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The Complexities of Off-the-Shelf Defence Procurement

by Timothy Choi and Jeffrey F. Collins

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POLICY PERSPECTIVE

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Among the many issues being raised in Canada over Russia's brutal, unprovoked war in Ukraine is the state of the Canadian Armed Forces (CAF) and its equipment. As the lack of highly sought-after anti-tank and anti-aircraft portable missile systems in the CAF's inventory makes abundantly clear, the type and quantity of equipment held by a country's military has a direct bearing on its foreign policy.

Defence policy and the CAF are typically not a major priority during the best of times, and with government attention on COVID-19 spending and recent high-profile domestic issues like the protests in Ottawa, the promise of additional dollars to the defence budget seems an unlikely probability. Yet, as former British prime minister Harold MacMillan famously noted over 60 years ago, events have a way of knocking a government off its agenda. In response to the Russian invasion, Prime Minister Justin Trudeau used his recent overseas trip to Europe, meant to signal Canadian resolve in NATO, to hint that he is open to more defence spending.

With simultaneous operational demands for the CAF to respond to domestic climate change and pandemic emergencies, sustaining the anti-ISIL campaign in the Middle East, and a planned increase in naval deployments in the soon-to-be announced Indo-Pacific Strategy, a promise of more dollars could not come at a better time. The question is how to turn this money into actual equipment – be it ships, jets, armoured vehicles, munitions or small arms – in a timely and efficient manner. Here, the CAF, the Department of National Defence (DND) and successive governments, Liberal and Conservative, have been found wanting.

Getting equipment for the CAF is a battle in and of itself. The Trudeau government's own 2017 defence policy found 70 per cent of procurement projects were delayed. A 2006 internal DND audit pegged the average length of time it takes to deliver major equipment at 15 years, a figure that has only worsened as shown by the 16-year (and counting) struggle to replace Canada's four-decade-old CF-18 jet fighters.

Process can certainly account for a lot of these delays. Getting a procurement project from "Eh to Zed" requires going through a bureaucratic pipeline stretched across three departments (DND, Public Services and Procurement Canada, Innovation, Science and Economic Development Canada), key central agencies like the Treasury Board Secretariat and the Privy Council Office and cabinet committees. As we have noted elsewhere, this is one of the most complex procurement structures among any of Canada's allies. Further, adding more dollars is only part of the solution. If there are no clear political directives prioritizing defence, the process can even block the usage of monies already allocated to national defence. Last year alone saw the DND lapse $1 billion of its $5 billion procurement budget.

The OTS Solution?

This set of circumstances, illuminated by the war in Ukraine, has seen pundits like the *Globe and Mail*'s John Ibbitson, and other defence observers, cast about for solutions for Canada to quickly re-arm, or at least modernize its armed forces, to prepare for such a rapidly uncertain and unstable geopolitical environment. One clear idea the commentariat have focused on is buying off-the-shelf (OTS) equipment. OTS advocates believe that Canada could acquire the equipment the CAF needs faster and cheaper from existing suppliers, who are overwhelmingly found overseas in allies like France, Italy, Germany and the U.K. This would be the military equivalent of going to a car dealership and buying straight off the lot instead of building domestically to help satisfy federal industrial goals or modifying (Canadianizing) foreign equipment to meet CAF particularities, something critics blast as wish-list behaviour that adds to costs and delays.

As tempting as it is to believe that there is a straightforward solution to Canada's perennial defence procurement woes, caution on an OTS-based model is warranted. First, when it comes to complex, big-ticket items like Ottawa's 15, $62 billion (at least) Canadian surface combatant (CSC) warships or $19 billion future fighter capability jet project, off-the-shelf does not actually exist. The term can mean either an item that's currently in production and is physically available like a car at a dealership or, more commonly, it can mean a design that's available for purchase to use in new production. Both of these options convey more problems than would appear at first glance.

For an item already in production, the design is already several years old. This is very pronounced in naval shipbuilding, where the process timeline from initially establishing a project's requirements to settling on a final design can take over a decade before the first piece of steel is cut. The problem is further compounded by the fact that the more complex the equipment, the more dependent it is on high-end technologies that evolve rapidly, like computer processors.

Buying in-production equipment also means being beholden to the requirements set out by the original customer, which are often at odds with both Canadian-specific military requirements and generally regulated standards for things like habitability and safety. It should come as no surprise that a German submarine is built in Germany to meet the operational requirements primarily of the Germany navy which, given its largely Baltic Sea mission area, is distinctly different from the three-ocean naval requirements of Canada. Simply buying a German submarine off the shelf would leave the Royal Canadian Navy (RCN) with a submarine limited in range and needing additional expenditures in support infrastructure to ensure it can meet the demands of long-range patrols in a country with the world's longest coastline. This is hardly ideal, even if it arrived faster and potentially saved the federal treasury some money. Canada's decision to buy the infamous second-hand *Victoria* class submarines is perhaps the most extreme example of the challenges faced by modifying existing products. The *Victoria*s were certainly "off the shelf" in its most pure form, having already been built, but the obsolete condition of the vessels led to lengthy and expensive changes to bring them into Canadian service.

Therefore, assessing the extent to which an in-production item is suitable for Canadian use and what changes are needed requires its own dedicated process that can take months, if not years. Canadianization changes must then be incorporated into equipment that is already being built (or has already been built), which is almost always more difficult than incorporating them at an earlier stage when nothing has yet been assembled. The contract for 15 Chinook helicopters, signed in 2008, is one clear example of this phenomenon. The U.S.-made Chinook, in production in various variants since the early 1960s, required numerous Canadianization changes to adjust to the operational realities of flying long distances with access to sparse support infrastructure (e.g., larger fuel tanks), with each change requiring more testing and recertifications to prove airworthiness. The first Canadian Chinook entered CAF service five years later in 2013.

Capacity and Management Hurdles

To make matters more complicated, and this may well be the biggest factor, is the simple matter of sheer production capacity. A foreign manufacturer may simply not have the ability to produce items for Canada without unacceptable sacrifices for its main clients, especially if such items will take years or decades to complete in their entirety. A premium will undoubtedly have to be paid if Canada were to move its CSC project, for instance, to an Italian or French shipyard, jumping ahead of the existing queue. Likewise, the federal government would still be responsible for overall project management, except rather than managing relations between Ottawa and current contractors in Halifax, Vancouver, Montreal or London, Ontario (all of which have proven a struggle at times), procurement officials would now have to deal with time zones on the other side of the world and with different business cultures and languages. This would hardly be a recipe for a smoother procurement cycle, as the Norwegians learned during their 20-year process to procure their five Nansen-class frigates from an existing Spanish shipyard despite using an in-production hull design.

For an OTS scenario where only the design exists but the item will be built from scratch, one has to consider how mature the design actually is. There are different levels of design work, some of which fall within the expertise of different companies. An RCN or Canadian Coast Guard (CCG) ship, for example, can have a design that outlines the general capabilities, appearance and dimensions of the vessel, but this is insufficient for construction at a shipyard. Shipyards require more details on the literal nuts and bolts that make up the overall design. In such a scenario, as witnessed throughout Canada's National Shipbuilding Strategy since its inception in 2010-11, another company will conduct the necessary detailed work to turn that basic design into something that actually works while reflecting the specific industrial capabilities and suppliers approved by the government.

Finally, yet another stage of design involves translating the completed design into building instructions for the producer, which again changes depending on who has been approved to build the item. For the CCG's future polar icebreaker, the basic overall design was already laid out by Vard Marine in Vancouver nearly a decade ago, but Seaspan Shipyards now has to team up with

Genoa Design in Newfoundland and Labrador to conduct additional detailed design work so they can actually build the ship.

A similar process had to be done for the RCN's joint support ship (JSS) being built in Vancouver. Technically, an off-the-shelf design using the German Berlin class. The original design was over a decade old by the time it was chosen for the JSS in 2013. During this time Canada implemented new standards that had to be incorporated into the design in addition to its own operational requirements. At the same time, the original German design assumed suppliers of steel and equipment that were available in the German supply chain, but which are only available in slightly different forms in Canada.

As the Berlin class was designed to be built in modular form at the larger Hamburg shipyard, the Canadianized design also had to be redrafted to reflect the smaller Vancouver shipyard. Further design work was thus necessary to assess the extent to which Canadian suppliers could offer suitable substitutions and whether they needed to be changed. Even if Canada was willing to source from the original German supply chain, many of them no longer produced the necessary parts or the firm no longer existed. Finding a suitable replacement could have extensive follow-on effects to the ship's broader requirements such as power and cooling, leading to lengthy redesigns beyond the substituted part itself. Construction on the JSS formally began in 2018, five years after the decade-old Berlin design was selected.

OTS therefore does not guarantee quicker or cheaper outcomes for large, complex equipment. Indeed, an argument can be made that clean-sheet designs (e.g., original, grass-roots designs like the current Halifax-class frigates) might produce less friction, especially if using domestic design firms. Domestic firms may also be more familiar with potential partners' capabilities and the government rules and processes which govern the entire end-to-end process.

This can help increase the odds that a design will survive the long development and production process without unexpected expensive changes for any partners along the way. For example, the president of Irving Shipbuilding Inc. recently revealed in a podcast interview that the firm's Halifax shipyard, slated to build the new CSC, will have to undergo an extensive refit in order to accommodate the new ships, despite the yard having been rebuilt from scratch less than 10 years ago specifically for this project. The cost for this reconstruction is yet to be determined, never mind who would pay for it. The reason for this is the larger-than-expected size of the CSC, which was selected from a slate of vessels designed abroad by foreign firms (in accordance with an off-the-shelf design approach aimed at streamlining the process) well after Irving's Halifax yard was modernized.

A domestic clean-sheet design would likely have been well aware of the limitations of the shipyard selected for the ship's construction, avoiding the need for such a drastic change that may further delay the project's timelines. At a general level, this would be more akin to the standard manufacturing practice of design for production rather than vice-versa.

Conclusion

Contrary to the assumptions of many Canadian defence observers, an OTS approach has in fact been taken to some degree with many of Canada's biggest procurement projects in an effort to reduce risks. The fact that projects like the Chinook helicopters and joint support ships have still encountered significant delays demonstrates the limits of OTS. Off-the-shelf approaches vary in the degree to which the final product is truly available without modifications, but the more complex the item, the less likely it can be procured without changes or further design work. This is more so the case for items that are built in places with limited excess capacity like naval ships, but the feasibility of OTS will always rest in the details.

There are some instances where existing products can indeed be procured off the shelf quickly and with minimal modifications, but these tend to be single-purpose items whose global demand allows for production lines with excess capacity. Examples of this include the C-17 and C-130J transport planes which Canada previously acquired through non-competitive processes. Ultimately, while OTS (in all its variations) should be examined as an option for any project, it is not a one-size-fits-all solution and offers no guarantee of a speedy project or cost savings. No matter how you slice it, defence procurement is complex.

About the Authors

Timothy Choi *is completing his Ph.D. at the University of Calgary's Centre for Military, Security and Strategic Studies, where his dissertation is entitled, "Maritime Strategies of the North: The Seapower of Smaller Maritime Forces in an Era of Broadened Security." It asks how the Danish, Norwegian, and Canadian maritime forces developed in response to the adoption and legitimization of the 200 nautical mile exclusive economic zone, and whether smaller forces have generalizable differences in such responses compared to larger ones. This has seen him sailing with Danish and Norwegian patrol vessels to gain deeper insights into the tactical level of peacetime naval activities. He is a former Smith Richardson Predoctoral Fellow at Yale University's International Security Studies, where he worked with Professor Paul Kennedy, and is also a Research Fellow at Dalhousie University's Centre for the Study of Security and Development. He serves on the editorial board of and is the photo editor at the Canadian Naval Review. Outside of academia, his interests and expertise include scale ship modeling, photography, and social media outreach.*

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Jeffrey's research interests are in defence procurement, missile defence, Canadian and Australian defence policy and the Arctic. He has spoken and published widely in these areas and is the co-editor of the book, "Reassessing the Revolution in Military Affairs" (Palgrave Macmillan 2015). A new book, "Canada's Defence Procurement Woes" (Palgrave Macmillan), is due out in 2022.

A proud east coaster, Jeff hails from Newfoundland but now resides in Prince Edward Island.

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