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Sustainable Force Development How Mistakes with the Littoral Combat Ship Threatened the US Navy's Shipbuilding Strategy

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Activities associated with generating the future fleet, including key considerations such as naval strategy, doctrine, requirements and stewardship of project delivery, are all components of force development.² The Royal Canadian Navy (RCN) operates in a complex and volatile environment shaped by technological advances, shifts in global military power balances and new types of conflict (asymmetrical and littoral warfare).³ Flexibility and responsiveness are key tenets of force development that enable navies to remain relevant.⁴ As the RCN works toward its future fleet, what lessons can be learned from the experiences of other navies? This paper will use the US Navy's Littoral Combat Ship (LCS) program to show the importance of evidence-based information to support the procurement business case. It will examine the flaws of the LCS program and provide recommendations for the RCN to consider as it pursues its own fleet recapitalization.

The US Navy introduced the LCS program with the intent to deliver a ship with the right balance of flexibility, responsiveness and endurance to augment existing assets and to enable operations in a contested littoral environment.⁵ However, the LCS program has faced heavy criticism due to an unclear concept of operations, unproven viability of design and failure to apply sufficient rigor to the planning and integration of the LCS into the current fleet.⁶ As this paper will discuss, the US Navy's decision to advance the procurement of the LCS without definitively addressing these criticisms affected its credibility and jeopardised the sustainability of the USN fleet. By analysing the USN LCS program within the domains of strategy and force development, the RCN could learn the importance of having a clear and coherent strategy and quality information to underpin its recapitalization activities.

The LCS program also demonstrates the challenges stemming from adopting an innovative approach to procurement without sufficient risk control measures. Recapitalizing a fleet is an expensive endeavour and there is pressure for organizations to move out aggressively when both funding and political support are available. In the case of the LCS, the US Navy under-estimated the complexity of an industry-led design, committed to a modular design concept without proving the feasibility of the payloads, and compromised on standards and testing to maintain production in order to prove the viability of its strategy and business case in the face of public scrutiny. Additionally, many of the sustainment factors such as crewing and maintenance were not fleshed

out.

As the RCN recapitalizes its fleet, it faces many of the same challenges as the US Navy in terms of the complexity of the operating environment and fiscal constraints. The LCS program struggled to find its footing and is an excellent case study in the importance of planning and strategic messaging to successful program delivery. The program experienced significant cost and schedule over-runs that affected the size of the force delivered, exposed gaps in strategic alignment amongst key stakeholders – including the US Navy, the US government and the prime contractors Lockheed Martin and General Dynamics – and ultimately threatened the USN’s credibility in terms of strategy and force development.

The Littoral Combat Ship Program

Since World War II, the US Navy’s force had been structured around the aircraft carrier, and surface combatants tended to be of intermediate size (8,000-10,000 tons displacement) and capable of filling a variety of mission roles (e.g., anti-air warfare).⁷ The inclusion of small ships, with a displacement less than 3,000 tons, in the 2001 defence review caught many stakeholders by surprise and the rationale for the change was poorly explained which resulted in immediate scrutiny.⁸ The shift in strategy was attributed to concerns surrounding increasingly contested littoral waters and the desire to shift towards network-centric warfare where fighting power (including sensors and information) is distributed across the entire fleet and is measured by the number of ships (nodes) in the network.⁹ Building an appropriately sized fleet within the financial constraints would require “smaller, cheaper combatants that could be reconfigured for any task at hand.”¹⁰ The LCS represented the first small ship to embody the USN’s new strategy.

The LCS was advertised as a transformational capability to pivot the USN towards network-centric warfare and, by the nature of its modularity, be “invulnerable to operational obsolescence.”¹¹ The USN had historically argued against the small ship concept on the basis that balancing speed, endurance and payload in a small hull form would demand significant design compromises and increase the cost and complexity of the vessel.¹² The multi-mission platforms that defined the USN’s fleet were the obvious choices as flexible platforms that could protect the carriers at sea and fulfill a variety of independent missions in contested waters.¹³ The decision to introduce small ships to the fleet arrived without sufficient explanation or a corresponding options analysis to justify the change in tack.¹⁴ Furthermore, it remained unclear whether the impact of introducing and integrating the LCS into the existing fleet had been considered from an operational or tactical level. As an example, an LCS operating at high speeds, which is a defining characteristic of the ship, would have a higher rate of fuel consumption than other USN ships and based on its small size would require a higher frequency of replenishment at sea to maintain its endurance. The LCS would also be dependent on support from the fleet to protect itself and gain access to ports where mission payloads could be swapped. An ill-configured LCS would be a liability to the broader fleet as its single-mission focus would prevent it from supporting the fleet until such time that it could be reconfigured, likely outside the theatre of war.¹⁵ In short, while the LCS offered potential to introduce a new approach to naval strategy, it remained “a capability in search of a ship,”¹⁶ leaving many program stakeholders confused as to its utility and value to the existing fleet.

The criticism of the US Navy’s LCS program over-shadowed the level of innovation inherent in the ships, and the necessity to innovate in the navy. Because of flaws in the rollout of the LCS program, people stopped believing in the innovative vision for the future fleet and defaulted back

to the old design models which left the LCS as an orphan. There was a real opportunity to innovate the fleet models that failed to get the support/buy-in required to move the new concepts forward. As well, the criticism over-shadowed the fact that by delegating authority over the design to industry, the USN benefitted from modern shipbuilding approaches such as open architecture designs and commercially available equipment.¹⁷ The innovations from industry were meant to achieve both cost-savings and flexibility relative to traditional military procurement, however the ship costs skyrocketed as a result of constantly evolving concepts of operation and design requirements.¹⁸ As the LCS platform was meant to form the basis of the USN's future fleet, overall project failure would jeopardise the USN's shipbuilding strategy.¹⁹

The requirement for a flexible approach does not excuse the USN's lack of a clear and coherent strategy at the onset of the LCS program. The failure to articulate that the LCS was the first step in shifting the USN from its carrier era to the new network-centric warfare strategy caused conflict and churn within the program stakeholders. Without a clear link between the LCS and its broader naval strategy, the USN introduced new challenges and public scrutiny of the LCS program. Worst of all, this communication failure introduced programmatic risk into the navy's overall fleet recapitalization strategy and brought the USN's organizational credibility into question.²⁰

As noted, the LCS program failed to deliver on its key promise of lower-cost ships. At the program onset, each LCS platform was estimated to cost \$220 million. To promote further cost savings, the USN contracted two shipyards to produce competing prototypes based on a common set of requirements with the intent that both variants would be evaluated to inform the final design of the LCS.²¹ The USN allowed the ships to be designed to near commercial standards with an aim to reduce complexity, and delegated technology integration to the shipyard in order to incentivize economic efficiencies.²² The result, however, was that both variants of the prototype ships were delivered at more than double the projected costs and both failed to meet the minimal survivability standards for a combat vessel, a problem that was largely attributed to the commercial design basis.²³

It was extremely concerning that the navy waived survivability testing of the LCS, in favour of design analysis and simulations, based on considerations of practicality and cost savings.²⁴ As these tests are designed to confirm platform safety, it was clear that the USN was putting cost savings as the top priority. Lacking quality information to make a choice on the preferred variant, the USN continued to order both designs, potentially sending good money after bad. The Government Accountability Office – independent advisors to Congress on matters of financial and operational efficiency – noted that the USN was prioritizing program delivery without supporting information on program viability and platform suitability.²⁵ The USN thus failed in its duty to steward the LCS program to ensure the assets delivered to the fleet were fit for purpose, demonstrated value for money and did not pose a risk to safe and sustainable operations.

The navy may justify the acceptance of reduced survivability standards for the platforms by the proposed employment of the LCS. The ships are intended to capitalize on their speed to avoid being hit and to evacuate the threat area if damaged.²⁶ Designing and delivering a ship to traditional survivability standards would add cost, weight and complexity that would erode the business case of the LCS which was built around a high volume of relatively low-cost platforms. However, naval warfare is a war of attrition, and as the USN intended to employ the platform on independent operations in littoral areas, there is a reasonable expectation that minimal survivability standards should be met.²⁷ Therefore, the USN's acceptance of the LCS without minimum survivability standards despite an intent to employ the platform independently in contested areas demonstrates a failure to respect minimal survivability standards for the class.

Many of the benefits associated with the LCS design depended on the success of the modular mission payloads. While the USN originally envisioned an ability to change payloads quickly, optimism gradually gave way to reality. After eight years the navy had determined that an LCS executing a modular swap could be out of operations for 12-29 days.²⁸ Additionally, in order to remain within the design margins for the platform, future mission modules would be required to conform to similar margins (weight, power, cooling) as the original modules. This requirement might prevent the LCS's mission capability from keeping pace with technological advances.²⁹ In summary, it became apparent that the LCS may have over-promised and under-delivered in its ability to adapt its mission employment quickly and may have compromised its long-term relevance by constraining the platform to a small hull form.

Finally, in evaluating the business case for the long-term cost savings associated with the LCS, the USN made unfounded assumptions pertaining to crew size and sustainment. It planned to operate the LCS with 40-80 personnel (mission dependent) which represented a significant reduction in crew size relative to the frigates and destroyers which have crews of 172 and 254 respectively.³⁰ However, the navy failed to underpin this assumption with an analysis of the work demands on the LCS crew which could make the model unachievable from the perspectives of fatigue and mission effectiveness.³¹ The technical complexity of the LCS and the smaller crew size required specialist training and meant correspondingly greater responsibilities at the individual sailor level. Strategies to support smaller crew size included cross-training crew beyond their functional occupation and shifting non-essential administrative and maintenance activities ashore.³² However, this simply masks the cost of the LCS strategy by transferring it to the USN's shore establishments. Additionally, a ship designed for smaller crews limits the space aboard for trainees, driving requirements for a training platform/facility to generate the crews. The training challenges in terms of facilities and limited opportunity to consolidate training at sea result in increased operation and maintenance costs over the life of the class (similar to submarines).³³ In short, the USN assumptions introduced significant risk to the LCS business case, and will have a knock-on effects to the existing fleet's training and shore establishments. This serves as yet another example where the USN put the cart before the horse with the LCS program.

Conclusions

The RCN is undergoing a major fleet recapitalization. It faces similar challenges as the US Navy in terms of recapitalizing its fleet while sustaining the capabilities required to protect interests at home and abroad.³⁴ The LCS program offers the RCN an opportunity to learn that while innovations in technology and shipbuilding offer potential to deliver flexible and cost-effective platforms, there are other considerations that must be taken into account.

Overall, the lessons from the LCS project offer pertinent insights to the RCN. First, there must be a clear and coherent strategy to translate how an acquisition complements the current fleet while enabling transition to the future fleet. Without this, the organization risks introducing change that threatens its own sustainability. Second, projects have a triple constraint of cost, scope and schedule. When issues are encountered, informed decisions are required to determine where to accept trade-offs. Finally, adherence to standards and requirements is essential to ensure the delivery of a minimally acceptable platform. Delegating authority over key decisions to industry, or making concessions to compensate for poor planning will invite scrutiny and challenge the organization's credibility.

The LCS has battled through most of its growing pains. A re-organization in 2016 of the LCS program designated the first four ships – *Freedom*, *Independence*, *Fort Worth* and *Coronado* – as test ships so that the training problems with the LCS fleet could be sorted out. The test ships were instrumental in figuring out crewing, maintenance and other matters, but their continued usefulness has been questioned. Thus, in December 2019, the USN announced that because the cost of upgrading and repairing the first four LCS was too high, it would be better to decommission them.

Much of the resilience to the problems of the LCS program can be attributed to the size and resources available to the US Navy. As a smaller navy, the RCN must be more judicious in managing its procurements as the consequences of errors will be more painful.

The lessons of the LCS program extend beyond the vision and purpose for a single asset, but rather focus on understanding how that asset will integrate with and affect the fleet. As stated in the RCN strategic plan, the key to sustainable development of the fleet is “embracing a faster cycle of innovation while deliberately managing the risks that arise.”³⁵ The RCN must ensure that future acquisitions are based on sound strategy and quality information, and that appropriate risk controls are in place.

It is recommended that the RCN closely monitor defence and commercial procurements in other countries to identify trends in technology, shipbuilding and contracting that enable innovative program delivery without surrendering ownership of the program to industry. Particular attention should be paid to procurement activities in states with similar size and resources such as Australia. The RCN should also consider joint procurement with allies to achieve the requisite economies of scale while maintaining interoperability. And, finally, the RCN should explore the concept of modular mission payloads on intermediate to large-sized platforms where multi-mission capability can be achieved with margins for sustainable growth.

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Notes

1. This paper was written in 2018 while the author was attending the Canadian Forces College in fulfillment of one of the requirements of the Course of Studies. The paper is a scholastic document, and thus contains facts and opinions which the author alone considered appropriate and correct for the subject. It does not necessarily reflect the policy or the opinion of any agency, including the government of Canada and the Canadian Department of National Defence.

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