Canada's hidden plan for predicted failure: Planning for the introduction of the Canadian Surface Combatant

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"Canada cannot afford to have cumbersome processes delay the purchase and delivery of equipment needed by our men and women in uniform."[1]

Throne Speech, November 2008

Canada is undergoing the largest fleet replacement since the end of the Second World War. This ambitious project started with the Harper Conservative government and is now being overseen by Prime Minster Justin Trudeau's Liberal government. Successive governments will be overseeing this program until 2041 or later depending on delays that are already occurring.

The Canadian government will be building an entirely new navy from the keel up. Over the course of the next 20 years, most of the existing fleet will be retired. The Royal Canadian Navy (RCN) has retired both the *Iroquois*-class destroyers and the vital Auxiliary Oiler Replenishment Ships (AORS). The reality is that Canada does not have a logistical capability to replenish what little is left of its navy at sea. The troubling matter is that we may be now sailing in the same direction with what remains of our fleet, the *Halifax*-class frigates.

To much acclaim, the National Shipbuilding Procurement Strategy (NSPS) was introduced in June 2010 with the intention of replacing Canadian Coast Guard (CCG) and RCN ships, this procurement initiative has been set to run until 2041. NSPS aims to build over 50 large ships

[1] Speech from the Throne, "Protecting Canada's Future" 19 November 2008 available at:http://www.parl.gc.ca/Parlinfo/Documents/ThroneSpeech/40-1-e.html (accessed 6 September 2015)

and 115 smaller ships, at a cost that will exceed $50 billion.[2] The NSPS' strategy is far from realized and well behind its original, intended schedule. Other objectives of the NSPS include: forming a stable, long-term relationship between the government and the shipbuilding sector, fostering advanced warship building capability and to help the industry sector to move away from the "boom or bust" shipbuilding.

The NSPS was divided into two procurement umbrella contracts: combat ships and non-combat ships. Irving Shipyards was the recipient of the Canadian Surface Combatant (CSC) and the Arctic Offshore Patrol Ship (AOPS) pledge worth $33 billion.[3] The CSC project is slated to cost $26 billion, with an estimated additional operational and sustainment costs of $14.7 billion.[4] It has been already been confirmed by Vice-Admiral Mark Norman that the construction costs for the Canadian Surface Combatant could rise to perhaps $30 billion.[5] This number does not include the In-Service Support estimates that have been required, since 2008, by the Auditor General and the Parliamentary Budget Office. Ultimately, the CSC will form the backbone of the RCN fleet for much of this century after it eventually comes into service.

The NSPS has already run into a myriad of problems and delays. The Parliamentary Budget Office (PBO) has found that the $3.1 billion set aside to build 6 AOPS and the proposed arctic base at Nanisivik is woefully inadequate. The Harper government's grand ambitions for Nanisivik have been completely derailed. The PBO has also concluded that $3.1 billion would only cover the costs of four AOPS, now known as the *Harry DeWolf*-class.[6] An additional $400 million has been added to meet the goal of building five to six ships.[7] Full operational capability (FOC) was slated for the Summer of 2013 and now is expected to be achieved in 2023.[8] Despite delays and growing costs, the first steel was cut for the *Harry DeWolf*-class in September 2015, two years after the class was originally set to be fully in service.[9]

Inadequate budget estimates have also plagued the JSS program for years as well with the original number of proposed ships being reduced. Of course, it is not just the number of ships that have faced reductions, but also the capabilities of the ships.[10] This all indicates systematic mismanagement within the Harper government concerning the Canadian military procurement process. The Harper government's management of the NSPS demonstrates that they were not able to establish the close government to industry relationship that the NSPS espoused.

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[2] Office of the Auditor General, "Chapter 3 - National Shipbuilding Procurement Strategy" Fall 2013 available at: http://www.oag-bvg.gc.ca/internet/docs/parl_oag_201311_03_e.pdf, p. 2 (accessed 6 September 2015),
[3] Public Works and Government Services, "Results of the National Shipbuilding Procurement Strategy" 19 October 2011, available at: http://news.gc.ca/web/article-eng.do?nid=629989 (accessed 6 September 2015)
[4] John Pike, "Canadian Surface Combatant" available at: http://www.globalsecurity.org/military/world/canada/HCMs-csc.htm (accessed 6 September 2015)
[5] James Cudmore. "Warship cost could rise to $30B, Vice-Admiral Mark Norman confirms" 2 December 2015 available at: http://www.cbc.ca/news/politics/warships-30-billion-navy-mark-norman-1.3347145
[6] Parliamentary Budget Office. "Budget Analysis for the Acquisition of a Class of Arctic/Offshore Patrol Ships" 28 October 2014 available at: http://www.pbo-dpb.gc.ca/web/default/files/files/files/AOPS_EN.pdf
[7] David Perry. "2015 Status Report on Major Defence Equipment Procurements" December 2015 *Canadian Global Affairs Institute and School of Public Policy, University of Calgary* available at: http://www.policyschool.ucalgary.ca/sites/default/files/research/defence-procurement-perry.pdf, pg 22.
[8] Ibid., pg. 23.
[9] David Pugliese, "Work has begun on Arctic Offshore Patrol Ships- first ship to be operational in four years" 3 September 2015, available at: http://ottawacitizen.com/news/national/defence-watch/work-has-begun-on-arctic-offshore-patrol-ships-first-ship-to-be-operational-in-four-years (accessed 6 September 2015)
[10] Office of the Auditor General, "Chapter 3 - National Shipbuilding Procurement Strategy", pg 19-21.

Furthermore, the previous government was unable to move the procurement process forward at a sufficient pace to avoid costly delays.

This comes at a time when the RCN is already facing problems with its legacy ships. The *Iroquois*-class has been retired as well as our AORS. The retirement of the destroyers comes well before the introduction of the CSC into the fleet. This has created a major operational gap the RCN was poorly prepared for, despite having identified these looming gaps as early as 2008. Plans to replace the AORS with the JSS were originally approved in 2004 but the RCN is still waiting.[11] The RCN has also been considering retiring the *Kingston*-class coastal defence vessels after its $100 million mid-life refit was cancelled.[12] Unfortunately for the RCN, inadequate planning and cost estimates will probably continue to affect its proposed backbone - the Canadian Surface Combatant.

The RCN is sailing into waters it knows to be dangerous concerning the maintenance of legacy ships while hoping for replacements. In order to meet the constant delays in the NSPS, the RCN appears to be preparing to extend the life of the *Halifax*-class frigate further through new naval systems requests outlined in the Defence Acquisition Guide 2015 (DAG). These systems would be integrated after the conclusion of the *Halifax*-class Modernization/Frigate Life Extension (HCM/FELEX) program - a refit that was intended to modernize the class for the next fifteen years. The HCM/FELEX program "encompasses modernization of the ships' platform, including ships' systems upgrades, acquisition and installation of new capabilities, such as enhanced radar, new electronic warfare system, upgraded communications and missiles integrated into a new Combat Management System."[13] Under DAG, communication and weapon systems will be further upgraded.

DAG - Halifax

Beginning in 2014 as part of the Harper government's larger Defence Procurement Strategy the government published its inaugural Defence Acquisition Guide (DAG). The DAG was established as an annual report intended to identify "future potential Canadian Armed Forces requirements and associated procurement projects." The DAG comes with the caveat that "the majority of the initiatives listed ...[have not] been brought forward for Government of Canada approval."[14]

Although the ambitions outlined within the DAG are not official programs as yet they provide intriguing insight into the government's approach to the military and vision for its future through its procurement initiatives.

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[11] Chief Review Service, "Internal Audit of the Joint Support Ship (JSS) 7050-45 (CRS) available at: http://www.crs.forces.gc.ca/reports-rapports/pdf/2011/P0934-eng.pdf, pg iii/v (accessed 6 September 2015)
[12] Canadian Press, "Coastal patrol ships could be retired early" 18 Mary 2012 available at: http://www.ctvnews.ca/coastal-patrol-ships-could-be-retired-early-1.248273 (accessed 6 September 2015)
[13] Department of National Defence, "Backgrounder: Halifax-Class Modernization (HCM) / Frigate Life Extension (FELEX)" 24 November 2014 available at: http://www.forces.gc.ca/en/news/article.page?doc=halifax-class-modernization-hcm-frigate-life-extension-felex/hkm9beb0 (accessed 6 September 2015)
[14] Department of National Defence, "Defence Acquisition Guide 2014 –Forward" available at: http://www.forces.gc.ca/en/business-defence-acquisition-guide/index.page (accessed 6 September 2015)

The 2015 DAG report has, through its changes and additions to DAG 2014, shown how government "priorities continue to be refined and evolve to reflect Canadian Armed Forces needs."[15] It has also clearly demonstrated the paradigm by which the Harper Government approached military procurement. Its emphasis has been on business first and in the words of former Minister of Defence Jason Kenney " [t]he DAG seeks to help Canadian industry position themselves to compete for potential future Canadian and international defence procurement opportunities."[16] It would seem that the Harper government was more interested in utilizing defence spending to build Canadian industry than on building the Canadian military.

Former Minister Kenney went on to write that "[t]he Department of National Defence remains committed to keeping the processes for procurement open and transparent, and continues to build and maintain strong relationships with industry. We remain open to any feedback on DAG 2015, and look forward to engaging with industry on important projects for the Canadian military as we improve the way we do business while delivering Defence Priorities".[17]

With the intention of "keeping the processes for procurement open and transparent" in mind it is worth taking a good look at what the DAG actually outlines. The DAG is broken up into six sections; Naval Systems, Land Systems, Aerospace Systems, Joint and Other Systems Services Joint and Other Systems, Services, and Canadian Special Operations Forces Command Services.

In the case of the Navy, some interesting programs appear in the table of contents which raise considerable questions concerning what precisely the Harper government envisioned for the future of the Navy. In many cases, these programs would suggest that either the left hand and right hand were on different pages or what the government was saying of its intentions was widely divorced from what it was actually doing and/or planning to do.

Of the twenty-five initiatives listed in the Naval Systems table of contents, at least ten deal directly with post HCM/FELEX upgrades to the *Halifax*-class frigates. This might not in itself be all that shocking. It is, however, strange to see a government in the midst of a mid-life refit to the *Halifax*-class missing the boat on at least ten major upgrades that it apparently intends to tackle immediately after an extensive mid-life refit program is concluded.

There are, however, other elements to these initiatives that are cause for at the very least a moment's pause. Of the ten initiatives identified as pertaining directly to the *Halifax*-class each and every one has a cost estimate that ranges either between 50 and 99 Million or 20 and 49 million with the exception of two which are estimated to cost between 100 and 249 Million. The total estimate of the *Halifax*-class projects under DAG is $510 million to $1.140 billion. This begs the question, why? Either the government was planning to spend a minimum of more than half a billion dollars delivering new systems to the frigates from the moment the HCM/FELEX program is finished to be delivered just in time for their retirement or the government did not expect these ships' retirements to correspond with the government and Navy's own projected timeline.

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[15] ibid.
[16] Department of National Defence, "Defence Acquisition Guide 2015 –Forward" available at: http://www.forces.gc.ca/en/business-defence-acquisition-guide-2015/index.page (accessed 6 September 2015)
[17] ibid.

This is only one-half of the problem, the other more concerning issue is with the projected dates these contracts were to be awarded and when they would be projected to be delivered, provided there are no cost overages or delays. With the exception of three, the rest are not even projected to be awarded until the early 2020s. One system was scheduled to be awarded in 2015, which it was not. All of these initiatives are, with the exception of one, not expected to be delivered until the mid-2020s at the earliest. Two are not expected until the mid-2030s, which happens to correspond with the government and Navy's own and widely agreed upon expected date for the retirement of the *Halifax*-class. This is of course if they stay on their estimated schedule which given the recent track record seems unlikely.

This would suggest that there was alarm within the Harper government over the NSPS timeline. The *Halifax*-class fleet is already projected to sail past its original projected life cycle of 2027-2031 and into at least 2036.[18] Further delays in the delivery of the CSC fleet may mean that the *Halifax*-class will need further upgrades to ensure operationality - meaning the ships will be sailed well past their projected retirement date. This is a prospect that given past experiences could become very expensive and troublesome for the RCN's operational capacity.

The DAG additions were added on because they were de-scoped due to budget constraints during the HCM/FELEX planning. Under the Government Contingencies Expenditure Authority (TB Vote 5), which is internally managed, the RCN Naval Staff chose to upgrade the frigates further, and right up to the class' supposed retirement date. Vote 5 allows for "temporary advances for urgent or unforeseen items".[19] This serves to highlight a demonstrable lack of confidence in the proposed NSPS schedule. The consequence of this is that depending on when the CSC-class will be ready, the *Halifax*-class might face similar issues with those experiences with maintaining the *Iroquois*-class and AORS.

Defence cuts have had a further impact on maintenance for the RCN and has created a bow wave of work that has been delayed. Maintenance costs are under the purview of the National Procurement fund managed by the Assistant Deputy Minister (Materiel).[20] The Auditor General's 2011 report found that the overall gap between maintenance demand and funds allocated covered 70 percent of what was called for. In 2008, DND conducted a study and found that delayed maintenance work would result in: a backlog of work, fewer operating sea days (or flying hours), more laborious and expensive repairs and reduced life expectancy of military equipment.[21] Even though the *Halifax*-class and the beleaguered *Victoria*-class submarines have been given maintenance priority in the navy, extending their life expectancies past their retirement dates may be a difficult task.

It seems the Harper, and now Trudeau governments, DND and the Navy not only lack confidence in the NSPS but are actively planning for its failure by anticipating having to continue on sailing the *Halifax*-class well past when their own projected decommission dates.

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[18] Chief Review Services, "Audit of the Halifax-Class Modernization/Frigate Equipment Life Extension (HCM/FELEX) Project", pg 6.
[19] Government of Canada "Government of Canada budgets and expenditures" 19 October 2015 available at: http://www.tbs-sct.gc.ca/hgw-cgf/finances/pgs-pdg/be-bd/index-eng.asp
[20] Auditor General of Canada. "Chapter 5: Maintaining and Repairing Military Equipment – National Defence" Fall 2011, available at: http://www.oag-bvg.gc.ca/internet/docs/parl_oag_201111_05_e.pdf, p. 9.
[21] Auditor General of Canada. "Chapter 5: Maintaining and Repairing Military Equipment – National Defence", p. 16.

This is the only logical justification for the further investment other than the government simply engaging in make-work projects. The result of the *Halifax*-class life cycle being extended to cover failures in the NSPS could lead to an AORS or Sea King type situation in the making all over again.

Another question raised is of course where this work will be done and what kind of personnel and equipment demands will be needed. Will these programs draw off not only money but other resources needed to the NSPS that will only further compound the existing potential for delays and ensure the need to sail the *Halifax*-class past their retirement dates?

Looming Threat of Halifax-class Frigate Life Extension

Unlike the *Iroquois*-class destroyer, the *Halifax*-class frigates do not have the same issue with life expectancy at the moment. In fact, their problem is the exact opposite as they have just reached their standard mid-life extension refit. The *Halifax*-class frigate is a recent addition to the Canadian Navy. The frigate class was commissioned between 1992 and 1996 and is designated as a Guided Missile Patrol Frigate.[22] The ship is outfitted with an array of weapons systems that allow it to engage in anti-air warfare (AAW), anti-submarine warfare (AWS) and anti-surface ship warfare (ASuW).[23] In addition to this, one Sea King helicopter operates from the frigate.[24] In July 2007, the HCM/FELEX was announced. The purpose of the HCM/FELEX project is to upgrade communication, weapons and electronic warfare systems to ensure its warfighting capabilities for the second half of its life.

Through HCM/FELEX the ships undergo physical inspections and surveys during the mid-life refit program to identify maintenance necessary to return the ships to the state essential to meet the requirements of the second half of their service life. The majority of the contract is going toward technological upgrades, and there is very little of the budget left for hull maintenance. This would indicate that the integrity of the *Halifax*-class hulls are presently in good condition and are only facing routine maintenance to maintain the standards required to meet their *projected* retirement date.

The full operational capability is expected to be achieved in January 2018.[25] DND's *Leadmark* report outlined that the modernization program is to maintain "their operational viability over the projected 30-year lifetime of their hulls."[26] A ship's hull can potentially be extended beyond its project lifetime. This, however, requires due diligence and proper maintenance of the hulls with special awareness of the stresses and weights of the ship and routinely checking for cracks and regular cleaning. It would also require an End of Service Life Assessment to determine

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[22] Department of National Defence, "Canadian Patrol Frigates" available at: http://www.navy-marine.forces.gc.ca/en/fleet-units/frigates-home.page (accessed 6 September 2015)
[23] ibid.
[24] ibid.
[25] Department of National Defence, "Backgrounder: Halifax-Class Modernization (HCM) / Frigate Life Extension (FELEX)" .
[26] Department of National Defence, "Leadmark: The Navy's Strategy for 2020" 18 June 2001 available at: http://publications.gc.ca/collections/collection_2012/dn-nd/DB3-22-2001-eng.pdf, p. 68 (accessed 6 September 2015)

whether the ship can operate at "acceptable levels of expenditures, required levels of availability, and safety".[27]

There are two outcomes that could arise from an End of Service Life Assessment. If the assessment were to conclude an extension feasible then there would be an additional fiscal burden placed upon the RCN budget. This, of course, affects total ownership costs and the overall RCN budget. Depending on the political culture at that time, it might be lower defence spending and a greater burden on the RCN to allocate any additional funds. Furthermore any hull work that might be required would need dry dock facilities and could potentially interrupt work on the CSC class. Alternatively, if the assessment deems it not worth the funds, then RCN and the Canadian Forces would face yet another operational gap. As we initially saw with the decommissioning of the AORS. However, fulfilling a loss in frigate capabilities cannot be solved by leasing support ships as we have seen with the Chilean Navy supply ship, the *Almirante Montt* and the Spanish supply ships, the *Patiño* and the *Cantabria*.[28]

The unfortunate circumstance is that the CSC project is already facing delays. The first delivery of the CSC class was reported, in 2013, to be 2022.[29] That same year, the Auditor General, in its report, stated that the first CSC would not be delivered until 2025.[30] The DAG 2015 does not state when the first delivery of the CSC-class will be, but it does say that the final delivery be in 2036 or later.[31] David Perry's 2015 Status on Major Defence Procurements states that it is now believed that this will occur in 2026 and FOC will be achieved in 2042.[32] With the life expectancy of the *Halifax*-class, according to the Chief Review Service, "...rang[ing] from 30 to 42 years with an average of 35 years, longer than the original expected 30 years" this means that the average life expectancy of the frigate fleet will end between 2027 and 2031. [33] To put this in some context, the *Halifax*-class will be a comparable age to that when the *Iroquois*-class was retired: 40-44 years old. What this means is if there are any delays in the CSC program, it may be difficult to keep the *Halifax*-class sailing.

With further systems upgrades proceeding under the DAG well into the 2030s, it would appear to demonstrate that the *Halifax* fleet is either expected to operate past its original life cycle or that there is a startling issue in the planning process that has led to proposed system delivery

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[27] Karl Stambaugh and Chris Barry. "Naval Ship Structure Service Life Considerations". ASNE Fleet Maintenance and Modernization Symposium (FMMS) 2014 Sept 9- 10 September at the Virginia Beach VA. Available at: https://www.navalengineers.org/ProceedingsDocs/FMMS/FMMS2014/Papers/Stambaugh_paper.pdf

[28] David Puglises. "Canada's Navy is relying on Chilean vessel for resupply after critical ships damaged or decommissioned. *The Globe and Mail*, 24 August 2015 available at: http://news.nationalpost.com/news/canada/canadas-navy-is-relying-on-a-chilean-vessel-for-resupply-after-critical-ships-damaged-or-decommissioned

Esteban Villarejo. "Spanish Replenishment Ships to Support Canada in 2016" *DefenceNews*, 8 December 2015 available at: http://www.defensenews.com/story/defense/naval/ships/2015/12/08/spanish-replenishment-ships-support-canada-2016/76984012/

[29] Louise Mercier, "Unanswered questions about the Canadian Surface Combatant" *Vanguard Canada* 28 January 2013, available: http://www.vanguardcanada.com/2013/01/28/unanswered-questions-canadian-surface-combatant/ (accessed 6 September 2015)

[30] Office of the Auditor General, "Chapter 3 - National Shipbuilding Procurement Strategy", pg 8.

[31] *http://www.forces.gc.ca/en/business-defence-acquisition-guide-2015/naval-systems-27.page*

[32] Perry. "2015 Status Report on Major Defence Equipment Procurements", pg. 29.

[33] Chief Review Services, "Audit of the Halifax-Class Modernization/Frigate Equipment Life Extension (HCM/FELEX) Project" March 2011, available at: http://www.crs.forces.gc.ca/reports-rapports/pdf/2011/P0913-eng.pdf, pg. 6 (accessed 6 September 2015)

dates that coincide with the retirement of these vessels and when a new replacement fleet is expected to be delivered.

The CSC Project

On 16 June 2008, the Harper government published its *Canada First Defence Strategy* (CFDS) which outlined its commitment to various defence procurement projects, including the replacement of the *Iroquois*- and *Halifax*-class ships.[34] The CFDS outlined that the proposed fifteen ships would be based on "...a common hull design, the frigate and destroyer variants will be fitted with different weapons, communications, surveillance and other systems."[35] The intention is to have the CSC fill the roles of both the *Halifax*-class frigates and *Iroquois*-class destroyers depended on what equipment the hull is fitted with. These news ships are intended to utilize a modular design that allow a single hull design to be fitted with various equipment sets. The ambitious project had planned on construction beginning on the first of these ships as early as 2018 - 2020.[36]

Originally, DND stated that they would be finalizing the design of the ships in 2016.[37] However, Public Works and Government Services Canada (PWGSC) now states that they "expect to have a Combat Systems Integrator and a Warship Designer by early 2017."[38] Given that Canada will not have a Warship Designer until 2017, there should be concern over the ability to meet their delivery targets.

This is all still in the aspirational phase and the Navy still does not have a design for these ships, the construction of which is not expected to begin until "the early part of the next decade".[39] Despite this fact, the first CSC is expected to be delivered in 2025, a lofty ambition to say the least.[40] To have the program meet these goals and completed in time for the projected retirement of the *Halifax*-class seems a difficult target to reach, especially with the *Harry DeWolf*-class being 10 years behind schedule.

The CSC will likely have a displacement of approximately 6,000-ton given the stated requirements of the vessel including range, speed, capabilities etc.[41] Nothing is known about what weapons and communication systems will be equipped on the CSC class. It is rumoured that the Statement of Operational Requirements (SOR) draft states that the CSC will be larger

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[34] Department of National Defence, "Canada First Defence Strategy" 16 June 2008 available at: http://www.forces.gc.ca/assets/FORCES_Internet/docs/en/about/CFDS-SDCD-eng.pdf, p. 17 (accessed 6 September 2015)
[35] Department of National Defence, "Canada First Defence Strategy", 17.
[36] CBC News, "New ships for navy, coast guard National Shipbuilding Procurement Strategy to cost $38.6 billion" 13 November 2013 available at: http://www.cbc.ca/news2/interactives/shipbuilding/ (accessed 6 September 2015)
[37] Louise Mercier, "Unanswered questions about the Canadian Surface Combatant".
[38] Public Works and Government Services Canada, "Frequently Asked Questions - Canadian Surface Combatant" 8 June 2015 available at: http://www.tpsgc-pwgsc.gc.ca/app-acq/sam-mps/faqsurface-eng.html (accessed 6 September 2015)
[39] Public Works and Government Services Canada, "Frequently Asked Questions - Canadian Surface Combatant"
[40] Eric Lehre. "The CSC Statement of Requirements - Pushing the Envelope?" Dalhousie University Centre for Foreign Policy Studies. Maritime Security Program Workshop: "National Shipbuilding Procurement Strategy (NSPS) – Charting the Course." 6 June 2014 available at: http://www.dal.ca/content/dam/dalhousie/pdf/cfps/nsps/Lerhe%20-%20CSC%20SOR.pdf (accessed 6 September 2015)
[41] John Pike, "Canadian Surface Combatant".

than the *Halifax*-class, and will be expected to be manned by less than 100 crewmembers, which is doubtful given crew levels on comparative frigates. This can easily be indicated by the standard crew size for similar vessels currently entering service among the navies of our allies. For example, the French FREMM design has 108 officers and crew and the UK's Type 26 Global Combat Ship will have a crew of 118. To place this in context, currently there are 225 crewmembers per *Halifax*-class ship.[42] A similar crew reduction serving on the JSS will also occur, reducing the amount from 250 to 165.[43] Given that the RCN's core war fighting policy – which is the driver in determining the readiness of a ship's company in multi-threat combat – is far more stringent than many of its allies it is likely to only further advance the size Canadian complements higher than automation technologies would otherwise allow. This suggests that all the technology in the world still does not make these target numbers realistic.

CH-148 Cyclone

It is also rumoured that the CSC will have on board and operate two helicopters. This will be the new CH-148 Cyclones that are replacing the CH-124 Sea Kings. The Paul Martin government ordered 28 Cyclones from Sikorsky after much controversy. Out of the 28 Cyclones, only 15 will be in service, the other 13 are to be allocated for training, flight-testing, scheduled maintenance, and attrition.[44] The original assessment of 28 maritime helicopters was based on a surface fleet that would house and operate only one helicopter. But then this puts into question if Canada has enough Cyclones given two helicopters per fifteen ships and training requirements? This may leave the Navy shift and allocate resources which will ensure that the entire fleet is never available as those rotating in are striped of resources for those rotating out as part of an elaborate shell game in the name of saving money that does nothing for defence except create an illusionary image of a fleet larger and more capable than it actually is.

The Maritime Helicopter Statement of Operational Requirements (SOR), which was prepared in 1999, stated that a fleet size of 28 would "still be sufficient to provide for [Task Group] operations on both coasts on a routine basis plus support to a STANAVFORLANT, [now Standing NATO Maritime Group One] ship; however, it would not provide the ability to rotate ships in and out of the TGs seamlessly."[45] Although 28 was seen as a minimum, the SOR did conclude that 32 "would provide a sustainable two-coast, two-[Task Group] capability, plus support to a STANAVFORLANT ship. This construct would allow for the rotation of ships in and out of [Task Groups] without degradation of the overall [Task Group] readiness level."[46]

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[42] Department of National Defence, "Canadian Patrol Frigates".
Naval Technology. "FREMM European Multimission Frigate, France / Italy" available at: http://www.naval-technology.com/projects/fremm/ (accessed 10 December 2015)
Naval Technology. "Type 26 Global Combat Ship (GCS) Programme, United Kingdom" available at: http://www.naval-technology.com/projects/global-combat-ship-gcs-programme/ (accessed 10 December 2015)
[43] Chief Review Services, "Audit of the Joint Support Ship", p. 5.
[44] http://www.forces.gc.ca/en/news/article.page?doc=the-statement-of-operational-requirement-for-the-maritime-helicopter/hnmx18y5
[45] Department of National Defence. "Statement of Operational Requirement: Maritime Helicopter" June 1999. DSP No. 00002680, p. 43
[46] Ibid., p. 43.

The CH-148 Cyclone fleet will not be further strained by the *Harry DeWolf*-class as they will fitted with a light helicopter such as a Bell 212.[47] The *Harry DeWolf*-class, will still have the capacity of housing a CH-148, but according to the SOR this is not the RCN's plans.

Then again, it is admitted in the CSC draft that it is only aspirational and due to be revised. However, one should also recall that the JSS are expected to house two Cyclones.[48] At the moment, Davie Shipyard is Quebec is refurbishing the MV *Asterix*, a commercial cargo ship, into a naval support and logistics supply ship. This is being done to fill the capability gap left by retiring the AORS and the JSS program being woefully delayed. The refurbished MV *Asterix* will also have the capacity of two Cyclone helicopters.[49] It seems quite likely that there will be a strain on the Cyclone fleet unless the RCN substantially alters their current helicopter ambitions. This may require purchasing additional Cyclone helicopters from Sikorsky.

Delays

Delays are inevitable with procuring complex systems that have to be designed and built. The Harry DeWolf-class, although a smaller and less complex ship, had to be redesigned to be a smaller ship than the Norwegian *Svalbard upon* which it is based. The *Harry DeWolf* program was originally projected to have the first of the 6-8 ships in service by 2013, but the steel is only now just being cut.[50] Accord to DND, the 10 year delay will postpone the CSC project by only six years. This places any goal of having the CSC designed and construction began by 2021 far from realistic. The first *Harry DeWolf* is now projected to be delivered in 2018, five years late. The final *DeWolf*-class ship is expected in 2023, meaning that if the AOPS remain on the current projected timeline it will have taken 15 years from the announcement to the completion of the program.[51] This leaves one with little confidence in the current procurement strategy's effectiveness. Fifteen years is obscene and demonstrates quite clearly how deeply dysfunctional the government management of the actual procurement process is.

Meanwhile, even the HCM/FELEX program is lagging behind its projected completion date. Work on the *Halifax*-class begun in October 2010 and was originally slated to be finished in 2016.[52] The final delivery is now estimated to take place in January 2018. In an internal audit, the CRS warned of the potential delay in the HCM/FELEX project and also asserted that delays in refits are somewhat common place. According to the CRS, the *Tribal*-class Update and Modernization Project (TRUMP) was delayed by 32 months from the original estimated time of 55 months.[53] The CRS also asserted that "[o]ther ship upgrade projects with 18-month planned

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[47] Chief of Maritime Staff. "Statement of Operational Requirement: Arctic/Offshore Patrol Ship". May 2009. DSP No. 00001216. Pg 17

[48] Defence Industry Daily, "Canada's C$ 2.9B "Joint Support Ship" Project, Take 3" 28 September 2014 available at: http://www.defenseindustrydaily.com/canada-issues-rfp-for-cdn-29b-joint-support-ship-project-updated-02392/ (accessed 6 September 2015)

[49] Project Resolve. http://projectresolve.ca/website/?page_id=3299

[50] Canadian press, "Arctic patrol ships budget 'insufficient to buy 6 vessels"

[51] David Pugliese, "Work has begun on Arctic Offshore Patrol Ships- first ship to be operational in four years" 3 September 2015, available at:

[52] Differences Between Military and Commercial Shipbuilding: Implications for the United Kingdom's Ministry of Defence" *Rand Europe* 2005.http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG236.pdf, p. 35 (accessed 6 September 2015)

[53] Chief Review Services, "Audit of the Halifax-Class Modernization/Frigate Equipment Life Extension (HCM/FELEX) Project", pg 4.

[mid-life refit] periods per ship have experienced 36 percent schedule slippage."[54] TRUMP was part of the major upgrades that occurred in the early 1990s that repurposed the destroyers for anti-air defence. It is possible that the FELEX project might experience further delays.

The reason for the current NSPS delays goes beyond the standard delays that come with programs of this type and is compounded by one glaring issue, a lack of experience. Both within the government's naval procurement mechanisms and Canadian shipyards there is little recent experience with shipbuilding projects of this kind. There is also the requirement of developing special relationships in a design-and-build project of this kind that have not existed in Canada for quite some time. The preparation work is, therefore, both costly and time-consuming.[55] Cutbacks to the entire government apparatus, including DND, Public Works and Industry Canada have reduced their capabilities to undertake such a complex procurement project. The Trudeau government is already seeking for someone with shipbuilding experience to bring the project back on course.[56] Canada's shipbuilding industry is also waning in 21st-century and has lost a great deal of experience and it is currently attempting to get its newly enlarged workforce up to date. Given these issues it seems reasonable to expect the government will be compelled to re-examine its projected timeline concerning the CSCs. These delays call into question the viability of the entire CSC project as it relates to the *Halifax*-class as currently envisioned.

All of this compounds upon the aforementioned concerns of having to extend the *Halifax*-class well past their projected retirement. A lack of government acknowledgement of this fact is disconcerting to say the least. A lack of a plan to address the need to extend the life of the *Halifax*-class and a program in place to see it done safely borders on disastrous and harkens back to the AORS disaster whose macabre climax was ineptly overseen by the Harper government, despite its strong pro-military rhetoric.

It would seem the government/DND has begun to acknowledge their failure implicitly if not explicitly; although they would not say so if you asked publically. The *Halifax*-class, which is still in the midst of the HCM/FELEX mid-life refit is already being prepared for further additions that are not projected for completion until the government's own projected date for the retirement of the class. This would suggest at some level an awareness has developed that things have gone off track and current target dates unlikely to be met.

Disturbingly none of these preparations seem to address the elephant in the room, neglected hull maintenance to extend the frigates beyond this date. It would seem HCM/FELEX which is still ongoing is working under the assumptions that the *Halifax*-class will be retired by the early 2030s while the government and DND are already moving the goal posts without the right hand letting the left hand know what it has in mind. This leaves us taking a huge gamble that all will be well with the hulls – if there are issues we could find ourselves in very treacherous waters

Inflation Concerns

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[54] ibid, pg 4.
[55] Nick Taylor-Vaisey, "The Canadian Navy's Slow Motion Crisis" *MacLeans* 1 August 2014, available at: http://www.macleans.ca/news/canada/the-canadian-navys-slow-motion-crisis/ (accessed 6 September 2015)
[56] Elizabeth Thompson. "Government may tap non-Canadian for shipbuilding program" *iPolitics.ca* 11 December 2015 available at: http://ipolitics.ca/2015/12/11/government-may-tap-a-non-canadian-for-shipbuilding-program/

Canada has already experienced some drawbacks from long procurement projects in shipbuilding. The Joint Supply Ship (JSS) is years behind schedule and what was originally for three ships, is now for two ships with a possible third if remaining money permits.

Cost concerns over the CSC project are more than justified. Around 2007, it was estimated that the CSC project would cost around 15 billion for the fifteen ships and now a budget has been set of $26.2 billion for at most fifteen ships that are not even designed. New estimates for the CSC project are around $30 billion. The fact of the matter is that we do not know how much the CSC project will definitively cost. Earlier this year Kevin McCoy, president of Irving Shipbuilding, stated that no one knows the costs and that the Navy had not entered discussions on the design or what technology/weapon systems would be in the ship.

Of course, there is also the political wish of wanting to balance the budget or run controlled budgetary deficits. The fact of the matter is that the Canadian defence budget has shrunk to an unprecedented low. DND has seen its budget slashed while the Harper government simultaneously attempted to produce new equipment projects. These budget cuts in the face of the Harper government's desire to present a balanced budget for the 2015 election have been deeply felt within the procurement process.[57]

Canada's defence spending has been cut from 1.2 percent in 2012 and has fallen to 1 percent in both 2013 and 2014.[58] The lowest part of the Tories' much decried Liberal "Decade of Darkness" was 1.2 percent in 1994.[59] Canada was still, however, able to construct the *Halifax*-class frigates during the so-called Decade of Darkness while simultaneously maintaining a larger force by number of personnel. As Canada slips slowly into another recession, the falling value of the Looney and the various political parties speaking on balancing the budget or continuing on with deficits, difficult decisions will have to be made. The CSC program is currently set at $26.2 billion dollars and might be subjected to an inflationary rate and currency deficit that was not projected at the time.

Inadequate inflation projections have been a serious contributing factor to the failure of the JSS program. The DND's own Chief Review Services (CRS) office found in their audit of the JSS that inflation was improperly assessed at 2.7 percent instead of the 3.5 to 5 percent factor "acknowledged to be prevalent in the shipbuilding industry."[60] The RAND Corporation estimates that since 1950s warship inflation has been between seven to eleven percent annually.[61] The failure of the original JSS project was because of the impact of the exponential rise in commodity prices. The original plan of two to three JSS was reduced to two. Plans for

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[57] David Pugliese, "Nanisivik naval facility was originally supposed to cost $258 million but DND balked at price tag" 8 September 2014 available at: http://ottawacitizen.com/news/national/defence-watch/nanisivik-naval-facility-was-originally-supposed-to-cost-258-million-but-dnd-balked-at-price-tag (accessed 6 September 2015)
[58] Stockholm International Peace Research Institute, "SIPRI Military Expenditure Database" 12 April 2015 available at: "http://www.sipri.org/research/armaments/milex/milex_database/nato-milex-data-1949-2014 (accessed 6 September 2015)
[59] ibid.
[60] Chief Review Services, "Internal Audit of the Joint Support Ship (JSS) Project", p. 1.
[61] Mark V. Arena, Irv Blickstein, Obaid Younossi, and Clifford A. Grammich. "Why Has the Cost of Navy Ships Risen? A Macroscopic Examination of the Trends in U.S. Naval Ship Costs Over the Past Several Decades" *Rand Corporation*, 2006 available at: http://www.rand.org/content/dam/rand/pubs/monographs/2006/RAND_MG484.pdf, p 71.

building six to eight *Harry DeWolf*-class ships has been put in question by the Parliamentary Budget Office saying that Canada could potentially build four ships with the existing budget.[62] In order to keep the CSC project within budget, given the complexity of 21st-century warship design, and a lack of planning when it comes to inflation, the RCN and the Canadian government will have to choose between reducing the capabilities of the CSC fleet and the number of ships to be constructed. It is foreseeable that there will be both a reduction of capabilities and ships to be built.

If the inflation assessment has been evaluated on a similar rate of that as the JSS project, there will be considerable restrictions. The ship design of the CSC has not yet been finalized and won't be until at least 2016, and as costs naturally increase, will the capabilities of the ships decrease or will the project simply incur cost overruns? If not assessed properly, it might mean that the fifteen CSCs will be reduced in number, a similar experience to that of the JSS project. This eventuality is not to be taken lightly as it will limit Canada's ability to operate overseas.

It seems these concerns are only compounded by the suggested purchases outlined in DAG which could potentially draw off resources needed for the CSC and could be put towards adding another new ship to the inventory. This also begs the question of where this work going to be done? All of Canada's shipyards are supposed to be cutting steel for the new ships. Even if these facilities are not required for any of this work it would at the very least create the potential for personnel shortages.

Another question that must be asked is if the Harper government was engaged in another game of funny math. At least some of the DAG 2015's suggested *Halifax* programs could be potentially transferable to future JSS and CSC ships. By ripping off systems from the Halifax and adding them to the CSC, is the RCN attempting to offset the costs of the CSC by undertaking separate procurement projects? And at what cost?

Conclusion

Under the DAG 2015, the *Halifax*-class will face further upgrades that are outside of the current mid-life HCM/FELEX upgrade. The upgrades, and the delivery dates, suggest that the RCN is attempting to keep the *Halifax*-class operational past 2036. This is past its originally expected life cycle which was between 2027 and 2031. Of course, the original plan was to have the replacement for the *Halifax*-class frigates and *Iroquois*-class destroyers ready during this period. The original intention was to have the first delivery of the Canadian Surface Combatant-class warship in 2022. Unfortunately because of delays, it is unknown at this time if the first delivery of the CSC will meet this target. It is hoped that the final delivery will be in "2036+". This means that the *Halifax*-class frigates will be 40-44 years old when they are retired. This is a similar age of when the *Iroquois*-class was pulled from active service and retired because of issues with rust on the hull and structural cracks.[63]

The current situation is such that one of two views can be taken.

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[62] Parliamentary Budget Office. "Budget Analysis for the Acquisition of a Class of Arctic/Offshore Patrol Ships".
[63] Canadian Press. "HMCS Iroquois sidelined indefinitely after rust found in hull" 7 May 2014, available at: http://www.cbc.ca/news/canada/nova-scotia/HMCs-iroquois-sidelined-indefinitely-after-rust-found-in-hull-1.2635322

The first is that the CSC program is going to delay the retirement of the *Halifax*-class. If this is the case then so be it. The procurement initiatives suggested in DAG 2015 would then be appropriate and the billion or so dollars to extend their life another decade or more to prevent the creation of yet another operation hole is both sound and appropriate. If this is the case, however, the government will need to go back and revisit the issue of hull maintenance. At present they have been operating under the assumption that the frigates would be retired on time in the early 2030s and have approached hull maintenance from this paradigm. If they intend to extend the Halifax-class retirement timeline there is a very real danger that we could be left with a nasty surprise concerning these 'neglected' hulls.

If, however, the government is alternatively committed to the original timeline then they must take two points of action. The first is that a clear plan to keep the CSC project on track so that they can be delivered in time to retire the *Halifax*-class as planned must be articulated. This might take the appearance of constructing one destroyer and one frigate variant alternatively which would be more costly and logistically challenging for the construction process but ensure that when the class face retirement in the early 2030s the RCN has not only received the destroyer variant and has all of their operational capabilities maintained even if at lower numbers for a temporary period. The second point of action that is needed is to acknowledge the initiatives proposed within the DAG 2015 concerning the *Halifax*-class are an inappropriate expense and that the delivery dates for these systems are unrealistic when considering the *Halifax* retirement date.

This also means the government has another problem that they must acknowledge, it is obvious that communication across the procurement process has broken down. The left hand is not talking to the right hand. An initiative must be formulated and taken with immediate effect to correct this dysfunctional lack of communication to ensure that throughout the future of the NSPS there are not further mistakes of this kind taken, some of which could prove to be far more costly and even dire than that reflected within the DAG 2015. The government clearly must get a handle and demonstrate active and clear leadership on these issues

Regardless what is to be done with the *Halifax*-class frigates, the initiatives outlined in DAG 2015 when compared with the officially stated timeline for the retirement of these ships indicates that there is a dire need for the government to address the ongoing and systemic dysfunction taking place in Canada's defence procurement planning.

Recommendations:

1. Assess the longevity of the *Halifax*-class fleet and whether individual DAG programs are appropriate, necessary and required given their current projected life-cycle;
2. Consider officially extending the life-cycle of the *Halifax*-class and the appropriate measures required, such as adopting DAG 2015 initiatives and developing a strategy to address the potential hull concerns that would arise from the is extension;
    a. Alternatively, if the *Halifax*-class frigates are to be retired as scheduled they should be fitted with the bare-bones essentials and the focus should be kept on the building and introduction of the Canadian Surface Combatant fleet.

3. New appraisal of the NSPS that will take into consideration potential delays and foreseeable cost overruns, such as projected military-related inflation;
4. Reconsider the CSC construction strategy to reflect an alternate schedule of the two variants to ensure that overall operational capability.

Appendix 1:

DAG 2015 Halifax-class Initiatives

Program	Target Contract Award Date	Estimated Cost	Target Completion Date
StrongBow	2021	$50 Million to $99 Million	2026 – 2035
Multi Role Boat	2017	$50 Million to $99 Million	2020
Maritime Next Generation Communications Suite	2021	$20 million to $49 million	2025
Maritime Satellite Communications Upgrade	2015	$50 million to $99 million	2018
Maritime Tactical Command and Control	2022	$20 million to $49 million	2026 - 2035
Naval Electronic Attack Recapitalization (Onboard)	2023	$50 Million to $99 Million	2025
Naval Electronic Warfare System Surface	2023	$20 million to $49 million	2025
Virtual Integrated Shipboard Information Networks	2021	$50 Million to $99 Million	2025

Underwater Warfare Suite Upgrade	2017	$100 million to $249 million	2024
Torpedo Countermeasure Hard Kill	2022	$100 million to $249 million	2025

Appendix 2: Description of DAG 2015 Halifax-class Projects

StrongBow: A replacement program for the current *Halifax* Cryptologic Direct Support Element equipment suite (AN/SRD-504) Designed to provide "tactically relevant warning of threat emissions in the Communications Intercept and Electronic Intelligence spectrums"

Multi Role Boat: This program aims to replace the existing "obsolete" rigid-hull inflatable ship's boats onboard the *Halifaxes* utilized by the NBP and for support to humanitarian and disaster relief operations, as well as over-the-horizon operations. "Boat improvements will include increased speed, dual engines, shock mounted seating for 12 personnel, larger load capability and electronics upgrades (communications, navigation and sensors). The boat will be the nine-metre class rigid-hull inflatable boat. The launch and recovery system will have a minimum lifting capacity of 15,500 pounds. It will also serve as the cargo handling system. Not only will it be capable of launching and recovering a fully loaded boat with personnel (12), it will also be capable of handling other Department of National Defence and Other Government Departments' boats of similar size and unmanned vehicles."

Maritime Next Generation Communications Suite: "[W]ill provide ... the next generation of Software Definable Radio equipment to support current and future Information Exchange Requirements for Line of Sight and Beyond Line of Sight ranges without the necessity of a satellite connection.

Maritime Satellite Communications Upgrade: This upgrade will provide "wideband satellite communications (SATCOM) operational capability to RCN warships as the current SATCOM services can no longer meet the RCN's Information Exchange Requirements (IERs). Therefore, MSCU will transition the RCN from a single-source, non-assured access, commercial satellite service to a combination of assured government owned and operated satellite services, with commercial alternatives."

Maritime Tactical Command and Control: "Maritime Tactical Command and Control (MTC2) will provide software to perform maritime tactical Command and Control amongst Canadian naval platforms and between platforms and their superior and subordinate Commanders and interchange C2 information seamlessly with allied navies of the United States, Britain, Australia and New Zealand. MTC2 will provide necessary hardware upgrades to the Naval Information Systems (NAVIS) to support the new software demands."

Naval Electronic Attack Recapitalization (Onboard): The new system will be integrated with the current *Halifax*-class Combat Management System to provide Electronic Counter Measures (ECM) self-defence to the *Halifax*-class frigate from target designation and missile lock.

Naval Electronic Warfare System Surface: This program will "upgrade the existing Electronic Intelligence (ELINT) and Electronic Support Measures (ESM) system in the *Halifax*-class frigates to provide signals intelligence and early warning of threat emitters to the ship." "The project will also provide interception, identification, platform correlation, analysis and direction finding of electronic emissions so as to provide the maximum effectiveness in ELINT/ESM surveillance" and "contribute to early Indications and Warning of surface vessels."

Virtual Integrated Shipboard Information Networks: This program aims to "establish a common shipboard networking baseline" that will "put in place the framework, infrastructure and process required to leverage emerging technologies such as virtualisation, service oriented architecture and cloud computing." This will be accomplished by leveraging the "Virtual Integrated Shipboard Information Networks (VISIoN) [to] deliver high-availability, mission critical network capabilities interoperable with allies and Other Government Departments at a sustainable pace. The project will ensure that new technologies are consistently leveraged to significantly reduce the cost and effort required to maintain networking capabilities."

Underwater Warfare Suite Upgrade: The Underwater Warfare Suite Upgrade (UWSU) aims to "modernize the underwater warfare sensor suite that is currently installed on the *Halifax*-class frigates" by "improve the performance of the underwater sensors through the upgrade and/or replacement of the components of the underwater warfare sensor suite." The UWSU will "deliver an integrated system that replaces the current towed array sensor and sonobuoy processing system" that "adds additional active intercept sensors, and improves the processing and transmission control system of the existing hull mounted sonar. Additional components for the project will include a towed low frequency active sonar capability and a compatible active receive array that will improve detection performance for targets operating in both open ocean and littoral environments"

Torpedo Countermeasure Hard Kill: This program will add further defensive capabilities to the *Halifaxes, Victorias* and will be transferable to the JSS and CSC. The Torpedo Countermeasure Hard Kill program provides "defensive capability against the full range of modern and emerging threat torpedoes by adding a hard kill anti-torpedo weapon to compliment shipboard soft-kill torpedo countermeasure systems."

Appendix 3:

Remaining DAG programs that do not specifically mention the Halifax-class

Program	Target Contract Award Date	Estimated Cost	Target Completion Date
Canadian Underwater Mine warfare Apparatus	2020	Under $20 Million	2025
Lightweight Torpedo Upgrade	2021 - 2025	$250 million to $499 million	2026 - 2035
Naval Electronic Warfare System Sub Surface	2023	$20 million to $49 million	2025
Naval Large Tug	2019	$100 million to $249 million	2023
Naval Mine Countermeasures Unmanned Surface Vehicle	2021	$50 Million to $99 Million	2026 - 2035
Naval Minewarfare Countermeasures Support Craft	2021	Under $20 million	2025
Naval Remote Weapon Station	2016	$50 million to $99 million	2021 - 2025
RCN Intelligence Surveillance Tracking Acquisition and Reconnaissance	2021	$100 million to $249 million	2021 - 2025

Programme			
Submarine Equipment Life Extension	2020 - 2026	More than $1.5 billion	2026 - 2035
Surface Supplied Diving	2022	$50 million to $99 million	2026 - 2035
System of Training and Operational Readiness Modernization	2021	$50 million to $99 million	2026 - 2035
Arctic/Offshore Patrol Ship	N/A	More than $1.5 billion	2018 - 2025
Canadian Surface Combatant	2018 - 2020	More than $1.5 billion	2036 +