

The Upholder Acquisition: Why it was a Deal of a Lifetime

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In the early 1960's Canada purchased three OBERON-class submarines from the United Kingdom. Since then, the "O-boats" have formed an integral part of Canada's maritime force capability. The submarines have been employed in an anti-submarine role, training of the surface fleet of Canada and her allies, and in aid of other government departments – fisheries patrols for the Department of Fisheries and Oceans (DFO) and drug interdiction operations for the RCMP. Within the Canadian Forces, the submarines operate in cooperation with both surface and air forces to further Canada's anti-submarine warfare capability through Combined Anti-submarine Exercises (CASEX). Possessing a submarine fleet has also meant that Canada has been privy to information regarding the submarine fleets of her allies. This paper will illustrate that the submarine is a vital naval asset and the *Upholder* acquisition was an efficient use of scarce government resources.

By the mid-1980's the "O-boats" were nearing the end of their useful lives. Consequently, the Canadian Navy started to look for a suitable replacement. In the late 1980's, the governing Progressive Conservatives under the leadership of Brian Mulroney proposed a fleet of nuclear powered submarines (SSN). Economic conditions, however, and the enormous cost precluded such a project and it was officially cancelled in 1989. In making a decision to replace the submarines Canada had to "choose carefully because [her] decision [would] have implications for the country for years to come – indeed, if [she] were to allow [her] submarine capability to lapse, [she] would have great difficulty re-establishing it." For the next decade Canada continued to search for a suitable replacement.

The fiscal climate of the 1990's made things even worse. The new Liberal government followed a deficit reduction strategy that resulted in severe cuts to the defence budget as well as to other government spending. The result was that any proposal to buy submarines off the shelf, even at bargain basement prices, was an extremely difficult decision to get through the cabinet. In fact, the military "put more hours into getting four submarines for basically no cost than [it] did in persuading the [Canadian] government to build the CPF".

The difficulty in persuading the government and the public is not surprising. Submarines have been viewed with much contempt ever since they entered the ranks of the naval combatants. "Submarines are seen by some as distinctly un-Canadian." They are viewed as offensive weapons that are not in line with the 'peacekeeping role' of the Canadian Armed Forces. "Even if the utility of submarines in peacekeeping operations is not immediately apparent, they are, nonetheless, critical factors in the planning of peacekeeping operations." As will be shown, the submarine is well suited to the majority of the tasks required of Canada's Navy.

On 2 July 1998 the Honourable Art Eggleton, Minister of National Defence, announced Canada's intention to purchase four Upholder-class submarines from the United Kingdom. This

announcement marked the end of a protracted debate in political, military and civilian circles on the need for submarines in the Canadian Navy.

Arguments Against

There are several individuals who have taken the time to express their opposition to the Upholder purchase. Bloc Québécois MP Pierrette Venne stated that the government was making the purchase at a very inappropriate time. She felt the government should not be spending money on submarines while at the same time slashing billions of dollars in provincial transfers and that the money would be better spent on quality of life in the military. However, she neglected to mention that the provinces were not alone in experiencing funding reductions. The Department of National Defence and the Canadian Forces had been hit with very deep cuts to their budget. Between 1989 and 1998 the defence budget was shrunk by a total of \$21 billion.

It is because of these cuts that the purchase of the *UPHOLDER* makes good fiscal sense, the cost is low and they are cheaper to operate than the *OBERON*-class. The annual operating costs for the four *UPHOLDERS* will be roughly equal to the costs to operate the three *OBERONS*. As for the quality of life issues; it would be satisfactory if the entire armed forces budget could be spent on quality of life issues; however, it is not the primary mandate of the military to place each member on the apex of Maslow's Hierarchy of Needs. Granted, it is necessary to maintain happy troops, but to do so at the expense of providing them with the proper equipment to do their job would have disastrous results. To ask 'well paid' and 'well housed' armed forces personnel to enter a theatre of operations without modern equipment is ineffective and potentially deadly. In this regard, Ms. Venne missed the point. Modern equipment is not only necessary for quality of life but also, necessary for the maintenance of life itself.

Other critics questioned the purchase for technological reasons. Alexa McDonough, the New Democratic Party Leader, stated the purchase relied on "undeveloped technology" to allow the submarines to conduct under-ice operations. Project Ploughshares analyst Bill Robinson stated the submarines required the under-ice capability upgrades before they could be used. He further stated that the upgrade cost would be approximately \$1 billion and the operation and maintenance costs for the subs would be greater than \$180 million annually. Both of these individuals are incorrect. The technology required for an under-ice capability – essentially an Air Independent Propulsion system powered by a methanol-based fuel cell – is still in the development stage; consequently, any associated costs are unknown. Further, any such program has yet to be approved by either the Navy or cabinet. The cost to operate the *Upholders* will be approximately \$90 million annually; this amount includes all personnel, operations, and maintenance costs, represents less than one percent of the defence budget, and approximately three percent of the Navies budget.

The effectiveness of the Upholder is by no means singularly based on an under-ice capability. The conventional submarine (SSK) is in itself a highly effective platform. The fuel cell, if successfully developed, would mean a paradigm shift for the SSK. It would result in a safer submarine that would be a sort of hybrid SSK/SSN, which some have already begun to refer to as SSn. However, contrary to Mr. Robinson's statement, this capability is not required before the submarines could be used.

An editorial in the *Globe and Mail* asserted that adequate surveillance of Canada's coasts could be conducted with planes, satellites and surface ships. These assets are effective means of surveillance; however, the submarine is a very cost effective way for a navy to conduct surveillance of its areas of interest. One submarine can conduct surveillance of a 125,000 square kilometer area for approximately 50 days. This is approximately twice the area and five times the duration of a normal surveillance patrol in one of Canada's new *HALIFAX*-class frigates. Moreover, a submarine can conduct the patrol for approximately 30 percent of the cost to conduct the same patrol with a frigate. The cost savings result from the smaller crew – 47 on an Upholder *versus* 220 on a frigate – and the lower fuel costs. Satellites and aircraft are greatly limited by weather conditions; this renders them ineffective as a 'stand-alone' surveillance system. This is not to mention the incredible expense of placing satellites into orbit; "the cost of one satellite alone exceeds that of the four Upholders on offer." Moreover, we could not rely on US satellites to watch our coasts just as we do not rely on the US navy to represent our country abroad.

Toronto Star columnist Richard Gwyn argues that since the Cold War has ended "there is simply no longer any imaginable use for our armed forces in [a] conventional military mission, nor every bit as important, does any public support for them exist any longer." This is a very dangerous and completely inaccurate position to take; the "threat, distant as it may seem today, could re-emerge much faster than we could re-develop submarine skills, if we let them disappear." Indeed, Canada's Armed Forces have been deployed to more theatres of operation since the end of the Cold War than during the 50 years preceding its demise. The equipment requirements for peacemaking and peacekeeping are very similar to those required for limited and total conflicts; additionally, the tasks are much the same. After the military's aid during the ice storm in Ontario and Québec and the assistance during the floods in both Québec and Manitoba, the public opinion of the armed forces was on the rise. Moreover, a February 1997 public opinion poll indicated support for replacing the Oberon-class was around 60 percent. It follows that Gwyn's assertion of declining public support is unfounded.

The Need for Submarines

The 1994 White Paper on Defence (WP94) clearly articulated Canadian Naval Policy. In order to effectively fulfill its role of providing multi-purpose combat capable forces it was suggested that Maritime Command (MARCOM) required a submarine fleet. The 1994 White Paper on Defence (WP94) clearly articulated Canadian Naval Policy. In order to effectively fulfill its role of providing multi-purpose combat capable forces it was suggested that Maritime Command (MARCOM) required a submarine fleet.

On several occasions Canadian submarines have proven their worth in surveillance. In 1993 HMCS *OJIBWA*, with a DFO official embarked, successfully conducted a surveillance operation in the region of Georges Bank off Nova Scotia. As a result of this operation, violations of the Canadian economic fishing zone (EFZ) in this area decreased from 33 in 1993, to 6 in 1994 and only 1 in 1995. This possibly led to Canadian scallop fishers landing larger catches as the competing US fishing violations decreased. The post-operation analysis of the patrol stated that the lack of comfort on a submarine might make it difficult to get volunteers from DFO for future operations. The Upholder-class submarines have far more comfortable berthing arrangements

and, consequently, eliminate this potential barrier to future inter-governmental operations. On another occasion, HMCS *OKANAGAN* again proved the worth of submarines by covertly taking pictures of the Spanish fishing trawler *Ria de Ponta Verde* on the Grand Bank off Newfoundland in 1994. During the 'Turbot War', which was the 1995 fisheries dispute with Spain, incorrect press reports led the Spanish to believe that our submarines were monitoring the Spanish fishing fleet. The possibility of the reports being correct had an effect on Spanish policymakers and was a factor in a satisfactory outcome of the dispute for Canada. Submarines have also assisted the RCMP in combating drug smuggling in Canadian waters, in 1994 an O-boat made a significant contribution in a large-scale drug interdiction operation. These instances clearly indicate the operational value of submarine's and their ability to conduct effective sovereignty patrols.

Maintaining a high standard of training is essential to an effective maritime force and the submarine is also a key part of the Navy's training organization. It is one thing for sailors and air force personnel to conduct anti-submarine warfare (ASW) against a simulated target in a controlled environment, it is quite another to train against a real submarine; moreover, it is necessary to train with real submarines in order to develop and sustain sound ASW tactics and strategies. Additionally, by maintaining both surface and sub-surface platforms, ASW can be examined from all three dimensions of maritime warfare – from on, under, and over the surface of the ocean. The changing nature of the world order and the proliferation of conventional submarines – over 600 submarines are now operated by 46 countries- underlies the need for a sound ASW capability for all coastal nations. Consequently, the chance of Canadian warships facing a submarine threat during operations in support of NATO or the United Nations is fairly high and "Canadian ships and aircraft operating under UN auspices must be prepared for underwater warfare." This potential subsurface threat to Canada's naval forces dictates that she maintains both a submarine fleet and a high degree of ASW proficiency.

Canada's submarines have and will continue to be used to train with other navies; this, in itself, leads to benefits for Canada. Co-operation with the US also affords Canada the ability to conduct operations, although rarely, with SSNs and to perfect skills in water-space management, which is the art of coordinating the movements of naval forces in order to minimize the possibility of damage due to friendly fire between ships, submarines, and aircraft.

Intelligence is also a very important part of the overall picture compilation in all maritime operations. Throughout the Cold War, Canadian submarines tracked vessels of interest (VOI), including Soviet submarines, operating off the east coast of North America and since 1995 Russian submarine activity has been on the rise. Without a submarine force, Canada would lose access to information about the movements of US, UK, and French submarines as well as vital intelligence from these allies on the activities of submarines from other nations.

Perhaps the submarines greatest quality is stealth; this quality is extremely important. In times of tension, the submarine can approach the coast of another nation and conduct 'surveillance/reconnaissance' and 'indications and warnings' operations while a surface ship could not do so without placing herself in imminent danger. Moreover, the submarine can carry out these tasks without a visible naval presence; therefore, there is minimal impact on foreign relations. The significance of this point cannot be overstated. The fact that a nation merely possesses submarines can be a significant deterrent to potential adversaries. It is not necessary to

deploy the submarine to a patrol area; "a submarine that is not observed in port equates to a military asset that could be anywhere." Often, simply having the submarine exit the mouth of her harbour and dive beneath the surface will create a strategic advantage that can prevent an escalation in tensions. The fact of the matter is the enemy simply does not know where a submerged submarine is; this is a very effective deterrent. The new submarines are necessary to maintain this deterrent capability.

The New Submarines

The *Upholder*-class submarines were built at the shipyards in Birkenhead and Barrow, UK, between November 1983 and 1993 and upon delivery to Canada they will be re-designated *Victoria*-class. The order of commissioning and hull numbers will be as follows: *Victoria* (876), *Windsor* (877), *Cornerbrook* (878), and *Chicoutimi* (879). The first submarine to be delivered to Canada will be the HMCS VICTORIA in the early fall of 2000, with subsequent deliveries approximately every 6 months thereafter. The last submarine, *CHICOUTIMI*, is scheduled to arrive in July 2002. The *UPHOLDERS* are very modern and capable conventional submarines. They have a displacement of 2,455 tons (dived), a relatively high maximum submerged speed of 20 knots, a maximum surface speed of 12 knots, and a maximum range of 8,000 miles. The submarines have 6 x 21-inch torpedo tubes – in the bow – which, after retrofitting, will fire the US Navy Gould MK 48 Mod 4 active/passive homing torpedo, which has an enormous 267 kg conventional warhead. The subs will also carry an array of sensors including two high definition surface-warning navigational radars and the effective type 2040, type 2007, and towed array sonars.

In addition to the submarines the acquisition also includes a training package, four state-of-the-art shore-based simulators, initial spare parts, and a technical data package. The training package will complete the initial training of four Canadian crews and the shore support staff necessary to safely operate the *UPHOLDERS*. The simulators will include a tactical systems trainer and a ship control trainer, which are full size replicas of the combat systems and control room platform fitted in the submarines. These simulators will offer a cost effective shore-based method of training command and combat personnel. For the submarine's engineering personnel there will be a machinery control trainer and for the weapons personnel a torpedo and discharge trainer to conduct weapons loading drills in order to enhance combat effectiveness. The spare parts will be sufficient for the initial two to three years of operations including special tools and other support equipment. The technical data package consists of all technical manuals, design data, reports from the various trials, maintenance records, and configuration information. The possession of this material will enable all future maintenance and refit work for the *UPHOLDERS* to be completed in eligible Canadian shipyards, thereby maintaining 200 civilian jobs in the Halifax area over the next three decades. The anticipated regional and industrial benefits to Canadian industry are worth approximately \$350 million. This includes \$150 million in direct and indirect industrial benefits. There is an additional \$100 million in industrial waivers for Canadian companies bidding on defence contracts in the UK and \$100 million (of the \$140 million in project costs) to be spent in Canada on modifications to the submarines and the re-location of the simulators to Canada. In addition, National Defence has funded the research and development for an experimental air independent propulsion system for the *UPHOLDERS*.

Air Independent Propulsion

Canadian politicians and the Navy have long been concerned about our ability to patrol the waters under the Arctic ice cap. Indeed, this concern was of prime importance to the government's earlier attempt to purchase nuclear submarines in the 1980's. After the nuclear submarine program was cancelled due to the enormous cost and unpopularity of the project the navy began to investigate other methods of conducting surveillance in the Arctic. In a May 1989 discussion paper it was recommended that research and development be initiated into non-nuclear propulsion systems. Since then, Ballard Power Cells of Canada, a world-leading fuel cell producer, has been developing an air-independent propulsion (AIP) system and the Department of National Defence has carried out studies into upgrading the Upholder-class submarines with an AIP system. If this plan is found to be feasible, the replacement will probably take place when the submarines undergo their first major refit, after approximately five years of service.

The AIP system will enable the submarines to operate much like a nuclear submarine (SSN). With an AIP system in place, the Upholder-class will be able to operate below the surface for extended periods; estimates vary from 10 to 45 days. Consequently, this will permit the sub to conduct sorties under the Arctic ice cap. Moreover, this capability will be a first for the Canadian Navy; Canada has never had an adequate method of conducting sovereignty patrols in this region.

The estimated cost to acquire nuclear powered submarines in the mid 1980's would have been approximately \$416 M per sub plus another \$3 B for the necessary infrastructure and maintenance facilities. The cost for a similar capability with AIP updates to the Victoria-class is approximately \$203 million to purchase each submarine and between \$140 million and \$1 billion for the update. This would result in a saving of \$2.852 billion, assuming update costs of \$1 billion. In a National Post article, Andrew McIntosh asserts that although the Navy has publicly stated that any decision regarding AIP will not be made until the subs are delivered to Canada, privately, contracts have been awarded for feasibility studies and that the cost to install AIP will be approximately \$680 million. By all estimates, this is far less than the cost to acquire under ice capability with an SSN.

However, the lower cost come with some disadvantages. AIP fitted *UPHOLDER*-class submarines would not have the endurance or speed of an SSN. The SSN is limited in endurance only by the amount of food it can carry for the crew, this amounts to roughly 45 days and theoretically, an SSN could stay dived for the entire duration. The AIP would only allow the Upholder-class to remain submerged for up to several weeks. The second major shortcoming of the AIP system is speed. In order to remain submerged for up to 14 days the Upholder-class would be restricted to a maximum speed of 6 knots. Clearly this would place the sub in a severe disadvantage during antisubmarine operations against a nuclear powered submarine. Despite these drawbacks, the fitting of AIP would greatly enhance the overall surveillance capability of the Upholder-class submarine.

In addition to being far less expensive than nuclear power, the AIP system is also safer. Safety is a very significant advantage the AIP system has over nuclear power; this is the case both on board the submarine and ashore. The products used to power the cell are far less dangerous than

uranium. The Ballard fuel cell will use "methanol as the storage medium...[t]he other reactant in the process, pure oxygen, is stored cryogenically as liquid oxygen. The by-product of the reforming process (carbon dioxide) is dissolved in seawater. The cell uses a metal membrane of Palladium with high-pressure steam reforming to generate hydrogen for the fuel cells." This also means there are no radioactive by-products to dispose of, as is the case with depleted uranium.

The Cost

The Upholder purchase comes in at a fraction of the cost to build the submarines from scratch. The cost to build a comparable submarine would be approximately 4-5 times greater. The Upholder purchase is divided into two distinct parts. The first includes the cost of the submarine, the simulators, the initial spare parts and technical data package, and initial crew training. This amount was set at \$610 M. The second includes the project related costs for Canadian modifications, moving the simulators to Canada, project management, and other contingencies. Initially, these costs were to total \$140 million and the total cost of the project was not to exceed \$750 million. To date Canada has spent \$163.8 million and estimates non-recurring expenditures between 2000-2003 to total \$382.5 million. This will bring the total project cost in at \$812 million. "Funding for this initiative was provided for in the February 1998 federal budget within existing defence allocations and is therefore built into the existing fiscal framework."

The cost for the AIP is separate from the acquisition cost and is funded by Defence Research and Development Canada through the Naval Platform Technology Trust with sponsorship from Director Maritime Planning and Project Development and project management from Director Maritime Management Support. To date, approximately \$8 million has been expended on this project. Any future costs to install the AIP technology would have to be approved by cabinet as a separate expenditure.

Several newspaper articles have asserted that the federal government has understated the Upholder acquisition by as much as \$579.7 million. This amount includes \$84 M for new torpedoes, \$30 M for escape and rescue tools, and \$465.7 M for the first refit. The Upholder is not getting new torpedoes, it will use the MK48 currently used by the Oberon; it is the torpedo fire control system that will be updated and this expense is included in the cost of the Canadian modifications described above. Currently, the estimates to install an AIP system are merely part of the continuous long range planning conducted by the DND and are neither planned nor approved expenditures. These articles also include the refit cost as an acquisition cost; however, this is not logical from an accounting perspective. The purchase should be categorized as a capital acquisition; while the refit and maintenance costs should be recorded as an operations and maintenance cost or as capital enhancements – depending upon the complexity and size of the project and whether or not the project extends the life of the capital equipment. Maintenance should then be accounted for during the period in which it is conducted and enhancements recorded throughout the period of the life extension. For the purpose of comparison, one would not include anticipated expenditures on tires, mufflers, brakes, and tune ups in the price of a new car. So why should costs to extend the life of a submarine be included in the acquisition cost; arguably, they should not. From an economic or financial investment perspective, any investment, whether in the government or private sector, should be measured by opportunity cost; this is the cost of foregoing an alternative action. This concept is key to the *UPHOLDER*

acquisition. If the navy is getting submarines, then what is it giving up? In fact, the Navy is giving up very little.

In order for the new submarines to fit into the Navy's current budget, some sacrifices had to be made. The Navy made plans to decommission four aging destroyers – HMC Ships *GATINEAU*, *TERRA NOVA*, *ANNAPOLIS*, and *NIPIGON* – on 1 July 1998; the original plan would have seen the last of these ships decommissioned in 2002. The recommendation to decommission these ships early was the result of an internal audit conducted by the Navy. The audit revealed this action could yield as much as \$377 million in savings in operations and personnel costs during the period 1995 to 2002, with additional savings of up to \$21.7 million due to elimination of obsolete spare parts and the decommissioning of three minesweepers.

The loss of these ships represents the only opportunity cost to the Navy. This cost is far outweighed by the increased capabilities as a result of acquiring the four new submarines. This makes the Upholder program an exceptional deal for the Navy. Maritime Command has managed to achieve what most organizations could only dream of, giving a little to gain a lot. Some would argue that the \$812 million dedicated to the *UPHOLDER* submarine acquisition might be better spent on the Army's ever-increasing operations and maintenance expenses. In such a scenario, the benefit received from the \$812 million would be an equal amount of goods and services. However, with the *UPHOLDER* acquisition this is not the case; in this situation the Navy is receiving \$3 billion worth of goods and services for the \$812 million. Moreover, in these times of fiscal restraint, the government has negotiated very acceptable payment plan, which minimizes the strain on both the Defence and Federal budgets.

The Payment Plan

The financing for the Upholders is a blend of bartering, savings from early retirement of surface ships and submarines, adjustments to the navy's operations and maintenance budget, and an eight-year, interest free, lease-to-buy arrangement. At the end of the eight-year term in March 2006, the Canadian government will pay a nominal fee of £1 for each submarine to complete the transaction and gain ownership.

The bulk of the money to finance the Upholders will come from a unique 'bartering' process whereby the "Canadian lease payments on the four submarines are exchanged for the costs charged to the UK for continued training of British Forces" at Canadian bases in Suffield and Wainwright, Alberta and in Goosebay, Labrador. However, this 'barter' arrangement is not the traditional form of bartering. The traditional type of 'barter' arrangement is simply not practical for governments that must accurately account for public funds; consideration must be given for the goods and services it receives. Consequently, there will be no change to the current arrangements with the UK training programs. The Department of National Defence will simply continue to collect monies from the UK and account for these monies as it always has. The monies received from the UK are separate from the arrangement for the Upholder purchase.

Confusion continues to exist, however, around the barter arrangement itself. One source states Canada will not pay the British any cash, however, this is not the case. Under the barter agreement, there is no change to the past practices; the UK continues to "reimburse the

Department of National Defence for the full cost of all support provided [by DND] to its training programs." The UK reimburses only the actual costs incurred; there is no profit element built into the cost. Any net gain or loss is simply the result of timing differences between revenues and expenses – this is due to the *cash-based* accounting system used by the federal government; an accrual-based system would result in a different bottom line. The payments are then held by DND as departmental revenue. The unique aspect of the agreement is the circle of financial transactions that occur between the Canadian and UK governments. Funding from the Treasury Board Vote 5 (capital account) is placed in a bank account in Toronto, which is the submarine account, and each month DMMS deposits the lease payment for the Upholders. The Canadian government then bills the UK for training conducted at Canadian bases in Suffield and Wainwright Alberta and in Goosebay Labrador. The British then access the account in Toronto and uses that money to pay for the use of Canadian bases. This method eliminates the need for any funds to leave the country and eliminates any gains or losses due to fluctuating exchange rates. Additionally, this method allows DND to continue with current practices regarding revenue. "In addition to its annual appropriation, the Department is allowed to spend cash received by the Department for the provision of goods and services."

Conclusion

The past indicates what can happen when a maritime force neglects a vital capability. Had Canada maintained a submarine service during the inter-war period ship's crews would have been far better trained in ASW to face the German submarine threat during World War II and, undoubtedly, fewer sailors would have perished in the frigid waters of the North Atlantic. The *UPHOLDER* acquisition reduces the likelihood of this happening again and leaves the Canadian Navy well prepared to meet the threat of the future by maintaining a balanced maritime capability.

Submarines are vital to the core capabilities of Canada's Navy and are a very economic way of carrying out several naval tasks. Submarines are an effective deterrent and are instrumental in maintaining an effective anti-submarine capability. To acquire this capability by building the submarines from scratch would cost upwards of \$3 billion; the current program saves the Canadian taxpayer over \$2.1 billion. Moreover, the payments for the *UPHOLDER*-class submarines from the UK will be spread over several years and will have a minimal impact on government revenues. Overall, the Upholder purchase is an exceptional deal for the Canadian public and the Navy. To use these funds in any other manner could not result in as much benefit. To pass up this opportunity would have meant the loss of an essential capability of Canada's Armed Forces; such a loss could very well result in unnecessarily placing Canadian service personnel in harms way.

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