to the military, while keeping costs as low as possible. Added to this objective are the considerations of job creation, value propositions, industrial competitiveness and economic growth. It is obvious that there will be compromises that will have an impact on the capability of the RCN and this is a basic question that deserves attention going forward.

Building a modern warship is perhaps the most complex of defence procurements for Canada. The Canadian Surface Combatant arguably will be one of the most complex procurements to date. The government has taken a strategic decision to build its complex ships in Canada. Moreover, the government has taken this one step further in the Defence Procurement Strategy to undertake strategic investments in specific industrial sectors (or KICs). The NSPS provides for a rational and deliberate approach to the management of the renewal of the government's fleets.

Within this renewal, the largest project will be the Canadian Surface Combatant and clearly there are challenges that lie ahead that must be watched and debated. These include:

- The CSC class of ships will be a replacement for both the *Iroquois*-class and the *Halifax*-class. How this one class will serve to replace two classes of ships deserves close scrutiny.

- The RCN does not directly control the outcome of the building programme. This is not because of a lack of leadership but because of the complex structure of the government-wide procurement system.
- Equally important will be the procurement approach. Will it be the most capable design or the most qualified team? This decision will determine the capability of the CSC.
- Does the government have the capacity to manage the project and if not, how will it get the capacity?
- What will tip the scales in the competition: a capable ship that meets the needs of the RCN and Canada; or jobs? And who will decide?

It is probable that the Canadian government will provide the RCN with the means to accomplish its assigned missions, but the track ahead may be neither smooth nor straight.

Summaries of Panel Presentations

In the remainder of this Maritime Security Occasional Paper summaries of each of the presentations from the three panels will be given.

The workshop was opened by David Smart, CFPS Research Fellow, Coordinator for the Maritime Security Programme and workshop organizer. He explained that the purpose of the workshop was to bring together invited representatives from industry, academia, the federal government – including the RCN, DND, PWGSC, Canadian Coast Guard and officers of Parliament – and the government of Nova Scotia, to identify, discuss and share their perspectives on the potential challenges and issues as the NSPS proceeds through the various phases in the procurement process.

Following David Smart's presentation Matt Hebb, Dalhousie University Assistant Vice-President for Government Relations, welcomed all present on behalf of the Dalhousie University President Dr. Richard Florizone. He stated that the university plays a vital role in the life of the province. This workshop was an event to balance the maritime security of the province with the economic output of the province. Dalhousie was pleased to be able to play a role in the process of enhancing and continuing the conversation about maritime security and the role of the university. He encouraged all present to stay engaged on this topic and to remain abreast of the CFPS's future NSPS Workshop series.

Following these remarks, the workshop was officially opened by the Director of the CFPS Dr. David Black. He emphasized that there is a shared understanding of the value of the NSPS among participants, and that the CFPS has created a unique academic venue to explore the value of the NSPS. He reminded all that the NSPS is the largest contract of its kind since the Second World War, noting that the project goes beyond just shipbuilding and that the federal government intends this to be pivotal to the development of Canadian industry.

Part One:
Special Presentations

The purpose of this first panel was to give the workshop participants an overview of the first two projects under the NSPS, namely the Arctic Offshore Patrol Ship and the Joint Support Ship. Detailed drawings of these two classes of ships were made available to the participants of the workshop allowing them a unique preview into the design of these ships.

This panel included the following presentations:

- JSS Programme Overview by Brian Lavigne
- AOPS Programme Overview by David Smart on behalf of Lieutenant-Commander Jamie Sangster
- AOPS as a Potential Science Platform by Jim Hanlon

Joint Support Ship, Brian Lavigne
JSS Programme Office, DND Materiel Group

The speaker gave a broad overview of the capabilities of the Joint Support Ship (JSS). The government has committed to build two of these ships but the RCN requirements were for three ships. The ship can remain at sea for 29 days, has two Replenishment at Sea (RAS) stations from the original four (the additional two were removed for weight considerations) and the ship can embark two Cyclone helicopters. The crew strength is 165. The ship can carry a maximum of 250 personnel for contingencies

and up to 50 containers. The ship can easily change payloads, and has a maximum range of 10,000 kms. The project is still in definition with the shipyard (Victoria Shipyards - Seaspan) and the first ship is expected to be delivered by 2019 and the second by 2020.

There are also a number of changes that will be added to the basic German *Bonn* design to meet Canadian needs, all of which will involve costs. These changes will include:

- displacement of existing accommodations areas to operate and maintain 2 Cyclone CH 148 Helicopters;
- increased heating, ventilation and cooling along with enhanced insulation to mitigate the effects of colder and hotter areas of operation;
- installation of standard RCN small boats and robust naval escape equipment;
- installation of standard RCN AOR weaponry including self-defence weapons such as two Close-in Weapons Systems 1B and four Naval Remote Weapon Systems;
- repurpose of surplus fresh water tanks to cargo fuel to maintain the same useable cargo fuel as current AORs;
- increased size of Operations Room;
- rearrangement of Messing facilities; and
- installation of the equipment necessary to carry two larger Landing Craft, Vehicle and Personnel (LCVP) in common with the AOPS.

After the definition work has been completed the project will return to the Treasury Board for funding for the actual construction and the remainder of the project needs. A revised JSS project budget of $2.33 billion was approved in June 2010 for two ships with an option for a third ship.

Arctic Offshore Patrol Ship, David Smart (on behalf of Lieutenant-Commander Jamie Sangster)
AOPS Programme Office, DND Materiel Group

The next presentation was on the Arctic Offshore Patrol Ship (AOPS). The workshop organizer David Smart gave the presentation on behalf of the AOPS office. The government will acquire six to eight Arctic Offshore Patrol Ships to conduct armed sea-borne surveillance in Canada's Exclusive Economic Zone (EEZ) including the Arctic.

The AOPS project of $3.1 billion was approved in 2007 and this included the infrastructure required to establish the northern operating station in Nanisivik, Nunavut.

The general specifications of the vessels are:

- Polar Class 5 (one metre first year ice with old ice inclusions);
- open water speed of 17 knots;
- good seakeeping for offshore patrol missions;
- range of at least 6,800 nautical miles (at 14 knots);
- command management system for maritime situational awareness;
- aviation facilities for commercial and military helicopters; and
- gun armament for sovereignty enforcement.

The ship will be Cyclone capable, but it isn't known if the helicopter will operate consistently from the ship. The ship has a haul-down system, and will be fitted for but not with a helicopter.

Fuel is a critical requirement in the Arctic, and there are fuel transfer points on the ship's sides. Also the environment in which the ship will work determined much of the equipment that

will be installed with de-icing of the decks being a requirement. The crew size will be normally 39 to 40 and up to a maximum of 80, contingent on the nature of the mission. It is expected that the completion of the first ship from Irving Shipyards in Halifax will be in 2015.

Scientific/Research Implications of the AOPS, Jim Hanlon
Chief Executive Officer, Institute for Ocean Research Enterprise

The next presentation was an overview of the scientific/research potential of the AOPS. Hanlon represented the Institute for Ocean Research Enterprise (IORE), which is a member-driven not-for-profit corporation headquartered at Dalhousie University. It was established in 2011 as a consortium of 14 industry, academic and government partners for the initiation, support, application and commercialization of world-class scientific research. To address the problems facing the oceans, IORE is actively engaged in projects that will increase the quality and impact of marine research.

A vast majority of ocean research is done by the navies of the world. There are many potential uses for the AOPS such as constabulary, sovereignty projection and ocean research. Other states such as Norway have outfitted their ships such as KV *Svalbard* in order to conduct research while maintaining munitions and weapons for its sovereignty role. This could serve as an example for the RCN.

Potential AOPS science activities could include hydrographic survey (single beam vs. multibeam sonar) and support for future activities such as autonomous data collection platforms. Marine chemistry and biology analysers can now automatically draw water from the ship's water intakes and with

the trend towards modular ocean science laboratories (built into standard ISO shipping containers), these could easily be accommodated by the AOPS design.

In summary, undertaking research using the AOPS platform would bolster ongoing support for the ship class and design and would provide a high-profile role for the RCN. This scientific support could also enhance the careers of naval personnel and would in the end allow the government to collect valuable information about Canada's Exclusive Economic Zone thus bolstering sovereignty claims.

Part Two: NSPS Current Progress and Potential Future Challenges

The second panel was Chaired by Dr. Eric Lerhe Commodore (Ret'd) of the CFPS. The panel included the following presentations:

- Budget 2014, CFDS Reset and the NSPS by David Perry
- Key Industrial Capabilities and the NSPS by Dr. Yan Cimon
- Independent Cost Estimating at the PBO by Erin Barkel
- The NSPS Programme View by Matthew Crawley

Budget 2014, the CFDS Reset and the Impact on the NSPS

David Perry

In his presentation Dave Perry gave a detailed overview of the financial and policy aspects of the NSPS and the significant challenges that lie ahead.

There is less money available for the recapitalization of the Canadian Armed Forces (CAF) and this situation is not likely to change soon. Budgets began to go up in 2005 and 2006 and this was supposed to provide steady and sustained finding until 2026 but the Canada First Defence Strategy was underfunded from the beginning. In essence it is short almost $1 billion annually for capital procurement. The programmes need to be protected against defence inflation that at this time is in excess of 4% and

possibly closer to 6%, depending on the material being procured and sustained. Unfortunately the budget for the CFDS was only given a 2% inflation escalator that is clearly insufficient.

It is time to undertake a major review of the CFDS plan particularly since the two budget freezes between 2010-2014 have seen nearly $9 billion pulled out of programme readiness for the future forces. The recapitalization plan is delayed and is not being used properly, and DND is unable to spend the full budget, leaving at least $1 billion unspent every year. Also some $8 billion has been pushed out several years, up to 2021 and projects that should have been finished years ago are still waiting approval of funding. Spending for major transfers to other levels of governments (such as health care) and major transfers to persons is increasing but direct spending on defence has almost flatlined. There is less money available now for the CFDS than there was in 2007 when the funds were allocated. Canada may not get the military ships it needs if budgets are not increased.

NSPS in its present level of funding today represents a major erosion of purchasing power. Much of the shortfall is in the naval program. The CSC requires potentially $40 billion and will only see $26 billion at best. The availability gaps of the RCN ships will be lengthened (particularly AORs and destroyers) and many new projects are competing with old projects that should have been completed long ago.

Perry concluded that the Defence Renewal that is underway (even if implemented fully) won't fix the funding shortfall in CFDS that existed even before the cuts.

Key Industrial Capabilities and the NSPS: Sailing toward Global Leadership

Dr. Yan Cimon

The Canadian defence industry is relatively large, generating $12.6 billion in revenues with approximately 2,000 firms participating. It is a major global player, ranked fourteenth, but with only one firm in the world's top 100 companies.

The NSPS is ambitious, wide-ranging and represents an essential step for Canada's security as well as for its industrial competitiveness. Government and industry (and academia) must work closely to make Canada a global leader in the defence production sector. However, there may be challenges ahead, as Canada's Auditor General noted, "a gap appears to be developing between the CFDS level of ambition, the evolving naval capabilities, and the budgets."

The NSPS is developing in a world that is facing a number of strategic challenges. These challenges include:

- China, a country with territorial claims disputed by other states within the region and with Arctic interests, is creating a large blue-water navy.
- Russia is expanding its sphere of influence to Ukraine and Georgian territories, Syria, Egypt and, along with Norway, Iceland, the United States and Canada, is an Arctic state.
- Non-military national security issues are growing including international drug smuggling, maritime piracy, illegal migration, female and child sexual slavery and servitude, and resource theft.

Against this international security backdrop there are several major industrial trends, including:

- a general industrial trend towards purchasing commercial, off-the-shelf material;
- a decreasing number of maritime platforms;
- the enhanced role of emerging economies;
- efforts to consolidate efforts and programmes to cut rising costs;
- the end of go-it-alone programmes, where major corporations and governments seek to collaborate with similar parties in other states to reduce costs and hasten delivery; and
- non-traditional partnerships, such as the French sale of *Mistral*-class ships to Russia.

Canada's strategic position is also evolving. Canada is a niche player while the global economy is highly concentrated, in which four players account for 55% of global revenues. Canadian shipbuilding capacities have evolved from simply constructing a floating hull to building a floating computer. Canada is increasing the capacity to take a shipbuilding project from design and build through to the sustainability, training and technology components of development.

Prior to the 2008 CFDS there was no mention of industrial capability in White Papers, but the Defence Procurement Strategy and an approach based around Key Industrial Capabilities (KICs) can help transform the Canadian industry on the global stage. However, there is still more work that must be completed to define better the Industrial Regional Benefits from future procurement and also how Canada might benefit from KICs in the NSPS.

There is a series of key policies however that must be envisaged to address a number of issues related to Canadian shipbuilding. These include:

- Single Point of Accountability: In 2008, DND implemented a contracting approach for maintenance and repair for the various capital equipment programmes that developed into the In-Service Support Contracting Framework (ISSCF). Within this framework, there is a single prime contractor per system fleet, which is awarded the supply and in-service support contracts, creating a single point of accountability (SPA).
- Security of Supply: Under open market conditions, security of supply has limitations. Under the ISSCF concept, there is a prime contractor with a large number of sub-contractors, each pursuing a series of limited supply and labour objectives, introducing a level of uncertainty about continuity of specialized services and sustained availability of components into the project. When the supply chain comprises manufacturers, producers, transportation and transmission operators, distributors, suppliers, regulators and purchasers, a complication or a change in regulatory protocols can jeopardize availability and delivery.
- Market-based Industrial Regional Benefits (IRBs): Industry Canada's IRB policy requires non-Canadian suppliers of goods and services that win defence and security contracts with the government of Canada to provide Canadian companies and businesses with business opportunities at the same value of the contract.

Four years ago the federal government established a panel to study federal support to research and development and to provide advice regarding the effectiveness of federal programmes to support business and commercially oriented R&D. It was also to examine the appropriateness of the current mix and design of these programmes, as well as possible gaps in the current suite of programmes and what might be done to fill them. The panel

mandate specified that recommendations must not result in either an increase or a decrease in the overall level of funding of federal R&D initiatives. The panel produced the Jenkins Report 2011 "Innovation Canada: A Call for Action."

In brief, the Jenkins panel recommended:

- Creating an Industrial Research and Innovation Council (IRIC), with a clear business innovation mandate (including delivery of business innovation programmes, development of a business innovation talent strategy, and other duties over time) so as to enhance the impact of programmes through consolidation and improved whole-of-government evaluation.
- Simplifying the Scientific Research and Experimental Development (SR&ED) programme by basing the tax credit for small and medium-sized enterprises on labour-related costs.
- Redeploying funds from the tax credit to a more complete set of direct support initiatives to help small and medium-sized enterprises grow into larger, competitive firms.
- Making business innovation one of the core objectives of procurement, with the supporting initiatives to achieve this objective.
- Transforming the institutes of the National Research Council (NRC) into a constellation of large-scale, sectoral collaborative research and development (R&D) centres involving business, the university sector and the provinces, while transferring NRC public policy-related research activity to the appropriate federal agencies.
- Helping high-growth innovative firms access the capital they need through the establishment of new funds where gaps exist.
- Establishing a clear federal voice for innovation, and engaging in a dialogue with the provinces to improve coordination and impact.

One of the main questions that arose out of the Jenkins Report is whether or not Canada should adopt the role of classical national industrial player or be a global value-added supplier, thus moving from an integrated industry into a shared value creation system with its potential for increased earnings. If indeed Canada wants to evolve to a more global industrial approach it will need to shift its mindset. This would include the following considerations:

- Involve stakeholders: Involved and interested parties should develop an engagement strategy for interested stakeholder groups and commercial and industrial players.
- Do sweat the supply chain management details: There should be open and consistent collaboration and information sharing between the end-user and suppliers and the efficient pooling of some resources.
- Foster innovation in products, processes and management techniques, challenge the status quo and be aware of the opportunities presented by the value chain.

This is very much a balancing act. The forces at play include industrial policy *versus* markets *versus* defence requirements and procurement. These forces may conflict as the federal government seeks to minimize expenditure in response to austerity measures and to maximize the economic benefit of military contracts so as to meet the military's requirements for capital equipment.

The federal government is using new processes to address some old issues. It will be important to decide which is more beneficial, industrial policy or government regulation through the

IRB process. What are the strategic gains of each process? These are important issues to consider in the future.

Independent Cost Estimating at the Parliamentary Budget Office
Erin Barkel

The mandate of the Parliamentary Budget Office (PBO) is to provide independent analysis to Parliament on the state of the country's finances, the government's estimates and trends in the Canadian economy. Upon request from a committee or parliamentarian, it has a mandate to estimate the financial cost of any proposal for matters over which Parliament has jurisdiction.

The PBO has a legislative mandate under the *Parliament of Canada Act.* The position was created in December 2006 as part of the *Federal Accountability Act* so as to provide better transparency and credibility to the government's fiscal forecasting and budgeting and promote truth in budgeting and foster trust in government.

Three features of the PBO are worth noting:

- it is independent from government;
- it is authoritative; and
- it is non-partisan.

Financial analysis should be available to any Member of Parliament.

The Parliamentary Budget Officer is selected by the Governor in Council, holds the office for a five-year renewable term and is subject to regulations agreed upon by the Speakers of both houses and the Joint Committee devoted to the administration of the Library of Parliament. The office looks at various

sources of procurement data and comes to its own conclusions without deference to the methods relied on by government. The PBO enables parliamentarians to hold the government to account without having any interest in the outcome of the cost estimate, only in the fiscal impact.

A second key feature of the PBO is that it is as authoritative as any private sector equivalent. On larger files, such as military acquisitions, the PBO often incorporates an independent peer review to provide guidance and assure the results meet the highest standards of quality.

Finally, the PBO is non-partisan. The Parliamentary Budget Officer is an officer of the non-partisan Library of Parliament and conducts analysis for committees and parliamentarians, independent of their political affiliation. Unlike private watchdogs and think tanks receiving private funding, the PBO is not influenced by private donors or beholden to a particular political ideology. It applies accepted economic methodologies in order to provide a second opinion to Parliament on fiscal matters.

When estimating the cost of a ship, the PBO uses the US Government Accountability Office (GAO) guide to cost estimating and follows the GAO's cost estimating process, a generally accepted, internationally used process that is also used by the professional group, International Cost Estimating and Analysis Association (ICEAA). The GAO cost estimating process is a useful outline for presentations because it provides structure to what oftentimes is a messy process.

The PBO is policy neutral. The office provides an independent cost estimate to deliver the full project scope, on time. The office doesn't critique the procurement strategy, adjust the requirements or change the schedule. The office is also neutral and realistic, however, neutrality doesn't mean that it doesn't attribute a cost to the policy decision. Factors that are considered include cost of materials, cost of transportation, and labour rates

and productivity.

One example of PBO's work was the review of the Joint Support Ship schedule. In questioning the schedule reality, the PBO found (in 2008-2009) that the project schedule was not proportionate to actual schedules of similar projects and sensitivity analysis showed that the proposed schedule was sub-optimal.

When the government of Canada compresses the construction schedule in an effort to limit the delay in the delivery date, the impact is felt in terms of overtime hours, materials and quality – rework resulting from an atypical schedule. And there are other occasions when unforeseen circumstances delay the production and delivery of capital equipment, again resulting in increased costs, and the risk of inflation and escalation. Defence escalation (not platform-specific) can be conservatively estimated at 6%.

The PBO frequently hears that the solution is to take a design-to-cost, or cost as an independent variable (CAIV) approach. While both are valid approaches to managing projects, it is important to note that they are not solutions to projects that have gone off-track. While the PBO cannot comment on policy in this regard, it can caution that no amount of design-to-cost will save a project where the initial budget allocation is unrealistic.

In conclusion, the three take-away messages regarding this process are:

- policy neutrality doesn't mean that policy is free;
- scheduling slippage is a significant cost driver; and
- a valid cost estimate should reflect who we are, not who we wish to be.

The NSPS Programme View
Matthew Crawley

On 3 June 2010, the government of Canada announced Canada's National Shipbuilding Procurement Strategy. The ship construction projects provide work for Canadians working in a broad spectrum of the marine industry, much of it in the higher technology areas of work. The shipyards need to include partners and suppliers, which will increase the Canadian participation in these projects. The equipment to be installed in these vessels represents a significant portion of the ship construction cost, thus suppliers will play an important role.

As with other major capital contracts, elements of the NSPS work that is sourced offshore will be matched dollar for dollar by Industrial Regional Benefits (IRBs). Furthermore, under the conditions enumerated in the federal government's Value Proposition, shipyards are committed to invest in order to enhance Canadian marine industry.

Attributes for NSPS success include:

- Engagement: There were regular meetings with stakeholders within Canada in a lead, but listen mode. Stakeholders contributed to development of the Request for Proposals (RFP), the evaluation criteria, and the methodology and procurement schedule.
- Use of reputable third parties to validate processes and provide credibility.
- Leadership, governance and decision-making through a process that is arm's-length from political considerations, with a dispute resolution process in place, and timely, key decisions made openly and transparently by committee of deputy Ministers and communicated to the general public instantly on the website.

An NSPS governance structure has also been established to guide the work going forward.

DM Governance Committee
Is the decision-making body for NSPS.
Chair: DM PWGSC
Members: DMs of DFO, DND and Industry Canada
Ex-officio: TBS, Finance, PCO, Aboriginal Affairs and Northern Development Canada

ADM Interdepartmental Steering Committee
Provides the ongoing oversight of implementation of the decisions of the governance committee.

Project Offices
Manage individual projects

The context for the large ship portion of the NSPS is based on the need for Canada to renew the federally-owned and operated fleets. It is also based on the need that the vessels will be procured, repaired and refitted in Canada to eliminate the historic project-by-project management resulting in inefficient boom-and-bust cycles.

The benefits are that the NSPS recognizes the strategic importance of a strong domestic shipbuilding industry. As well, it supports sustainable development through a long-term approach to federal procurement, it seeks long-term benefits over short-term fixes, and it delivers value for money for taxpayers.

This is a 35-year programme of ship construction that will foster and build on the long-term nature and strong foundation of the strategic relationships. Canada and the two selected shipyards, Irving Shipbuilding (Halifax) and Seaspan (Vancouver) signed umbrella agreements in February 2012 that entrench long-

term strategic sourcing agreements that contain the framework for business and relationship management and capture the obligations (the what) of both parties as well as the means (the how) those obligations are to be fulfilled. These are not contracts, but agreements that establish the process and pre-conditions for future contracts. They made no commitments for future work.

The NSPS stipulates that a design-then-build approach is undertaken that ensures the design work is completed before proceeding to construction. The contracts to build ships will generally take place in three phases:

- Ancillary contracts: understand the requirement and the initial design;
- Construction Engineering Definition contracts: complete the design so it is ready to be built; and
- Construction Build contracts: to build the ships.

The establishment of the timelines for the phases is part of the negotiations with the shipyards. This phased approach lowers cost and schedule risks and will improve the efficiency of the shipbuilding process. The design-then-build approach also ensures that the end-user gets the designs and production details for each vessel right before the shipyards start cutting steel. This reflects current industry best practices and is reflected in the Target State requirements placed on the shipyards.

A much greater percentage of the work is now being undertaken at the front end of the process to create full models of the ship in order to resolve the many issues that can arise during design rather than discover them during the build or construction phase. The net effect is an increased cost of the design phase in order to generate savings during the much more expensive construction phase.

This mandates a three-step contracting approach: understand the design; complete the design; and build the ships. This reduces design uncertainties up front and also reduces risk for the Canadian taxpayer over the long term.

The shipyards are modernizing their infrastructure to build the ships efficiently. This modernization is designed to be done at no cost to the government of Canada**.** An independent third-party expert has defined a future Target State requirement for each shipyard and will assess the shipyards' progress in attaining it.

The designs for the first projects in both Combat and Non-Combat Packages are being finalized for production of the vessels. And the once the shipyards have completed their modernization and readiness programs, they will move to start cutting steel over the next year.

Large Ship Work Package: Combat Vessel Package

Ship Class	**Number Vessels Announced**	**Forecasted Cut Steel Date**
Arctic Offshore Patrol Ship	6 to 8	2015
Canadian Surface Combatant	up to 15	2020
Total Combat Vessel Package	up to 23	

Large Ship Work Package: Non-Combat Vessel Package

Ship Class	**Number Vessels Announced**	**Forecasted Cut Steel Date**
Offshore Fisheries Science Vessel	3	2014
Offshore Oceanographic Science Vessel	1	2015
Joint Support Ship (DND)	2	2016
Polar Icebreaker	1	2018
Offshore Patrol Vessel	up to 5	TBD
Medium Endurance Multi-Tasked Vessel	up to 5	TBD
Total Non-Combat Vessel Package	up to 17	

The Other Components of NSPS

The Canadian Coast Guard announced a $488 million programme for small boats and lifeboats which is open to smaller shipyards. Industry consultations are underway for CCG lifeboats. A further contract for large tugs for DND is scheduled for 2016 to 2018, with deliveries expected in the period 2018 to 2022. Irving and Seaspan cannot bid for any of this work.

Vessel life extensions and refits are open to all shipyards, and include:

- Canadian Coast Guard (CCG) $360M vessel life extensions

and mid-life modernizations announced in February 2013;
- Most of DND refit work is under contract with the exception of HCMS *Algonquin* the refit of which is scheduled for 2015; and
- Industry engagement has been launched for a $5 billion In-Service Support (ISS) contract for the AOPS and JSS classes targeting an RFP in 2015 with contract award in 2017.

Ships are incredibly expensive and attract huge public and media attention. NSPS has created significant expectations among Canada's shipbuilding constituencies and communities, the media and the public. However, managing a programme in an ever-evolving environment with mounting demands presents a series of demanding challenges. The boom-and-bust cycles have left few experts in Canada, requiring the shipbuilders to seek the required skillsets offshore.

There are some questions about the affordability of the NSPS that leave many people to ask how many platforms can actually be built, with what capabilities, and at what cost? Projects have big aspirations and the NSPS is setting requirements for 50 years. The schedule is an important consideration as inflation increases the cost of steel and the prices of equipment, sensors and weapons continually rise, jeopardizing the capacity of the shipyards to deliver the number of ships with the required components on time.

Much has been accomplished through the early stages of this programme, but it must be remembered that the shipbuilding programme is very complex. There is a need to get design and production details right before cutting steel to ensure that the shipyards are ready to build ships efficiently. There is also a need to manage ship delivery dates to avoid the boom-and-bust cycles of the past and to recognize that there are large expectations associated with the programmes.

Part Three: The Canadian Surface Combatant

The third panel was chaired by Ken Hansen of the CFPS. This panel (primarily made up of corporate experts) carefully scrutinized the challenging issues that will be faced with Canadian Surface Combatant (CSC) programme. The panel included the following presentations:

- What the NSPS has delivered by Ian Parker
- The CSC Statement of Requirements by Dr. Eric Lerhe
- Value Propositions and NSPS by Kevin Arthurs
- CSC evaluation challenges by Jerry McLean
- Value Propositions considerations by Rich Billard

What the NSPS has Delivered, What Remains, Government Capacity and Lessons Learned
Ian Parker

As the NSPS begins, it is worthwhile to take an analytical look at the environment that is influencing the CSC project. This will be done by broadly addressing the CSC project, the NSPS and what it did and what it did not deliver, the influences on it, both governmental and non-governmental and, finally, some of the challenges that can be drawn from this analysis.

The Canadian Surface Combatant
The CSC will be the most complex and costly single Canadian government project since the *Halifax*-class frigate construction. Replacing 15 ships to include general purpose, anti-air warfare and integrated air missile defence will not be easy.

The operational environment facing the CSC is and will be more complex than when the *Halifax*-class was delivered over 20 years ago. These new ships will be in operation for over 30 years, which means that the RCN will be operating the class in the year 2050.

We live in a different, and rather, uncomfortable world. Given the long expected operating life of these ships and the difficulty of predicting the future threat, considerable flexibility in design is required. As a consequence, the CSC will, at minimum, need to be able to conduct operations in both open ocean and littoral environments, at home and abroad, independently, part of a national task group and as part of a coalition. Moreover, the ship will probably need some Arctic capability. This combined with the distances the RCN travels and the ocean areas transited should force the government and the CSC supplier to seek innovative solutions. This occurred with the *Halifax*-class, the challenge and the question is whether or not this can be done with the CSC.

There are several aspects of this project that deserve to be treated with caution.

Specialized Professional Staff
At its peak, the *Halifax* Project Management Office (PMO) was approximately 500 personnel. At this stage, the CSC PMO is about 50. When the *Halifax*-class was being delivered, naval strength was about 18,000, including both coasts, and the navy had Ship Repair Units (SRU), the maritime requirements staff, and the Naval Central Drawing Office in Montreal.

Today, the naval strength is about 9,000, the SRUs are the Fleet Maintenance Facilities (FMF), and the Fleet Maintenance Groups (FMG) and the Naval Central Drawing Office no longer exist. The Director General Maritime Equipment Management (DGMEM) has become the smaller Director General Maritime Equipment Programme Management (DGMEPM). In the past, the RCN was able to grow its establishments with project management positions.

When the RCN needed to crew the Canadian Patrol Frigate (CPF) there was a depth of engineers, logisticians and warfare officers on which to draw. The same number of specialized professionals is no longer available to the same degree.

National Shipbuilding Experience

When producing the *Tribal*-class fleet in the late 1960s, the RCN benefitted from both in-house and Canadian industrial experience that came from the shipbuilding programmes of 20 escort destroyers of the *St. Laurent*-class and its derivatives in the decades before. When the *Halifax*-class was constructed in the late 1980s, there was still a skilled pool of shipbuilding professionals. At that same time, Defence Research and Development Canada (DRDC) was a robust R&D establishment that collaborated with industry on innovative sensor systems, such as Canadian Towed Array Sonar System (CANTASS), Shipboard Integrated Processing and Display System (SHINPADS), Canadian Naval Electronic Warfare System (CANEWS), among others. These initiatives either influenced ships' requirements and designs or were integrated into the warships.

Canada no longer has this same degree of expertise and experience. The staff either retired or were eliminated in the 1990s. While industry can attract these professionals, it is not so easily done within government service.

NSPS

In his 2013 report, the Auditor General stated "[t]he selection of shipyards was efficient and successful." In fact, the Canadian government has cited the NSPS as a new type of responsible defence procurement and it has, to a degree, been used as the stepping-stone for the new government defence procurement strategy.

When designing and building a ship, particularly a complex warship, more is required than only a shipyard. Irving's Halifax Shipyard is an excellent choice for the new CSC. Irving provided Canada with the *Halifax*-class, the finest frigate in the class at the time, and the ships continue to be workhorses that, even today, are second to none.

But there is still work to be done. A combat system designer and integrator, a design house, a platform integrator and, perhaps, even a prime contractor still need to be identified. In the case of each of the other CCG and Navy NSPS projects, which total $7 billion in value, the shipyard either by default or by schedule became the prime contractor and was able to select its team. But this is not the case for the CSC. There is a good shipyard but the team has yet to be developed. This is a key issue that may determine the fate, the capability and the outcome of the CSC.

Each of the NSPS projects was, in one form or another, proceeding prior to the establishment of the NSPS. It would seem that within both the CCG and the DND procurement staffs, there is a desire to see, touch and feel a drawing, a modified off-the-shelf (MOTS) or a commercial off-the-shelf (COTS) solution. Each CCG project had independently contracted for a design prior to engaging the shipyard. Once the shipyard became involved the designs all required significant modification at a cost to the taxpayer. A similar situation exists for the AOPS and the JSS.

There is discussion among the Ottawa-based procurement staff about requiring a "certified design" as part of the selection of a combat systems integrator for the CSC. This would be a design selected and developed independently of the shipyard or the prime contractor. Given that there is no MOTS design that meets the known unclassified, high-level CSC requirement, there is a high probability that, similar to other NSPS vessels, significant additional investment will be required to modify any selected design once the shipyard and/or the prime contractor becomes involved. This could lead to a reduction in capability.

Lessons learned from the Australian Air Warfare Destroyer (AWD) project would reinforce the fact that choosing a design prior to the involvement of the shipyard and the prime contractor will create delays, increase cost and create delivery turmoil.

Government-Related Influences

Government seldom stays still. Each of the following influences is having an impact on how the CSC project will evolve. They can be categorized as foundational influences, decision-based influences and reactive influences.

Foundational Influences

- The Emerson Report (2012), a key aerospace report for government, advocates focus and investment in the aerospace sector of Canadian industry;
- The Jenkins Report (2011) identifies key industrial capabilities and recommends investment;
- The Parliamentary Budget Office in 2013 conducted a feasibility study for the acquisition of two JSSs, and advocated that there was and continues to be a need to budget for success for large complex projects;
- The 2013 Auditor General report, in addressing the NSPS, suggested that individual shipbuilding project budgets were established too early, were insufficient and, perhaps, there was a need to re-evaluate budgets; and
- Unification/integration of the Canadian Armed Forces and the establishment of an integrated national headquarters nullified the RCN management of fleet replacements.

Decision-Based Influences

- The fixed-wing search and rescue (FWSAR) project ushered in the introduction of a third-party review of requirements;
- NSPS introduced the establishment of the first secretariat;
- The new fighter aircraft created another secretariat, the expansion of third-party review, and the questioning of Canadian military capability to develop valid requirements;
- The Close Combat Vehicle (CCV) cancellation was another challenge of requirements;
- The truck project failure claims of requirement and cost-creep generated a refusal to recognize combat-based lessons learned;
- The evolution of a defence procurement secretariat as part of the new defence procurement strategy; and
- The shift of naval and military procurement focus and control from DND to PWGSC.

Reactive Influences

- Other government departments have been second-guessing the requirements and asking if DND is gold-plating the Statements of Requirements;
- There is increased engagement with industry but the impact and influence on final outcomes may not be understood;
- There is a decrease in foreign markets for international suppliers, and thus keen focus on Canada;
- There is significant lobbying by foreign companies of Canadian elected and non-elected members of government;

- There are suppliers threatening not to compete unless the competition is structured according to their advantage; and
- There is significant foreign government interest, involvement and support for their homegrown industries.

Finally, the government's new Defence Procurement Strategy will have a direct impact on the CSC project.

Defence Procurement Strategy

The new Defence Procurement Strategy (DPS) was announced on 5 February 2013 by Ministers Diane Findley and Robert Nicholson to reflect the government's intent to:

- deliver the right equipment to the Canadian Armed Forces and the Canadian Coast Guard in a timely manner;
- leverage defence equipment purchases to create jobs and economic growth in Canada; and
- streamline the defence procurement process.

There are some interesting issues that have evolved since the initial announcement of the DPS.

During Minister Findley's address at the Ottawa-based defence and security exhibition, CANSEC, she made it quite clear that companies that demonstrate a willingness to invest in Canada through the transfer of intellectual property, the creation of skill jobs, innovation-related activities and export, and international business development will have a competitive advantage when bids are evaluated.

This indicates a significant change in the Canadian government's approach to capital equipment procurement programmes. Previously, these issues were not evaluated in the requirements and were included in Industrial Regional Benefits. Essentially a supplier could either be compliant or non-compliant.

During CANSEC the Minister also stated "with the establishment of the Defence Procurement Secretariat and the working group of ministers, major decisions on procurement processes will be made in a joined-up way, so that the right outcomes can be achieved in a much more timely fashion." This too was a significant change.

How this new governance structure will play out as the DPS unfolds is not yet clear although one can and should anticipate a significant impact on CSC. We are still in the early stages for the new Defence Procurement Strategy. Through discussions, briefings and seminars, as well as through specific wording in procurement documents, it is possible to penetrate some of government's thinking. However, the government is taking a top-down strategic approach so there will be missteps and perhaps some confusion as the bureaucracy attempts to operationalize this strategy.

There are some areas of interest that bear watching as the strategy becomes operational. The first to watch is the development of Key Industrial Capabilities (KICs). These are intended to derive potential economic benefits from industrial procurements to increase the competitiveness of Canadian firms in the global marketplace. In the Jenkins Report there were six, we now understand this has expanded to 14, but they have yet to be published.

Second, an independent, third-party challenge function has been established within DND for military requirements. How this is to be done is yet to unfold fully. But there are signs that the government is seeking third-party technical and design assistance to offset the lack of capacity.

The role and impact of the independent, third-party Defence Analytics Institute (DAI), which is to provide expert analysis to support the objectives of the Defence Procurement Strategy and its evaluation, has yet to play out. The interim board, selected by

government, has been charged with developing the institute's mandate and scope of activities. The government estimates that a permanent DAI will be established in 2015, a potential election year and perhaps a decision year for CSC.

A final point is the establishment of a Defence Procurement Secretariat within PWGSC. The intent is to ensure close co-ordination of many departments. One has to wonder how this mandate is different from that of the DND's ADM (Mat) and PWGSC's ADM Procurement. Is this another coordinating bureaucracy that could bring more delay or more rapid delivery on all questions that have an impact on the CSC?

The CSC is already entangled in the unfolding of the DPS as well as the influences on the defence procurement processes. During the initial stages of the NSPS process the government approved a procurement model that in the current terminology is called the most capable design. This is essentially a classic competitive definition phase leading to the selection of a winner. How this will work with the selected shipyard and the multiple supporting teams, given all the work in which the yard is currently involved, is an ongoing concern. Moreover, a prime contractor has yet to be identified.

Current practices and procedures mandate an increased engagement with industry. As noted earlier, industry favoured a procurement approach that is somewhat different than the government's. Essentially industry favours what is now known as the most qualified team.

The considerations of reactive influence, reduced foreign markets and a consequent focus on the Canadian market linked to increased foreign and commercial lobbying and the concerns about choosing a design too early in the process are now directly affecting what procurement approach the government will take for the CSC.

It is essential to remember that defence procurement is a

complex and bureaucratic enterprise. Canada is not alone in this regard. The government's basic objective is to provide the military with the best equipment while keeping costs as low as possible and providing rapid, reliable and efficient delivery. Added to this are the considerations of job creation, value propositions, industrial competitiveness and economic growth. It is obvious that there will be compromises, but which compromises will be made and what impact this will have on the CSC and the capability of the RCN is a basic question.

Conclusions

Defence procurement as practiced in Canada and in other free market states is complex. There is no silver bullet. Building a warship is perhaps the most complex of defence procurements and for Canada, the CSC will the most complex procurement to date. Government has taken a strategic decision to build its complex ships in Canada. Moreover, it has taken this step further in the Defence Procurement Strategy to create a strategic investment in specific industrial sectors (or KICs).

This is good for the RCN fleet renewal and good for the CSC project. However there are challenges for the project, including:

- First, the RCN will receive a replacement for both the *Iroquois*-class and the *Halifax*-class. The challenge is how the leadership can influence the outcome given that the RCN does not directly control the outcome. This is not because of a lack of leadership but because of the structure of the CAF and DND.
- The second challenge is the procurement approach. Will it be the most capable design or the most qualified team? This decision could in some way determine the capability of the CSC.
- Third, does the government have the capacity to manage the

project and if not, how will it get the capacity?
- And the fourth, but not the final challenge, is what will tip the scales in any competition: a capable ship that meets the needs of the RCN and Canada, or jobs? And who will decide?

It is probable that the Canadian government will provide the RCN with the means to accomplish its assigned missions, but the road ahead may not be smooth or straight.

The CSC Statement of Requirements: Pushing the Envelope

Dr. Eric Lerhe

Project Overview

Canada has the world's longest coastline, bounded by three oceans, and requires protection of its maritime approaches from smuggling, trafficking and pollution. The federal government also provides life-saving search and rescue, as well as opportunities for scientific research. Federal fleets also act internationally to meet commitments and protect Canadian interests.

In June 2010, the government of Canada announced the National Shipbuilding Procurement Strategy to replace the current surface fleets of the Royal Canadian Navy and the Canadian Coast Guard. The first vessels to be constructed will be the Arctic Offshore Patrol Ships (AOPS) for the Royal Canadian Navy, followed by the Canadian Surface Combatant (CSC). The Joint Support Ships (JSS) will be built for the Royal Canadian Navy under the non-combat work package.

The CSC project will renew the RCN's surface combat fleet by replacing the capabilities provided by the destroyers (*Iroquois*-class) and the multi-role patrol frigates (*Halifax*-

class). This is the largest and most complex shipbuilding initiative in Canada since World War II and will ensure that the Canadian Armed Forces (CAF) can continue to monitor and defend Canadian waters and contribute to international naval operations.

The complexity of the CSC project has led the Canadian government to take a measured approach to project definition, beginning with extensive industry consultation to establish the course for the subsequent phases of the project, leading to developing the optimal ship design, costs and timelines.

The Irving Shipyard is expected to begin cutting steel in 2020 and deliver the first vessel in 2025. The last ship is expected to be delivered to the RCN in 2032 to 2034, approximately 20 years from now, and will be in service for 30 years, until after 2060.

The RCN is expected to receive two CSC variants: Area Air Defence and Task Group Command and Control (AAD/TG); and a General Purpose (GP) version. The GP version is intended to serve in three operational profiles:

- a task group environment;
- open ocean and littoral operational environments; and
- an increased requirement for joint operations.

The CSC statement of requirements is currently in draft form and is being developed as a result of in-house DND analysis with whole-of-government input, extensive DND and DRDC modeling, research and simulation that is based on what is known as synthetic environment based architecture, and four separate DND-PWGSC-Industry Technical Engagement with Industry (TEI) consultations.

This presentation examines the 'Draft Warship Requirements' used during the TEI consultations and attempts to assess

how they correspond with global warship trends.

The Global Warship Environment

In attempting to outline the future warship operating environment, the experience of other navies, and particularly the US Navy, offers some guidance. In his article "Building the Surface Fleet of Tomorrow" in the January 2014 US Naval Institute *Proceedings*, Rear Admiral Thomas Rowden (USN) opined that the world will be more multi-polar than it is now, with the United States, China, Russia, India, Brazil and the Eurozone all vying for resources and for economic, political and sometimes, military power and influence. Within this environment, the United States will maintain powerful naval forces forward, present, visible and ready to protect and sustain American global interests in a world of changing power dynamics.

He also noted that unless there is a period of sustained conflict, the resources allocated to the US Navy, in constant dollars, will not dramatically rise or decline. And, the overwhelming majority of ships in the 2034 surface force are currently in service or in advanced design stages. The Canadian situation is unlikely to be any different.

Currently, some 90% of the world's trade is on the oceans, and the volume of this ocean-borne trade will dramatically increase. In the near term, the international strategic outlook is undergoing rapid change. There are several major South China Sea disputes and followed by the US decision to undertake its major USN 'Pacific Pivot.' Russia is, once again, flexing its military muscle and engaging players outside its own borders. The long-running Western land presence is being replaced by naval forces in the Middle East and Southeast Asia and there is a significant call for the US Navy's on-station ships for ballistic missile defence (BMD) worldwide.

Warship Trends

During the past 20 years of Western naval operations there has been an increased emphasis on land strike and support to land operations and maritime interdiction operations. This, in turn, has led call to return and reinforce the traditional maritime warfare capabilities with an emphasis on anti-submarine warfare (ASW). Similarly, the US Navy predicts a return to Cold War-era large-scale electronic warfare concepts of operation.

With the limited funds available for the CSC, the RCN has called for a vessel that has the attributes of flexibility, commonality, scalability, cargo capacity, ability to partner with vessels of other navies, and modularity. As well, it must be able to accommodate one or two maritime helicopters. The United States Navy calls for similar flexibility, and US Secretary of Defense Chuck Hagel declared "[g]iven continued fiscal constraints, we must direct shipbuilding resources toward platforms that can operate in every region and along the full spectrum of conflict" (24 February 2014). The first casualty of this call for greater flexibility is likely to be the highly specialized Littoral Combat Ship.

Reduced Crewing

There is a worldwide push for reduced warship crew sizes. Given the staffing shortages within the RCN, there was an initial hope that the CSC could be crewed by a reduced complement perhaps of 100. The USN *Freedom*-class Littoral Combat Ship has a core crew of 50, and 65 but there is serious concern now over this vessel's small crew and limited flexibility. Elsewhere, the French multi-mission frigate (FREMM) can sail with a crew of 95, but can accommodate up to 155 personnel and HMS *Daring*, the Royal Navy's Type 45 air defence destroyer, has a regular crew of 190, but can accommodate up to 232. There is thus greater caution in moving towards very small warship crews.

Integrated Combat Systems

Sensors: The CSC requirements call for active electronically scanned arrays and this is becoming the world naval standard. Other states are calling for electric propulsion which could feature integrated full electric propulsion (IFEP). That, in turn, provides design flexibility and improved efficiency, modularity, signature reduction, zonal survivability, auto reconfigurability, improved reliability, reduced life-cycle costs, and flexibility for up-grading, better survivability and lower operating cost. The CSC requirements keep this option open.

Anti-Submarine Warfare (ASW): With some 40 states operating a total of approximately 400 submarines of various ages, roles and types, the CSC will need to conduct anti-submarine warfare operations and the requirements call for low frequency active arrays, offboard decoys, minehunting sonars and the ability to conduct multi-static operations.

The concept in multi-static ASW operations is to share sonar information amongst a number of dispersed ASW units using a communications network to increase the effectiveness of the assets. The information is used both for augmenting a shared view of the ASW operation by contributing to the common operating picture and for improving sonar performance. In essence multi-static ASW is an example of a networked-enabled capability since sharing sensor information to increase the effectiveness of the whole system is central in a multi-static sonar system.

Anti-air Warfare (AAW): The ship design calls for an integrated anti-air warfare capability that will feature Vertical Launch Systems (VLS) with 24 to 32 cells, ballistic missile defence (BMD) (limited), sea-based air defence, short- and long-range surface-to-air missiles, and cooperative engagement capability (CEC). The requirements also allow the possibility of a future hyper-velocity gun.

Anti-surface Warfare (ASUW): The Canadian Surface Combatant will also need to conduct anti-surface warfare, and the requirements call for surface-to-surface missiles, a naval gunfire support (NGS) capable 5-inch gun and land attack missiles.

Conclusion

A question that deserves to be addressed is whether or not the CSC is pushing the envelope. The draft CSC Statement of Requirements (SOR) moves well beyond the status quo and responds well to emerging international warship trends. However, the principal concern to be resolved is the tradeoff(s) to be made based on the cost versus the number of ships versus the capabilities sought.

While there are issues of cost and timing associated with the CSC, the programme's SOR process appears to be sound and well-suited to addressing the challenges of the future maritime security environment. It is a well thought out vessel that will be designed to operate within the evolving international maritime scene. In addition to involving extensive industry consultation, the ship requirements are also supported by an extensive in-house modeling effort (Synthetic Environment Based Acquisition). However, given cost concerns within a regime of tight defence budgets, it is likely that many of the draft requirements will be considered aspirational and may have to be considered for much later insertion. This is not a bad thing.

Value Propositions and NSPS: A Canadian Success Story?

Kevin Arthurs

The NSPS programme has been proclaimed as a breakthrough for the future of shipbuilding in Canada. Shipbuilding in Canada has for many years suffered from a boom-and-bust cycle, forcing every shipyard to compete for every government of Canada programme with no certainty of success and not allowing shipbuilding companies to provide the investment required to become competitive and thus remain relevant internationally as well as domestically. Protecting the Canadian shipyards and their expertise allows them the stability needed to retain the skillsets in Canada, and thus protecting the source of supply of the Canadian government's fleet. But what about all those other industries that support the government fleets – navy and coast guard? It is obvious that they will be needed during the NSPS fleet renewal. There should be significant work in every area of expertise.

Let's go back in time a little when IRBs were IRBs and were not yet renamed and refocused into ITBs or value propositions, before KICs were proposed by Emerson or Jenkins. In 1983, the last Canadian naval shipbuilding contract for the Canadian Patrol Frigates Programme (CPF) was signed. Saint John Shipbuilding Ltd (SJSL) (the jewel of Irving Shipbuilding at the time but since closed due to pre-NSPS uncertainty) as the prime contractor was entrusted under the fleet renewal of the time to design and build six (later increased to 12) frigates.

As part of that programme, Canada (not just DND) required some brave new technologies to be produced to catapult the RCN into the forefront of the current day naval capabilities. Canada had set its sights on a high level of integration and very low fault tolerance not yet seen in naval systems. All required local area

networks (LANs) of some degree. LANs at the time were leading edge. The first reported commercial LAN was in fact installed in 1977 in the Chase Manhattan Bank. This LAN was solely used to access a common database and printers from multiple terminals.

In the United States the Mitre Corporation was investigating the use of a multiple-bus local area network architecture for making tactical command and control systems more survivable and had developed an experimental survivable network (SURVNET). Canada's ambitions were higher. The Shipboard Integrated Communications (SHINCOM), Integrated Machinery Control (SHINMACS) and Integrated Processing and Display systems (SHINPADS) were all specified to be developed in Canada. They not only share information but control significant systems while providing increased decision aids to the naval operators as well as providing the survivability that was only being studied elsewhere.

The gestation of some of these had come from Canadian government personnel in various internally funded projects in the mid- to late 1970s. In fact SHINPADS technology was exported even before it was used in a Canadian system (by Sperry, now Lockheed Martin). The US Airborne Command and Control System (ACCS) and the Marine Air Traffic Control and Landing System (MATCALS) were the first systems fielded with this revolutionary redundant and distributed computer architecture. Remember that in 1983 military processors were just being passed by the commercial desktop in terms of performance. IBM's XT just hit the market in March 1983 and the TCP JIP standard had just been introduced. The ARPANET was just being used for civilian research programmes as a forerunner to the internet. The World Wide Web did not open for business until 1991.

These systems were not only developed for the CPF pro-

gramme but many saw significant commercial success outside of it. L-3 MAPPS with SHINMACS (currently branded IPMS) and DRS with SHINCOM have carved out international markets for some time. Although the SHINPADS concept was Canadian by birth, significant technology transfer from the United States was necessary on the CPF programme to ensure the idea became reality and to bring it fully into production. Other technologies have also come from the Canadian Patrol Frigate programme from infrared suppression and prediction (Davis Engineering) to hanger doors and helicopter hauldown systems (DAF INDALL). The CPF programme advanced many Canadian technologies and companies into the limelight.

This naval technology timeline is a continuum. The *Halifax*-class Modernization Frigate Life Extension (HCM FELEX) programme embraces the technologies from the CPF programme with obvious modernizations and upgrades to the proprietary LANs to embrace open standards as well as commercial-off-the-shelf (COTS) equipment with increased modernized functionalities. DRS SHINCOM, L3MAPPS IPMS, LMC modernized SHINPADS now CMS 330 have all been brought forward into HCM.

Other Canadian naval technologies have also become obvious as well. Open Systems Interconnection (OSI) has captured a world market in navigation and electronic chart systems. IBM Canada has benefitted from a technology transfer of data-link technology and now holds a product mandate for export of multi-link systems with a significant multi-link lab here in Canada. Infield Scientific has become internationally recognized as naval electromagnetic environment experts, and CAE, long established and known for flight training systems, has established itself in the naval training market as well with its recent Naval Warfare Training System contract in Sweden.

I am proud to say that the SHINPADS legacy held by

Lockheed Martin Canada has recently achieved some modicum of international success as the new variant (CMS 330) is part of the recent contract signing (29 April 2014) with the Royal New Zealand Navy (RNZN) to upgrade two of its frigates. This is a success for Lockheed Martin Canada but there are other Canadian companies benefitting as well: IBM Canada's Multi-link, and Infield Scientific's electromagnetic environment expertise are also part of the programme. It is likely that the option for DRS Canada's SHINCOM will be taken up, and due to the confidence placed in Seaspan by the NSPS and FELEX programmes, the refits will likely occur in Victoria at VicShips, a Canadian shipyard export.

These have all originated under the previous IRB mandates. The new ITB Value Proposition approach should be seen as a fall out of the Jenkins and Emerson Reports. They will and should affect all NSPS programmes going forward. They should:

- identify the key industrial capabilities (KICs);
- protect the capabilities in country;
- define the new areas of technology needed by Canada in areas of concern to sovereignty; and
- use the ITB Value Proposition Programme as part of the NSPS.

The second bullet above can be interpreted to conflict with the compete at all cost mentality that has crept into many Canadian procurement decisions.

As noted in the beginning of these remarks, shipbuilding in Canada has for many years suffered from a boom-and-bust cycle, forcing every shipyard to compete for every government of Canada programme with no certainty of success and not allowing shipbuilding companies to provide the investment required to become competitive and thus remain relevant internationally as

well as domestically. Protecting the Canadian shipyards and their expertise allows them the stability needed to retain the skillsets in Canada, and thus protecting the source of supply of the Canadian government's fleets and sovereignty over such.

Let's replace 'shipbuilding' with defence, in particular naval defence industry:

> Naval defence industry in Canada has for many years suffered from a boom-and-bust cycle not allowing naval defence industry companies to provide the investment required to remain competitive and thus remain relevant internationally as well as domestically. Protecting the naval defence industry, their expertise allows them the stability needed to retain the skillsets in Canada and thus protecting the source of supply of the Canadian government's fleets and sovereignty over such.

This sentiment has been heard in the bazaars of industry over the past years. Not because they are afraid to compete but because many offshore companies do benefit from government subsidies and protection that can place Canadian defence industry companies at a disadvantage internationally and in many cases domestically. Canadian procurement policies have been that competition is the only value proposition that returns benefits to the taxpayer. Any advantage inherent in being Canadian must be dismissed to level the playing field to ensure there is a competition. This attitude begs a couple of questions:

- Should the Canadian investment in the currently existing KICs, the technologies that current Canadian companies have sustained from various IRB programmes, be recognized/protected instead of simply providing the right to compete?

- How do we (Canada) ensure that the teaming constructs that industry has put or is putting into place currently to prepare for NSPS programmes will honour such and at least allow the current KICs to compete?

Canada's NSPS Successes and Transitioning to CSC Challenges

Jerry MacLean

In 16 months the Canadian government went from project announcement to selecting both NSPS shipyards. The CSC project is a very effective process that enabled selection of a shipbuilding team without external interference, an extremely difficult procurement activity that met the timeline challenges. I would like to discuss Thales' perception of how the NSPS achieved this.

The tenets of NSPS:

- industry engagement: well-established communication links with the potential prime contractors and government;
- governance structure: well-established with logical escalation, if required; and
- independent third-party assessment: First Marine International (FMI) effectively contributed to selecting baselining teams and established the metrics to assess plans. This firm's credibility and credentials are unquestioned.

A number of elements of the NSPS process have proceeded smoothly:

- selection of the potential shipyards was done quickly;
- smaller groups were able to deal aggressively with major

issues and arrived at consensus in a timely fashion;
- agreement on the evaluation criteria for the winning shipyards was arrived at in an integrated team fashion;
- First Marine International (FMI) evaluations of yards were done in a very focused fashion with strong and proven metrics that demanded demonstration of capabilities to evaluate baseline status of each yard;
- RFP capability assessments were clear on expectations for the prime contractors and where partners can deliver capability that are not pre-existing in the shipyard;
- the 'target state' was well-defined up front with clear requirements on the RFP plans required to demonstrate the shipyards' ability to meet these target states;
- FMI engagement was well-planned and executed with excellent feedback and a means to challenge its assessments to ensure an accurate score;
- with the value proposition in its embryonic state, value to Canada in developing the maritime domain was critical to its evaluation.

There remain a number of factors yet to be considered as the CSC draws closer:

- the selection of the potential teams should be done quickly. Procurement decisions delay this process. Ideally, doing Solicitation of Interest and Qualifications (SOIQ) to reduce quickly the applicant groups would help focus discussions and facilitate decision-making;
- smaller groups should be established to deal with major issues and arrive at a consensus when needed. This is an effective means to get buy-in from industries; and
- agreement on the criteria and means to evaluate the winning teams should be achieved in an integrated fashion. The CSC,

as an NSPS programme, has its own unique complexities.

FMI provided independent, third-party evaluations of teams in a very focused manner with strong and proven metrics, demanding the demonstration of capabilities to evaluate baselines.

The target state of CSC capabilities is well-defined up front with clear requirements on the RFP where plans and solutions are required to demonstrate the teams' capabilities. Clear definition of requirements is critical. Recent RFIs are a good start to understand better. How does Canada deliver a bulletproof SOR? If not, then what requirements are used to define baselines in an unbiased fashion?

Third-party engagement was well-planned and executed with excellent feedback and a means to challenge the assessments to ensure an accurate score. It isn't certain that this can happen in CSC. It is ideal but fraught with risk.

The Value Proposition is also under development and much more advanced than the NSPS. This is absolutely required for CSC and Canadian industry.

Conclusion

The CSC is a highly complex procurement programme that will have many of its own challenges. NSPS is a good base model but is not a panacea for all aspects. The evaluation methodology will be the key to its ultimate success.

The PMO CSC is working proactively on the challenges as industry is standing by and will help when called upon.

Improving Economic Outcomes: Value Proposition Considerations
Rich Billard

Industry experience has shown that Industrial and Regional Benefits (IRBs) must translate into Industrial Technical Benefits (ITBs). The 'Rated and Weighted' Value Proposition must be informed by the following:

- Key Industrial Capabilities (KICs) criteria;
- analysis of KIC market segments; and
- industrial engagement.

Where the government chooses to specify a targeted, desired industrial outcome, mandatory requirements will be used as appropriate. Bidders will be required to submit ITB plans that undertake to invest in Canada 100% of the contract value and to develop regional benefits across all regions of Canada.

The objectives of the new Defence Procurement Strategy are to:

- deliver the right equipment in a timely manner;
- leverage purchases to create jobs and economic growth; and
- streamline defence procurement processes.

Industry can have the greatest impact on the second objective. But importantly how do Canadian companies leverage the value proposition? To create jobs and economic growth in Canada certain factors are important such as intellectual property, value-added products or services, and the company's ability to export.

There also exists an intellectual property (IP) conundrum. It is well understood that sustained growth is only possible through

export but often the low-risk solution is to choose systems that are already in use by other countries. However there is the likelihood that there is a foreign Original Equipment Manufacturer (OEM) that owns the intellectual property associated with that system. So an important question arises, namely how does Canada ensure that Canadian companies will have access to that IP to deliver and support those systems? How do Canadian companies then add value and perhaps some of their own IP so that the capability is exportable in the global market?

These are important questions that deserve closer attention as the NSPS and the value proposition activities mature.

Concluding Remarks

The organizers would once again like to thank all of the generous sponsors, volunteers, presenters, panel Chairs and participants for attending this inaugural NSPS Workshop. The Centre for Foreign Policy Studies has already posted all the original presentations from this workshop on its website with details at http://www.dal.ca/dept/cfps.html.

Upcoming Events

CFPS is already in the planning stages for the second in a series of NSPS Workshops at Dalhousie University. Our next workshop in the Maritime Security Programme Workshop Series is entitled, "National Shipbuilding Procurement Strategy Part II: 'Human Capital' and the NSPS." It will occur in a one-day format on Friday, 14 November 2014 at University Hall, MacDonald Building at Dalhousie University.

Synopsis of the November Workshop

Given that personnel costs account for nearly 50% of the budgets of most organizations, it is vital that we take a comprehensive look at the human resource issues associated with the NSPS. The purpose of this workshop is to bring together invited representatives from industry, academia and the federal and provincial governments, including the RCN and international navies, to identify, discuss and share their perspectives on the potential challenges concerning the human dimension of ships and shipbuilding.

Research to date on this issue suggests that there is significant risk associated with the personnel aspects of the NSPS, particularly given the planned shift to a long-term and virtually continuous building approach to national shipbuilding. The key challenge will be ensuring that the right quality and quantity of skilled personnel is available over the next 30+ years to meet the needs of the NSPS.

In order to allow for fulsome discussion of this topic the day's events will progress through three themed panels entitled Building, Crewing and Sustaining. By breaking out the discussion into these panels the presenters will be able to cover the full spectrum of human demands in the NSPS. Additional panel topics may also be explored as workshop preparations continue.

We hope that you will join us for the next in the series of NSPS workshops at Dalhousie University.

Workshop Programme of Events

Friday, 6 June 2014
Location: 6300 Coburg Rd., Dalhousie University Hall, MacDonald Building, Dalhousie University, Halifax, NS

0815 - 0830: *Introduction and Welcome*
0830 - 0915: *Special Presentations*

- Joint Support Ship (JSS) General Arrangement Drawings (**Mr. Brian Lavigne**, JSS Programme Office, Department of National Defence, Materiel Group)
- Arctic/Offshore Patrol Ship (AOPS) General Arrangement Drawings (**LCdr Jamie Sangster**, AOPS Programme Office, Department of National Defence, Materiel Group)
- The scientific/research implications of the AOPS (**Jim Hanlon**, Chief Executive Officer, Institute for Ocean Research Enterprise (IORE))

0920 - 1030: *Morning Panel Discussion*
NSPS: Current Progress and Potential Future Challenges
Chair: Dr. Eric Lerhe, Dalhousie/CFPS

- Budget 2014, the CFDS Reset, and the Impact on the NSPS (**David Perry**, Senior Security and Defence Analyst, CDA Institute)
- Key Industrial Capabilities and the NSPS: Sailing Toward Global Leadership (**Dr. Yan Cimon**, Associate Professor, Department of Management, Laval University)

- The Method to our Madness: Independent Cost Estimating at the PBO (**Erin Barkel**, Office of the Parliamentary Budget Officer)
- The NSPS Programme View (**Matthew Crawley**, PWGSC, Senior Director, National Shipbuilding Procurement Strategy Secretariat)

1030 - 1050: *Coffee break*
1050 - 1150: *Moderated Q&A Session for Morning Panel*
1150 - 1210: *Morning Session Wrap Up and Take-Away*
1210 - 1310: *Lunch*
1310 - 1440: *Afternoon Panel Discussion*
The Canadian Surface Combatant (CSC)
Chair: Ken Hansen, Dalhousie/CFPS

- What the NSPS has Delivered, What Remains, Government Capacity and Lessons Learned (**Ian Parker**, CFN Consultants)
- The CSC Statement of Requirements: Pushing the Envelope? (**Eric Lerhe**, Dalhousie/CFPS)

Industry perspectives for delivering the capability:

- Lockheed Martin Canada, "The Evolution of Canadian Command and Control Systems" (**Kevin Arthurs**, Director of Engineering)
- Thales, "CSC Evaluation Challenges" (**Jerry McLean**, VP Marketing and Sales)
- MDA Corporation, "Improving Economic Outcomes: Value Propositions Considerations" (**Rich Billard**, Manager Business Development, Defence Systems)

1440 - 1500: *Coffee break*
1500 - 1600: *Moderated Q&A Session for Afternoon Panel*
1600 - 1620: *Afternoon Session Wrap Up and Take-Away*
1620 - 1630: *Workshop Closing Remarks*

About the Workshop Presenters and Chairs

Kevin Arthurs

Kevin Arthurs leads Lockheed Martin Canada's Naval Systems Department. His team oversees the requirements analysis, system architecture development and system design of both current and future Naval Combat Systems Integration Programmes. His expertise was gained though over 35 years of design, integration, test, trials and in-service support of naval combat systems.

Prior to joining Lockheed Martin Canada Mr. Arthurs held the position of Combat Systems Manager with Saint John Shipbuilding Limited during the Canadian Patrol Frigate Programme.

In his current role he is responsible for the Arctic Offshore Patrol Ship Command and Surveillance Systems Integrator (AOPS C&SSI) programme (in design phase with Irving Shipbuilding) and the recently signed Frigate Systems Upgrade (FSU) modernization of two ANZAC-class frigates for the Royal New Zealand Navy as well as future naval programmes.

Since he left the navy for industry he has worked continuously with the RCN as an industrial partner applied to modernizing the naval fleet. His experience with shipyards has been significant in the ship build and mid-life refit arenas.

Erin Barkel

Erin Barkel is a Financial Analyst working in the Office of the Parliamentary Budget Officer (PBO). Before joining the PBO, Erin was an analyst at the Treasury Board Secretariat, providing

policy advice on investment plans and projects. She holds a BASc (Industrial Engineering) from the University of Toronto and an MBA from the Ted Rogers School of Management at Ryerson University. In her spare time she is slowly pursuing a PhD in Management at the Sprott School of Business at Carleton University.

Rich Billard

Rich Billard has been the Business Development Manager for MDA Systems Ltd. for the past four years. MDA is a Global Communications and Defence Company with offices across Canada (Halifax, Montreal, Ottawa and Toronto with its headquarters in Vancouver). Each office has a focus area with the Halifax office focused on defence and primarily support for RCN programmes such as the *Kingston*-class ISS, *Victoria*-class Trainers, and the Maritime Command Operational Information System. They also have a team supporting the satellite work for the new RADARSAT Constellation Mission (RCM) and another team leading the Northern Watch Technical Demonstration Programme with DRDC (A).

Prior to joining MDA he served for 20 years in the RCN retiring as a Commander. While serving he obtained a Masters in Defence Studies from the CF Staff College in Toronto, an MBA from the Sobey School of Business at Saint Mary's University in Halifax and a Bachelor of Chemical and Materiel Engineering from the Royal Military College in Kingston. Some notable postings included DMSS 8 (Command Control and Communications) in Ottawa, Senior Staff Officer Engineering and Maintenance at MARLANT HQ in Halifax, and as the Combat Systems Engineering Officer in HMCS *Charlottetown* for *Operation Apollo*.

Yan Cimon

Yan Cimon, CD, PhD (HEC Montreal) is Associate Professor of Strategy at the Faculty of Business Administration at Université Laval (Quebec City, Canada). An alumni of the Defense Planning and Resources Management Programme of National Defense University (Washington, DC), he is Deputy Director of CIRRELT (Quebec), the Inter-university Research Center on Enterprise Networks, Logistics and Transportation. He is also an associate member of HEI, the Quebec Institute for Advanced International Studies. Keenly interested in North America's firms and business environment, his research focuses on strategic and network-related issues in several industries (aerospace and defence, automotive technology and biotech among others) that face a globalizing economy.

He held the Fulbright Visiting Chair in Innovation at the University of Washington (Seattle) in the Fall of 2012 where he studied the integration of North American value chains. His work has had a significant impact on academia and practice earning him a 2010 Star Researcher Award at the *Rendez-vous du Savoir*. Prior to his academic career, he worked in the Real-time Embedded Systems division of a major multinational firm in the defence industry. An author of numerous papers and conferences, he was elected to *Alpha Iota Delta*.

Matthew Crawley

Matthew Crawley, PEng, MAsc, PMP, has held various executive appointments within Public Works and Government Services Canada, including his current role as the Senior Director for the National Shipbuilding Procurement Strategy (NSPS) Secretariat. He is responsible the management of the long-term strategic sourcing relationships with the selected East and West Coast shipyards. Prior to this he was the Director of Procurement for the Joint Support Ship project, where he was responsible for

leading the procurement activities for this complex acquisition programme.

Before joining the acquisitions programme, he was the Director Strategic Systems for the Receiver General for Canada, where he was responsible for the management of the Receiver General Treasury Systems, liaising with over 100 government departments, national and international financial institutions to ensure the continued systems operations and interoperability for payments and receipts from the government's consolidated revenue fund. Prior to this, he held a number of positions with the Department of National Defence on a number of Major Crown Projects, including the Close Combat Vehicle Project and the Maritime Helicopter Project while working at Sikorsky Aircraft. Prior to joining the Public Service, he worked for Bombardier Aerospace in Toronto, where he held various manufacturing and engineering roles.

Jim Hanlon

Jim Hanlon is a 30-year veteran of the ocean technology industry, having worked in design, marketing and management for companies in Canada and the United States. His career has spanned the aerospace and defence sectors as well as the marine environmental monitoring field. Over the years, he has worked in senior management positions with several large publicly traded multinationals but has also sampled the waters of the entrepreneurial well as an owner of two separate ocean technology companies that have successfully grown and been purchased by multinationals.

Until February 2012, he was the President of Ultra Electronics Maritime Systems in Halifax. He and his partners sold their company to Ultra in May of 2008. In May of 2012, Jim assumed the role of CEO of the Halifax Marine Research Institute, now re-named the Institute for Ocean Research Enterprise

(IORE), a not-for-profit company established to foster collaborative ocean research among universities, government labs and private companies.

His personal passion is innovation and its impact on the competitiveness of the ocean tech industry.

He holds a Bachelor of Electrical Engineering degree from The Nova Scotia Technical College (now Dalhousie University). He also has an MBA in marketing from Saint Mary's University in Halifax and he is a registered professional engineer in Nova Scotia.

Ken Hansen

Ken Hansen was the Military Co-Chair of the Maritime Studies Programme at Canadian Forces College in Toronto before becoming the Defence Fellow at the Centre for Foreign Policy Studies at Dalhousie. Retired from the navy in 2009, he joined the Centre for Foreign Policy Studies (CFPS) as a Resident Research Fellow and lecturer and has been appointed Adjunct Professor in Graduate Studies (Department of Political Science) in 2013. He is a member of the Science Advisory Committee for Atlantic Oceans Research Enterprise, a member of the Security Affairs Committee for the Royal United Services Institute (RUSI), a member of the Editorial Board for *Canadian Naval Review* and the moderator for *Broadsides*, the online discussion forum of the journal. His research includes joint and interagency maritime security theory and doctrine, planning processes and logistical requirements. He has received numerous naval service and literary awards, plus a Commendation from the City of Edmonton Police Department.

Brad Lavigne

Brian Lavigne is Replenishment at Sea and Cargo Systems Manager. He has been with PMO JSS for the past eight years and has sailed with the German Navy on FGS *Bonn*. Prior to this he was the Life Cycle Systems Manager for weather deck systems in DGEMPM.

Eric Lerhe

Commodore Eric Lerhe joined the Canadian Forces in 1967 and was commissioned in 1972. From 1973 until 1983 he served on the HMCS *Restigouche*, *Yukon*, *Fraser* and *Annapolis*. He was promoted to Commander on 1 January 1986, and assumed command of HMCS *Nipigon* in September 1987and then HMCS *Saguenay* on 6 January 1989.

During the 1990s he served as Director Maritime Force Development and Director NATO Policy in NDHQ. He earned his MA at Dalhousie in 1996 and was promoted to Commodore and appointed Commander Canadian Fleet Pacific in January 2001. Commodore Lerhe retired from the CF in September 2003 and commenced his doctoral studies at Dalhousie.

His dissertation was recently published by the Centre for Foreign Policy Studies as *At What Cost Sovereignty? Canada-US Military Interoperability in the War on Terror*. His other interests are defence policy, NATO, the 3-D (development, diplomacy, defence) approach, and general naval issues.

Jerry McLean

Jerry McLean is an executive manager with Thales and has considerable experience in both government and industry procurements and programmes. He was involved in many national and international programmes and successfully managed organizations ranging in size from 10 to 95 employees. He has a strong

technical background in naval command and control, radar systems, electronic warfare, weapons, and training systems.

A graduate of College Militaire Royale in 1985 and the Canadian Forces Command College in 1997, he served in the Royal Canadian Navy for 28 years as a Combat Systems Engineer (CSE). He assumed the responsibilities of Director, Marketing, Sales and Strategy for Thales Canada, Defence and Security in 2009.

Ian Parker

Captain (N) (Retired) Ian Parker is a graduate of the Canadian Forces College and the United States Naval War College. He served in the Canadian Navy for 37 years and commanded HMC Ships *Fraser* and *Provider*. His executive appointments spanned strategic development and force planning, including involvement in several defence reviews, requirements development and implementation and human resource management. Ashore he served as the Director Military Careers, the Director Maritime Strategy and the Director General Maritime Development and Operations and as Chief of Staff to the Chief of the Maritime Staff, Commander Maritime Command.

Since he retired, he has been a consultant in Canada's defence and security industry providing strategic advice to clients in Canada's defence industrial sector from shipyards to major integrators to small and medium enterprises.

David Perry

David Perry is Senior Security and Defence Analyst with the CDA Institute, and a doctoral candidate in political science at Carleton University where he studies defence privatization. He holds the DND Defence Engagement PhD Scholarship and is a past recipient of the Dr. Ronald Baker Security and Defence Forum PhD Scholarship and a SSHRC Canada Graduate

Scholarship. In addition to numerous publications with the CDA Institute, his research has appeared in *Canadian Naval Review*, *Defence Studies, International Journal, Comparative Strategy,* and *Journal of Military and Strategic Studies*. He is a frequent media commentator on national defence and security issues and has testified before the House of Commons Standing Committee on National Defence.

Originally from Rothesay, NB, he received a BA in Political Science and History from Mount Allison University and an MA in Political Science from Dalhousie University.

Jamie Sangster

Lieutenant Commander Jamie Sangster P.Eng MSc is currently the AOPS Detachment Commander embedded within the Irving Engineering Team. He is a Marine Systems Engineer and Naval Architect and has served as the MSEO in *Halifax*-class frigates. In addition to fleet operational service, he has served in several Fleet Engineering positions in Halifax, most recently serving as the Naval Architecture Officer for the East Coast Fleet and Technical Director for the *Victoria*-class submarine refit programme. He holds a Bachelor Degree in Mechanical Engineering from Royal Military College and a Masters in Science (Naval Architecture) from the University College London, UK.

Canadian Naval Review Table of Contents
Vol. 10, No. 1 (2014)

Canadian Naval Review Table of Contents
Volume 10, No. 2 (2014)