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## **SUSTAINABLE FORCE DEVELOPMENT: HOW MISTAKES IN THE LITTORAL COMBAT SHIP PROGRAM THREATENED THE US NAVY SHIPBUILDING STRATEGY**

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By / Par le Lieutenant-Commander Ian Flight

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## **SUSTAINABLE FORCE DEVELOPMENT – HOW MISTAKES IN THE LITTORAL COMBAT SHIP PROGRAM THREATENED THE US NAVY SHIPBUILDING STRATEGY**

### **AIM**

1. The Littoral Combat Ship (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 overruns that impacted the size of the force delivered, exposed gaps in strategic alignment amongst key stakeholders (including US Navy, the US Government and the prime contractors Lockheed Martin and General Dynamics) and ultimately threatened the US Navy's credibility in terms of strategy and force development. This paper will examine the flaws of the LCS program and provide recommendations for the Royal Canadian Navy (RCN) to consider as it pursues its own fleet recapitalization.

### **INTRODUCTION**

2. 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.<sup>1</sup> The 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).<sup>2</sup> Flexibility and responsiveness are key tenets of force development that enable navies to remain relevant.<sup>3</sup> The US Navy introduced the LCS 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.<sup>4</sup> 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.<sup>5</sup> The US Navy's decision to advance the procurement of the LCS without definitively addressing these criticisms impacted its credibility and jeopardized its sustainability. By analyzing the LCS program within the domains of strategy and force development, the RCN stands to appreciate the importance of having a clear and coherent strategy, and decision quality information to underpin its recapitalization activities.

3. 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 underestimated the complexity of an industry led design, committed to a modular design concept

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<sup>1</sup> Canada. Department of National Defence. "Royal Canadian Navy: Strategic Plan 2017-2022." Ottawa: Canada Communications Group, 2016, 37.

<sup>2</sup> Canada. Department of National Defence. "Strong, Secure, Engaged: Canada's Defence Policy." Ottawa: Canada Communications Group, 2017, 34-35.

<sup>3</sup> Canada. Department of National Defence. "Royal Canadian Navy: Strategic Plan 2017-2022." Ottawa: Canada Communications Group, 2016, 8.

<sup>4</sup> Baskerville, James E., Robert P. Draim, and Robert G. Sprigg. "The Littoral Combat Ship." *Marine Corps Gazette* 90, no. 3 (2006): 39.

<sup>5</sup> McLeary, Paul. "Rough Waters for LCS." *Defense Technology International* 4, no. 10 (2010): 26. 2.

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 sustain factors such as crewing and maintenance were not fleshed out. As the RCN embarks on recapitalizing its fleet, it faces many of the same challenges in terms of the complexity of the operating environment and fiscal constraints. This paper will use the LCS program to show the importance of evidence-based assumptions to support the procurement business case.

## DISCUSSION

4. 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 (8000-1000 tons displacement) and capable of filling a variety of mission roles (e.g. anti-air warfare).<sup>6</sup> The inclusion of small ships (displacement less than 3000 tons) in the 2001 defense review caught many stakeholders by surprise and the rationale for the change was poorly substantiated resulting in immediate scrutiny.<sup>7</sup> 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.<sup>8</sup> Building an appropriately sized fleet within the financial constraints would require "smaller, cheaper combatants that could be reconfigured for any task at hand."<sup>9</sup> The LCS represented the first small ship to embody the US Navy's new strategy.

5. The LCS was advertised as a transformational capability to pivot the US Navy towards network centric warfare and, by the nature of its modularity, be "invulnerable to operational obsolescence".<sup>10</sup> The US Navy 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.<sup>11</sup> The multi-mission platforms that defined the US Navy'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.<sup>12</sup> The decision to introduce small ships to the fleet arrived without substantiation or a corresponding options analysis to justify the change in tack.<sup>13</sup> Furthermore, it remained unclear whether the impact of introducing and integrating the LCS with the extant fleet had been considered from an operational or tactical level. As an example, an LCS operating at high speeds (a defining characteristic) would have a higher rate of fuel consumption and based on its small size would require a higher frequency of replenishment at sea to maintain its

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<sup>6</sup> Work, Robert O. "Small Combat Ships and the Future of the Navy" *Issues in Science and Technology* no. 1 (Fall, 2004): 61.

<sup>7</sup> Ibid, 60.

<sup>8</sup> Ibid, 62-63.

<sup>9</sup> Ibid: 63.

<sup>10</sup> Work, Robert O. "Naval Transformation and the Littoral Combat Ship." CSBA. February 18, 2004. Accessed October 4, 2018. <https://csbaonline.org/research/publications/naval-transformation-and-the-littoral-combat-ship>.137.

<sup>11</sup> Work, Robert O. "Naval Transformation and the Littoral Combat Ship." CSBA. February 18, 2004. Accessed October 4, 2018. <https://csbaonline.org/research/publications/naval-transformation-and-the-littoral-combat-ship>. iii.

<sup>12</sup> Ibid, 2.

<sup>13</sup> Ibid, 2.

endurance. The LCS would also be dependent on support from the broader fleet to protect themselves 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 theater of war).<sup>14</sup> In short, while the LCS offered potential to introduce a new approach to naval strategy, it remained “a capability in search of a ship”<sup>15</sup>, leaving many program stakeholders confused as to its utility and value to the existing fleet.

6. The criticism of the US Navy’s LCS program overshadowed the level of innovation required to try and achieve the intent of the program and the shift in naval strategy. By delegating authority over the design to industry, the US Navy benefitted from modern ship building approaches such as open architecture designs and commercially available equipment.<sup>16</sup> 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.<sup>17</sup> As the LCS platform was meant to form the basis of the Navy’s future fleet, overall project failure would jeopardize the US Navy’s shipbuilding strategy.<sup>18</sup> The requirement for a flexible approach does not excuse the US Navy’s lack of a clear and coherent strategy at the onset of the LCS program. The failure to articulate the LCS as the first step in shifting the US Navy 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 US Navy introduced new challenges and public scrutiny of the LCS program. Worst of all, this communication failure introduced programmatic risk into their overall fleet recapitalization strategy, and brought the US Navy’s organizational credibility into question.<sup>19</sup>

7. The LCS program also failed to deliver on its key promise of lower cost ships. At the program onset, each LCS platform was estimated to cost \$220 million dollars. To further promote cost savings, the US Navy contracted two shipyards to produce competing prototypes based on a common set of requirements with an intent for each variant to be evaluated to inform the final design of the LCS.<sup>20</sup> The US Navy allowed the ships to be designed to near commercial standards with an aim to reduce complexity and delegate technology integration to the ship yard in order to further incentivize economic efficiencies.<sup>21</sup> Both variants of the prototype ships were delivered at more than double the projected costs and failed to meet the minimal survivability standards for a combat vessel (largely attributed to the commercial design basis).<sup>22</sup> Most

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<sup>14</sup> Ibid, 139.

<sup>15</sup> Ibid, 5.

<sup>16</sup> Baskerville, James E., Robert P. Draim, and Robert G. Sprigg. "The Littoral Combat Ship." *Marine Corps Gazette* 90, no. 3 (2006): 39.

<sup>17</sup> McLeary, Paul. "Rough Waters for LCS." *Defense Technology International* 4, no. 10 (2010): 26, 2.

<sup>18</sup> Ibid, 2.

<sup>19</sup> Alkire et al. *Littoral Combat Ships: Relating Performance to Mission Package Inventories, Homeports, and Installation Sites*. Santa Monica, CA: RAND Corporation, 2007.

<https://www.rand.org/pubs/monographs/MG528.html>.

<sup>20</sup> Francis, Paul L. "Littoral Combat Ship and Frigate: Congress Faced with Critical Acquisition Decisions." U.S. Government Accountability Office (U.S. GAO). December 01, 2016. Accessed October 4, 2018.

<https://www.gao.gov/products/GAO-17-262T>. 2-3.

<sup>21</sup> Ibid, 4.

<sup>22</sup> Oliveri, Frank. "Why is the Navy Buying this Ship?" *CQ Weekly* (2012): 330-332.

concerning was the waiving of survivability testing of the LCS in favour of design analysis and simulations on the grounds of practicality and cost savings.<sup>23</sup> As these tests are designed to confirm platform safety, it was clear that the US Navy was putting cost-savings as the top priority. Lacking decision quality information on the preferred variant, the USN continued to order both designs, potentially spending good money after bad. The Government Accountability Office (independent advisors to Congress on matters of financial and operational efficiency) noted that the US Navy was prioritizing program delivery without supporting information on program viability and platform suitability.<sup>24</sup> The US Navy 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.

8. The acceptance of reduced survivability standards for the platforms may be justified by the proposed employment of the LCS. The LCS is intended to capitalize on its speed to avoid being hit and to evacuate the threat area if damaged.<sup>25</sup> 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 is built around a high volume of relatively low-cost platforms. However, naval warfare is a war of attrition, and as the US Navy intended to employ the platform on independent operations in littoral areas, there is a reasonable expectation that minimal survivability standards should be met.<sup>26</sup> Therefore, the US Navy'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.

9. Many of the benefits associated with the LCS design depended on the success of the modular mission payloads. While the US Navy had originally envisioned an ability to quickly change payloads, optimism gave way to reality when after eight years the Navy suggested that an LCS executing a modular swap could be out of operations for 12-29 days.<sup>27</sup> 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.<sup>28</sup> In summary, the LCS may have overpromised and under-delivered in its ability to quickly adapt its mission employment and may have compromised its long-term relevance by constraining the platform to a small hull form.

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<sup>23</sup> Sherman, Jason. "PENTAGON WAIVES TESTING REQUIREMENT FOR NAVY'S LITTORAL COMBAT SHIP." *Inside the Pentagon* 27, no. 24 (Jun 16, 2011).15-16.

<sup>24</sup> Francis, Paul L. "Navy Shipbuilding: Significant Investments in the Littoral Combat Ship Continue Amid Substantial Unknowns about Capabilities, Use, and Cost." U.S. Government Accountability Office (U.S. GAO). July 25, 2013. Accessed October 4, 2018. <https://www.gao.gov/products/GAO-13-738T>. 5.

<sup>25</sup> Sherman, Jason. "PENTAGON WAIVES TESTING REQUIREMENT FOR NAVY'S LITTORAL COMBAT SHIP." *Inside the Pentagon* 27, no. 24 (Jun 16, 2011). 15-16.

<sup>26</sup> Work, Robert O. "Naval Transformation and the Littoral Combat Ship." CSBA. February 18, 2004. Accessed October 4, 2018. <https://csbaonline.org/research/publications/naval-transformation-and-the-littoral-combat-ship>. 96.

<sup>27</sup> Francis, Paul L. "Navy Shipbuilding: Significant Investments in the Littoral Combat Ship Continue Amid Substantial Unknowns about Capabilities, Use, and Cost." U.S. Government Accountability Office (U.S. GAO). July 25, 2013. Accessed October 4, 2018. <https://www.gao.gov/products/GAO-13-738T>. 5.

<sup>28</sup> Work, Robert O. "Naval Transformation and the Littoral Combat Ship." CSBA. February 18, 2004. Accessed October 4, 2018. <https://csbaonline.org/research/publications/naval-transformation-and-the-littoral-combat-ship>. 147.

10. Finally, in evaluating the business case for the long-term cost savings associated with the LCS, the US Navy made unfounded assumptions pertaining to crew size and sustainment. The US Navy 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 (crews of 172 and 254 respectively).<sup>29</sup> However, the US Navy failed to underpin this assumption with an analysis of the work demands on the LCS crew which could make the model unachievable from a fatigue and mission effectiveness perspective.<sup>30</sup> Strategies to support smaller crew size included cross-training crew beyond their functional occupation, and shifting non-essential admin and maintenance activities ashore.<sup>31</sup> However, this simply masks the costs of the LCS strategy by transferring it to the US Navy's shore establishments. A concerning assumption was that service in the LCS would be viewed as a specialty assignment requiring relatively senior personnel to undergo specialty training prior to joining the ship as a result of the challenges associated with onboard training (accommodating and supervising trainees).<sup>32</sup> In short, these assumptions introduce significant risk to the LCS business case, and will have a knock-on effect to the existing fleet's training and shore establishment. This serves as yet another example where the US Navy has put the cart before the horse with the LCS program.

11. Overall, the LCS lessons offer pertinent insight to the RCN. First, there must be a clear and coherent strategy to translate how an acquisition both complements the current fleet while enabling transition to the future fleet. Without this, the organization risks introducing change that threatens the organization's 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 or making concessions to compensate for poor planning will invite scrutiny and challenge the organization's credibility. While the LCS battled through its growing pains, much of the resilience can be attributed to the size and resources available to the US Navy. The RCN must be twice as judicious in managing its procurements as the consequences of errors will be more painful.

## CONCLUSION

12. The RCN is undergoing a major fleet recapitalization activity and is facing similar challenges as the US Navy in terms of recapitalizing its fleet while sustaining the capabilities required to protect its interests at home and abroad.<sup>33</sup> 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, a clear strategy is required to underpin future force

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<sup>29</sup> Francis, Paul L. "Defense Acquisitions: Realizing Savings under Different Littoral Combat Ship Acquisition Strategies Depends on Successful Management of Risks." U.S. Government Accountability Office (U.S. GAO). December 14, 2010. Accessed October 4, 2018. <https://www.gao.gov/products/GAO-11-277T>. 2.

<sup>30</sup> Ibid, 20.

<sup>31</sup> Ibid, 21-22.

<sup>32</sup> Francis, Paul L. "Defense Acquisitions: Realizing Savings under Different Littoral Combat Ship Acquisition Strategies Depends on Successful Management of Risks." U.S. Government Accountability Office (U.S. GAO). December 14, 2010. Accessed October 4, 2018. <https://www.gao.gov/products/GAO-11-277T>. 23.

<sup>33</sup> Fuhr, Stephen. "The Readiness of Canada's Naval Forces." Ottawa: House of Commons, 2017, 3-4.

development. This extends beyond the vision and purpose for a single asset, but rather focuses 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”.<sup>34</sup> The RCN must ensure that future acquisitions are based on sound strategy and quality information, and that appropriate risk controls are in place.

## RECOMMENDATIONS

13. It is recommended that the RCN:
  - a. Closely monitor defence and commercial procurements 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 nations with similar size and resources such as Australia;
  - b. Consider joint procurement with allies to achieve the requisite economies of scale while maintaining interoperability; and,
  - c. 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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<sup>34</sup> Canada. Department of National Defence. “Royal Canadian Navy: Strategic Plan 2017-2022.” Ottawa: Canada Communications Group, 2016. 9.



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