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THE RISK OF TRANSFORMATIONAL PROCUREMENT: LITTORAL COMBAT SHIP LESSONS IDENTIFIED

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SHIP LESSONS IDENTIFIED**

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Par le capitaine de corvette Darren Sleen

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AIM

1. The aim of this paper is to discourage the alteration of established Canadian procurement processes, by considering a key lesson from the United States Navy's (USN) acquisition of the Littoral Combat Ship (LCS). Rapid delivery of a fleet of transformational ships was prioritised over a detailed analysis of options and establishing clearly defined operational requirements. The impact of this decision forced a "design-construction concurrency," in which two distinct fleets of LCSs were built without a finalised design.¹ This unorthodox acquisition model is in the process of delivering ships that have not demonstrated success in operations. Given the significantly smaller pool of resources available to recover from failure, it serves as a warning that diverting from established processes poses significant risk to Canadian defence procurement.

INTRODUCTION

2. Canada's defence procurement system is often criticized for being inflexible and taking too long to deliver.² The contemporary operating environment, characterised by rapid technological change and complex conventional and irregular threats, demands a defence procurement system that can deliver relevant capabilities in a reasonable timeframe. Two of the three key objectives of the 2014 Canadian *Defence Procurement Strategy* highlight the desire to improve the timeliness and efficiency of delivering products.³ Despite the continuing efforts of the Trudeau government to prioritise streamlining procurement, there has been little success for

¹ Ronald O'Rourke, *Navy Littoral Combat Ship (LCS) Program: Background and Issues for Congress 2018* (Washington, DC: Congressional Research Service, 2018), 21.

² Elinor Sloan, *Something Has to Give: Why Delays Are the New Reality of Canada's Defence Procurement Strategy* (Calgary: The University of Calgary School of Public Policy, 2014), 3.

³ Public Services and Procurement Canada, "Defence Procurement Strategy," last modified 23 September 2018, <https://www.tpsgc-pwgsc.gc.ca/app-acq/amd-dp/samd-dps/index-eng.html>. The two key objectives referred to are: (1) delivering the right equipment to the CAF and the Canadian Coast Guard in a timely manner and (2) streamlining defence procurement processes.

major capital projects.⁴ In determining where to find efficiencies, a balance must be struck between eliminating parts of an inherently bureaucratic process and the risks that will be introduced as a result. As the LCS project example will demonstrate, the initial steps of identifying the capability gap, analyzing the options, and defining the solution before committing to production are indispensable.

3. Firstly, this paper will describe the historical context in which the LCS project was initiated to understand why decisions were made to depart from the traditional process. Secondly, the sequence of events that led to design-construction concurrency will be evaluated, with particular consideration of the point at which the LCS project was nearly cancelled. Finally, the current state of the LCS will be assessed as an overall failure as a result of the early errors in the programme execution. Overall, the paper will be framed in the context of the risk taken by the USN to achieve a transformational capability through a novel procurement process, and conclude that Canada would be unwise to follow a similar path.

DISCUSSION

Historical Context—Origins of the LCS Project

4. The LCS project was innovative when it was initiated in 2001. It sought to address the problem of maintaining a sizable fleet of ships by leveraging modular packages of emerging technology to significantly reduce cost and to take advantage of networked systems to compensate for the capabilities that it lacked. The Canadian Armed Forces (CAF), with significantly fewer resources, could be lured by a similar concept, which on the surface, promises to do more with less.

⁴ David G. Perry, *2016 Status Report on Major Equipment Procurement* (Calgary: The University of Calgary School of Public Policy, 2014), 1-4, 8.

5. The genesis of the LCS occurred in the late 1990s, when the post-Cold War USN fleet was rapidly declining in size. A widely-held belief existed that falling below a 300-ship threshold would not allow the USN to effectively conduct its global operations.⁵ There was also a growing need to replace the aging small surface combatant fleet in order to maintain ship numbers and fleet capabilities.⁶ An influential 1999 article by the U.S. Naval War College president, Admiral A.K. Cebrowski, and the naval strategist, Wayne Hughes, argued that it was necessary to rebalance the fleet by adding a low-cost, expendable, small surface combatant that they referred to as the *Streetfighter*. The premise was that these vessels would be able to assume the risk of accessing the littoral regions of an adversarial nation, particularly where enemy anti-access/area denial (A2/AD) capabilities, such as mines, submarines, fast attack craft and shore-based cruise missiles existed. This capability would provide a balance to the large surface combatants that did not have a sufficient level of survivability in comparison to the tremendous offensive combat power that they offered.⁷ A large contingent in the USN was not receptive to the idea of building more small surface combatants in general, and was hostile to the *Streetfighter* concept.⁸

6. The *Streetfighter* concept gained momentum after the appointment of Admiral Vern Clark as Chief of Naval Operations (CNO) in mid-2000, who had carefully followed the debate on future small surface combatants. Despite the controversy about the future of small surface

⁵ Robert O. Work, *The Challenge of Maritime Transformation: Is Bigger Better?* (Washington, D.C.: Center for Budgetary and Strategic Studies, 2002), 3. The USN fell from a peak size of 552 ships in 1989 to a low of 316 in 2001. Mr. Work was an accomplished Naval Analyst who eventually served as the Undersecretary of the Navy and later as the Undersecretary of Defense.

⁶ R.B. Watts, *American Sea Power and the Obsolescence of Capital Ship Theory* (Jefferson: McFarland & Co., Inc., 2016), 170. The LCS was intended to ultimately replace a total of 69 small surface combatants of the *Oliver Hazard Perry*, *Avenger*, *Osprey* and *Cyclone* classes.

⁷A.K. Cebrowski and Wayne P. Hughes, "Rebalancing the Fleet," *Proceedings* 125, no. 11 (November 1999): 32-33, <https://search.proquest.com/docview/205997367?accountid=9867>.

⁸Robert O. Work, *The Littoral Combat Ship: How We Got Here, and Why* (Washington, D.C.: Undersecretary of the Navy, 2014), 3-4.

combatants, he recognised it as the most viable option to grow the fleet to a desired 375-ship inventory.⁹ The ongoing reduction of the USN fleet size increased the urgency of the desire to acquire new ships.

7. As Admiral Clark was considering the options for the future fleet after assuming the CNO office in late 2000, President George W. Bush was elected and introduced his priority of “defence transformation”.¹⁰ In a 2002 speech, Secretary of Defence Rumsfeld expanded on this priority as it applied to procurement by stating that “[w]e must promote a more entrepreneurial approach to developing military capabilities...that encourages people...to behave less like bureaucrats and more like venture capitalists....”¹¹ It was in this political climate that Admiral Clark released a plan in November 2001 to build a fleet of LCSs.¹² The defence analyst, Robert O. Work, indicated that the LCS “...lineage and pedigree can be clearly traced back to Admiral Cebrowski’s...vision [of the *Streetfighter*].”¹³ The intersection of a growing need to build ships, a desire to transform procurement, and an innovative approach to small surface combatants created a permissive environment in which the USN could abbreviate the traditional process and set the stage for a significant error.

Procurement of the LCS: The Path to Design-Build Concurrency

8. Immediately after the announcement of the LCS project, the USN started their acquisition work in an unorthodox fashion. Normally, a USN project team would spend five years developing a new ship design, developing a concept of operations and deriving system

⁹*Ibid.*

¹⁰Robert O. Work, *Naval Transformation and the Littoral Combat Ship* (Washington, D.C.: Center for Strategic and Budgetary Analysis, 2004), 65-66.

¹¹Donald Rumsfeld, “Remarks on 21st Century Transformation of US Armed Forces,” (Speech, National Defence University, Fort McNair, Washington, D.C., 31 January 2002).

¹²Duncan Long and Stuart Johnson, *The Littoral Combat Ship: From Concept to Program* (Washington, D.C.: Office of the Deputy Assistant Secretary of Defence Forces Transformation and Resources, 2007), 8-9.

¹³Work, *Naval Transformation...*, 72.

requirements, followed by five years building the lead ship.¹⁴ This is comparable to the extant Canadian process, in which a project passes through a lengthy process to ensure that options and requirements are thoroughly evaluated prior to building a capability.¹⁵

9. In the LCS case, within a year of the project announcement, the USN had awarded six contracts to industry for concept studies on a “Focused Mission High-Speed Ship.” Robert O. Work contended in his 2004 analysis that the Navy subsequently “...prepared its LCS design requirements with little regard to the industry submissions,” given the very limited time between the receipt of the studies and publication of the requirements in February 2003.¹⁶ Within months, the project team contracted designs based on three of the initial submissions that were ultimately “downselected” to two significantly different seaframe designs for *Flight 0* builds (prototypes) commencing in May 2004. The intention was to allow a competition between the two prototypes to identify problems in design and operating concepts, which would then be used to refine the final product. Production would be awarded to the contractor with the best seaframe, with a finalised design based on the initial testing.¹⁷

10. The two industry teams embarked on building two radically different ships. Lockheed Martin designed a steel mono-hulled ship capable of partially planing on the surface of the water (USS *Freedom*). General Dynamics designed an aluminum trimaran (USS *Independence*).¹⁸ The

¹⁴O’Rourke, *Navy LCS Program: Background and Issues ...2018...*, 21.

¹⁵Department of National Defence. “Defence Purchases and Upgrades Process,” last modified 10 October 2018, <http://www.forces.gc.ca/en/business-equipment/procurement-projects/procurement.page>. As an example of the timeline for a recent complex Canadian project, the *Halifax*-class Modernisation/Frigate Life Extension Project commenced in 2002, and the first refit started 8 years later.

¹⁶ Work, *Naval Transformation...*, 3.

¹⁷Long and Johnson, *The Littoral Combat Ship...*, 10. The term “seaframe” referred to the hull, propulsion system, combat management system and basic self-defense capabilities that would be augmented by mission modules.

¹⁸Department of the Navy, “United States Navy Fact File: Littoral Combat Ship Class – LCS,” last modified 10 October 2018. https://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=1650&ct=4.

ships have minimal commonality, including different propulsion and combat management systems.

11. The transformational nature of the LCS concept itself was a driving factor behind shifting to prototype-based project definition. The concept of operations (CONOPS) for the LCS and the Project Design Interim Requirements Document (PD-IRD) published in 2003 made it clear that the ship would have three primary warfare roles: littoral anti-submarine warfare (ASW), mine countermeasures (MCM), and littoral anti-surface warfare (ASuW).¹⁹ These focused roles would be enabled by mission modules that would be developed separately and would enable an LCS to focus on one primary mission at a time, to be enabled through the use of unmanned air and surface vehicles. The ship itself was to be a node in a “Total Battle Force Network,” through which it would rely on other task group elements for situational awareness and survivability. Modularity and network-centric battle models were significant departures from previous USN experience. The prototype testing was considered necessary given the lack of experience with these operating concepts in the USN.²⁰ The plan was unorthodox, and it was not sufficiently evaluated for risk.

12. Despite the declared intention of the Secretary of Defence to make transformative changes to force development processes, friction between Congress and the USN regarding the approach taken to the LCS started in 2003, before the prototype contracts were awarded. Criticism arose regarding the lack of options analysis before significant progress was made in acquiring ships. Admiral Clark was aware that key steps in the normal process had been skipped,

¹⁹Department of the Navy, *Preliminary Design Interim Requirements Document for Littoral Combat Ship (LCS) Flight 0* (Washington, D.C.: Department of Defense, 2003), 4-5. Note that the ASuW role was to be specific to fast-attack craft swarm attacks. A number of other inherent capabilities were identified (such as maritime interdiction operations, ISR and Special Forces insertions).

²⁰Work, *The Littoral Combat Ship: How We Got Here...*, 22.

and was "...willing to accept the risks inherent [in order to enable the] rapid design, build, and in-service development strategy."²¹

13. The risks were realised between 2006 and 2008. The USN plan hinged on two years of testing the prototypes before selecting the best variant and commencing production. This testing would substitute for the abbreviated analysis at the beginning of the project. By 2006, before a prototype was delivered, it was evident that having the industry teams wait two years while a decision was made would increase costs substantially. Affordability was a critical factor for the LCS project, since the innovations were designed to avoid the huge costs of building multi-mission ships.²² With no analysis on which to base the choice of variant, the USN was forced to change its strategy to keep both industry teams intact and employed. The result was a successful proposal to Congress in 2006 to build seven of each Flight 0 variant, effectively putting the ships into production before testing had started. When a subsequent number of design changes were demanded by the USN, costs rapidly spiralled out of control, leading to Congress cancelling the orders for all additional Flight 0 ships other than the first two prototypes.²³ Using Canadian procurement terminology, the lack of thorough *options analysis* and *project definition* phases was the root cause of this issue. The USN expected these activities to be completed once the prototypes were delivered.

14. Several attempts were made to restructure the programme after these cancellations. The LCS project was ultimately saved by a combination of factors. The USN planned to procure up to 55 LCSs, which comprised almost 18% of the planned fleet.²⁴ There were no other alternative

²¹*Ibid.*, 12, 33-34.

²²Department of the Navy, *Preliminary Design Interim Requirements...*, 15.

²³Ronald O'Rourke, *Navy Littoral Combat Ship (LCS) Program: Background and Issues for Congress 2012* (Washington, DC: Congressional Research Service, 2012), 49. The most significant design change was to increase the survivability of the seaframes by requiring them to be altered to meet warship standards (Naval Vessel Rules) rather than the commercial standards originally specified.

²⁴O'Rourke, *Navy LCS Program: Background and Issues...2012...*, 2.

projects in the pipeline that would be able to deliver this quantity of ships, nor the littoral capabilities required. Additionally, the contractors were heavily incentivized by the credible threat that the programme would be cancelled, and ultimately provided “...extremely attractive fixed price bids.”²⁵ Due to the fact that there was still no evidence on which to choose one of the designs, ten ships of each variant were ordered in late 2010.²⁶ These contracts eliminated the concept development plan that was integral to the original decision to bypass much formal analysis at the outset of the project. Additionally, committing to two variants of ships added considerable complexity to the operational test and evaluation process and training regime that already had to contend with the integration of three separate mission modules.

Current State of the LCS Project

15. The Undersecretary of the Navy, Robert O. Work, made a compelling case in 2014 that the LCS project was a success: “...the Navy is getting very nearly the ship it asked for.” He did, however, caveat his assessment: “[s]imply put, the department should never again repeat the short cuts or questionable shipbuilding approaches taken in the LCS program.”²⁷

16. Official assessments do not paint a successful picture of the LCS project. The 2014 U.S. Government Accountability Office report heavily criticized the acquisition programme, noting that the Navy was still investigating significant design changes while production was ongoing, and also noted that a similar design-construction concurrency was posing problems for the acquisition of the mission modules.²⁸ More recently, the 2016 Director of Operational Testing and Evaluation (DOT&E) report stated that:

²⁵Work, *The Littoral Combat Ship: How We Got Here...*, 34-37.

²⁶O’Rourke, *Navy LCS Program: Background and Issues...2012...*, 8-9.

²⁷Work, *The Littoral Combat Ship: How We Got Here...*, 38, 43.

²⁸United States Government Accountability Office, *Littoral Combat Ship: Additional Testing and Improved Weight Management Needed Prior to Further Investments* (Washington, D.C.: US Government Accountability Office, 2014), 6, 22. Design changes included the addition of additional habitability spaces to deal with the crewing

...DOT&E has now evaluated both seaframe variants to be not operationally suitable because many of their critical systems are unreliable, and their crews do not have adequate training...[u]nless corrected, [these problems] will continue to prevent the ship and mission packages from being operationally effective.²⁹

17. In 2014, the planned LCS acquisitions were reduced from 55 to 32 with final delivery in 2019. The resulting gap in small surface combatants will be filled by an upcoming project to build 20 new guided-missile frigates, currently referred to as FFG(X).³⁰ The new frigate will be a traditional multi-purpose naval platform, and a clear departure from the modular, network-dependent architecture of the LCS.³¹ This shift in force development policy is the most compelling evidence that the LCS project is an overall failure.

18. A number of other problems with the LCS can be studied in further detail, including crewing and training problems, mechanical design issues, and fleet integration challenges. However, the key factor behind all of the problems is that there was a much higher probability of identifying and mitigating these issues early through more detailed analysis and planning prior to cutting steel. The initial rush to production in the spirit of the 2002 Secretary of Defence's encouragement to "...act like venture capitalists..." resulted in the failure of the USN to deliver a functioning operational capability 17 years after the initiation of the programme.

CONCLUSION

19. The LCS programme was a transformational project, incorporating many new naval paradigms, including modular mission capabilities and a networked approach to achieve mission

problems, changes to increase commonality between the variants (such as a common combat management system), and the addition of bridge wings to all *Independence* variants to address safety and visibility concerns.

²⁹Department of Defense, *Director, Operational Test and Evaluation FY 2016 Annual Report* (Washington, D.C.: Office of the Director, Operational Test and Evaluation, 2016), 261. The FY2017 report did not change this assessment, because no additional testing had been conducted.

³⁰Michael Fabey, "Ship swarm: Littoral Combat Ship starts to make its mark in US Navy fleet." *Jane's Navy International* 123, no. 6 (August 2018). https://janes.ihs.com/NavyInternational/Display/FG_990540-JNI.

³¹Ronald O'Rourke, *Navy Frigate (FFG(X)) Program: Background and Issues for Congress 2018*(Washington, DC: Congressional Research Service, 2018), 3-5.

objectives. The novel procurement process used by the USN rushed to produce two prototypes, which created a cascading series of problems throughout the history of the programme. The project team was therefore forced into a pattern in which design and construction occurred concurrently, spiralling costs out of control and delivering a system that has failed to demonstrate a successful operational capability. The key initial steps of defining the capability gap, analyzing the options and robustly defining the solution are time-consuming, but they are a relatively inexpensive way to mitigate risk in a major capital project. Innovative methods to conduct this work, such as the LCS prototyping, are accompanied with considerable risk. The USN has tremendous resources to more readily rebound from major errors like those made in the LCS procurement. In the CAF, similar errors could prove catastrophic to a major procurement.

RECOMMENDATION

20. In the context of Canadian defence procurement, the LCS programme is a harbinger of the risks inherent to a significant departure from established procurement processes. There is a possibility that the desire to inject agility into the bureaucratic process could result in a temptation to modify the process in the pursuit of transformation and efficiency, as it did for the USN. Streamlining the process should not be approached by changing the current paradigm of detailed planning and analysis conducted prior to implementation.

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