



17th Annual Graduate Student Symposium

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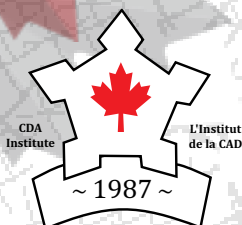
February 2015



Canada's Quest for New Submarines



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Papers from the 17th Annual Graduate Student Symposium



Canada's Quest for New Submarines

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The CDA Institute would like thank all the excellent reviewers who provided comments on drafts of this paper.

The views expressed in this paper are those of the author and do not necessarily reflect those of the CDA Institute.

Canada's Quest for New Submarines

Introduction

This paper is predicated on the idea that in 2035¹, the Royal Canadian Navy (RCN) will have been provided the funds and the political support to procure a new class of submarines. This is, understandably, a big assumption. Should the RCN find itself in a position to acquire new submarines, Canada should partner with Australia and Japan's reported plans to build a Collins-class replacement.

Considerations: Budget, Resources, Strategy

For several reasons, this project to replace the Victoria-class submarines could likely never come to fruition. Firstly, the Department of National Defence and the Royal Canadian Navy (RCN) face serious funding issues. David Perry of the Conference of Defence Associations Institute estimates that approximately \$37 billion has been removed from the *Canada First* Defence Strategy (CFDS) due to the departmental Strategic Review, the government's Deficit Reduction Action Plan (DRAP), two defence spending freezes, and further capital re-profiling of defence monies.² This budget reduction includes more than \$7 billion in capital delays (and counting) on CFDS projects, which becomes particularly problematic for the Navy, given the large-scale recapitalisation of almost the entire fleet promised through both CFDS and the National Shipbuilding Procurement Strategy (NSPS).

The affordability of the Navy's recapitalisation projects, which includes up to three joint support ships (JSS) and up to eight Arctic patrol ships (AOPS) - promised before CFDS and reaffirmed within policy - and up to fifteen Canadian surface combatants (CSC) to replace the Iroquois-class destroyers and Halifax-class frigates, has been questioned publicly on several occasions. Concerns regarding the overall costing structure of NSPS were raised by the Auditor General of Canada in 2013.³ During his Fall Report, he noted that "Canada may not get the military ships it needs" unless the funding structure is revised. The Navy has already suffered from reduced capability (and numbers) for the JSS, reduced requirements for the AOPS, and could see fewer ships built under the CSC programme, which is already losing up to \$1 million a day due to inflation and delays.⁴ Further studies on the funding structure and affordability of the JSS and AOPS programmes were conducted by the Parliamentary Budget Officer in 2013 and 2014 respectively, and have similar conclusions.

Moreover, a next generation submarine has not yet featured in CFDS, NSPS, or the new Defence Acquisition Guide (DAG), which only makes reference to the submarine equipment life-extension project. The absence of a Victoria-class replacement in the DAG is telling, especially given that the document includes a life extension project for an Army vehicle that is not yet in service. This means that any submarine replacement programme would potentially have to be funded above and beyond all 208 existing acquisition projects identified by the DAG.

Of equal concern is the tenuous assumption that, like with any major capital programme, there will be political support for new submarines. The RCN has existed for most of its history without submarines. In fact, it was not until the 1960s when the government became convinced of the utility of submarines for Canada's defence policy. Even then, the submarines were used as a training tool to develop Canada's anti-submarine warfare capabilities. Previous governments have supported submarine acquisitions, including a brief experiment with the procurement of nuclear-powered submarines in the 1980s, but there is a growing perception in Canada that submarines are a political liability.⁵ The Victoria-class submarines are no strangers to criticisms, particularly regarding the length of time and expense to bring them to a steady state. The Navy also dedicates between one-third and one-half of its maintenance budget to the modernization, support, and unplanned repairs of these



submarines. These unplanned repairs place an increased strain on the RCN, which is funded at the minimum necessary to maintain a ready state. This continues to be particularly difficult when bringing new platforms online, as the Navy does not have the resources to remedy any 'deviation' from the streamlined path from procurement to operational readiness. Debacles such as HMCS *Corner Brook's* collision off the coast of British Columbia, the HMCS *Chicoutimi* fire, or the diesel generator failure aboard HMCS *Windsor*⁶ demonstrate the challenges involved.

This is however, not to say that the resources needed to mitigate these issues do not exist. It is important to note, that these funding concerns are not reflective of the state of Canada's economy, but rather the allocation of monies to the defence budget. Previous leadership, such as the Mulroney and Martin governments, had initiated significant financial increases to the defence budget. This suggests that there are no impediments for the current government or its successors to set higher military ambitions and fund them accordingly. However, should the money to procure new submarines become available, the first question any government or defence policy would ask is that of function: what to do with submarines.

The answer to that question in part relies on strategic considerations. The Navy has already expressed the importance of submarines and their desire to maintain that capability. Naval theory also supports the value of submarines as a strategic asset that can act as a force multiplier. As evidenced by the Australian and American experiences, submarines are arguably the most effective military capability to combat the increased proliferation of submarines throughout the Asia-Pacific.⁷

Current Functions

In Canada today, these submarines are not an insignificant component of our fleet; submarines constitute a third of the Navy's operational capability and firepower. With the ongoing Halifax-class frigate life extension project, submarines also make up a third of the war-going fleet. They provide covetable characteristics such as: **stealth** – submarines, especially non-nuclear-powered ones, can be virtually undetectable when submerged and as such can go where ships and planes cannot, creating an air of uncertainty for the adversary; **lethality** – submarines can hunt high-value targets, such as the ARA *General Belgrano* during the Falklands War; and **endurance** – submarines create a steadily expanding area of uncertainty around their location that over a matter of days can become the size of an entire theatre of operations⁸. As governments increase the emphasis on the role of Special Forces over conventional ground forces, so too do navies further develop capabilities for maritime insertion of Special Forces by submarines. This is a role that Canada's submarines have practiced and one that the Navy, according to internal documents such as Horizon 2050, sees the Victoria-class fulfilling.

Recent changes in the defence procurement process in Canada mean that the previously determined strategic rationale, while militarily sound, may not be sufficient in convincing a future government to replace the submarine capability. Although not an explicitly new concept, the Defence Procurement Strategy (DPS) specifies the conditions future capital projects must meet. Chief among these is how the project fulfills requirements established in policy. With the new "challenge function" within National Defence, all future procurement must be defensible against stated policy. The issue of determining which policy to use for this purpose is contentious, because the government has itself admitted that CFDS is out-of-date. Although a new defence policy is expected soon (it was expected earlier this year) either in the form of a White Paper or an updated version of CFDS, in the absence of such a policy, the standard for the purposes of this paper is the present form of CFDS.



Meeting Policy Ambitions

In order to justify the continued role of submarines within the fleet, it is necessary to demonstrate that submarines can help the government meet its policy ambitions. This can be assessed using the three broad “roles” identified for the Canadian Armed Forces in CFDS and previous defence White Papers:

- 1) Defence of Canada: Canada's submarines have demonstrated their utility in surveillance and sovereignty to disrupt illegal fishing by American trawlers and de-escalate the Turbot incident of the mid-1990s.
- 2) Defence of North America: HMCS *Victoria* successfully participated in Op CARIBBE, while Canada's continued possession of conventional submarines will assist the US Navy with the necessary training and experience⁹ should it have to counter the increased proliferation of submarines in Asia-Pacific.
- 3) Defence of international peace and security: Canada can look to the inclusion of the Dutch submarine HNLMS Zeeleeuw and the German submarine FGS U33 in NATO missions as a model. This same breakdown could be similarly conducted for the six core missions identified in CFDS.¹⁰

Submarine Acquisition

Assuming that the funding, political will, and need for submarines has been established, the actual acquisition of the submarines must be addressed. Canada should strongly consider the viability of membership into the proposed Japanese-Australian defence and security technology consortium.

Australia has been actively looking for a replacement for their Collins-class submarines since 2013, when their government released its latest Defence White Paper. This policy calls for 12 new conventional, non-nuclear powered submarines to replace the current fleet of six. In April 2014, Japanese legislation was passed to allow the exportation of “defence-related items” to like-minded partners. The first of these partners included Australia, who recently signed a military technology and science cooperation agreement with Japan. The first step of this cooperation included signing a marine hydrodynamics agreement in July 2014, which will be followed by a training deal that “could see large numbers of Japanese troops training on Australian soil.”¹¹ The ultimate goal of this partnership is understood to be a project to build Australia's next-generation submarine.

Recent statements from the Australian defence minister suggest that their government is moving away from the idea of another domestically-built submarine. These sentiments are augmented by RAND Corp's government-commissioned report, which concluded that Australia lacked “enough engineers to design and build”¹² another class of submarines after a less-than-exemplary experience with the Collins-class programme. Although the Collins-class submarines have not been “the unmitigated disaster”¹³ that they are often described as in the press, Australian defense expert Ross Babbage stated that a domestically-built submarine “isn't the sort of experience that should be repeated given the rather more demanding requirements that Australia now has for its next-generation submarines.”¹⁴ This reality, in addition to former Australian Defence Minister David Johnston's continued affinity for Japan's Soryu-class submarines – he was the first foreign minister to tour a Soryu submarine and has said that the Soryus are the best conventional submarines in the world^{15 16} – increases the likelihood of this partnership being the solution to Australia's desire for new, fully-functioning submarines.

Canada's involvement in this consortium would be an attractive option for a future government if only due to the fact that while Canadians may support the procurement of a next generation submarine, it is politically unlikely that they would want to pursue another unique class of submarines. Financially, it would be simply unsustainable. The Chief of Review Services noted in 2003, that the cost to replace the Oberon-class submarines in 1998 would range between \$3 to 5 billion for a fleet of four. Using RAND's inflationary standards, this translates to around \$9 to 15 billion.¹⁷ In their 2013 Defence White Paper, Australia committed to



spending \$40 billion AUD (C\$38 billion) for full ownership of a domestically-built fleet of 12¹⁸ 19. Partnership with Japan would lower that price significantly for Australia, and potentially Canada, down to an estimated \$500 AUD million per submarine²⁰ for a total cost of ownership ranging from \$20 to 25 billion AUD²¹ 22.

The orphan class experience is one that both Canada and Australia shared as they explored different options to replace their Oberon-class submarines. One of the reasons why the Oberon-class enabled the maturation of a Canadian submarine force was that the Navy possessed three in a global fleet of 24. By contrast, the four Upholder-class submarines that the RCN purchased from the Royal Navy were the only four of its kind in the world. This meant that the supply chain was not fully established, unlike Canada's experience with the Oberon-class, and the engineering knowledge was not fully developed. As a result, it took the Navy until 2008, a full decade after buying them, to master the technological support of the Victoria-class submarines.²³

Both countries could arguably benefit from closer cooperation on submarine technology: Australia and Canada both had different experiences after the retirement of their Oberons but with similar results, including a two-decade long struggle to regain combat readiness. The Royal Australian Navy and RCN already have officer exchange programmes that include submariners. Also, it would not be the first time that both countries have worked together on a submarine replacement project. As the respective ministries of defence debated how to replace the Oberon-class submarines, Australia invited Canada to observe their design evaluation process in the 1980s during the Canadian Submarine Acquisition Project (CASAP-SSK). This is not surprising, given that both countries require their submarines to patrol vast amounts of water space, including a potentially expanding Arctic maritime domain for Canada, and a landmass with long, volatile coastlines (Australia is the size of Europe).

Calls for renewed Australian-Canadian partnership began as early as August 2013, when David McDonough, research fellow at Dalhousie University's Centre for Foreign Policy Studies, suggested the potential for cooperation on a replacement project. He noted that both the Victoria- and Collins-class submarines "have many similarities, including displacement, range, and speed."²⁴ This observation was furthered by CIGI's Craig Stone, who noted that both countries "will need to replace their submarine fleets in [a similar] time frame" and that the combined lessons learnt from this latest submarine acquisition "will allow [Australia and Canada] to leverage the expertise that now exists within that particular sector."²⁵

Alternative Options

Missing from this analysis thus far is an alternative, non-military consideration for greater partnership. At the same time, there are few attractive European submarine options for Canada which further strengthens the case for a partnership with Australia and Japan. It should be noted, that Australia's former defence minister responsible for the 2013 Defence White Paper, ruled out a European off-the-shelf option because the submarines offered by European builders "were not considered large enough or as having the endurance for the long-range patrols required by Australia."²⁶ These requirements would be similar, if not more demanding, in a Canadian context. That said, there are at least four submarine producing countries in addition to the Australians and the Japanese that could attract Canada's interest: the Dutch, the Swedes, the French, and the Germans.

The Dutch have been ominously silent about any replacement program either for Canada or for Australia, which could be interpreted as lack of interest or lack of capability. The last time the Dutch built a submarine was in the early 1990s, when they launched the last of their Walrus-class submarines. Given the type of expertise required to build a submarine, and the rate at which these skills atrophy without continuous employment, it is possible that the Dutch would be unable to help Canada in its quest for a new submarine. In June 2014, for example, the Dutch Ministry of Defence stated it was "looking for an international partner" to build its new fleet of submarines.²⁷



In response to increasing instability and uncertainty in their backyard, Sweden has pushed to renationalize their submarine industry.²⁸ However, Swedish submarines (despite their proposal of a 4,000 ton variant on the A-26 for Australia), realistically are too small and do not have the endurance that Canada needs to patrol its vast and growing expanses of ocean estate, as well as an extensive, almost unmatched coastline.

The French have conceptualised a conventional version of their nuclear-powered Barracuda-class submarine and were expected to have discussed the option when President Hollande visited Australia in November 2014.²⁹ However, this submarine is designed for operations in the Mediterranean, and arguably not what Canada and/or Australia need.

Lastly, the Germans have been the most vocal in calling for an open competition to replace the Collinses.³⁰ The CEO of Germany's submarine builder visited Canada with Chancellor Merkel in 2011, while its CFO has been actively lobbying Australia, presenting his company as a viable replacement partner. The German option, which would include an enlarged version of the current Type 214, could be a contender for Canada simply because they are the most experienced submarine exporter in the world³¹: ThyssenKrupp Marine Systems has sold 160 submarines in recent decades³² with an additional 20 currently being built for export.³³

A Beneficial Partnership

Canada should also strongly consider other trade implications that entry into an Australia-Japan consortium would carry. Australia and Japan, for example, are priority markets in the Canadian government's Global Markets Action Plan (GMAP), which also identifies defence and security as a priority sector for the government.

The cooperation partnership between Australia and Japan laid the foundation for an Economic Partnership Agreement, toward which Canada is also working. Given that Japan is Canada's second-largest trading partner in Asia and largest Asian source of foreign direct investment, the Canada-Japan Economic Partnership Agreement continues to be a priority for the current government. A defence partnership such as this could augment the recent successes of the Canadian aerospace sector in Japan and would enhance Canada's role as an "important, reliable, and trusted partner" in the region.³⁴ In addition, the United States is also reportedly interested in participating in the joint venture by selling weapons systems. This would benefit Canada in at least two ways: The first of which is that Canada and Australia operate comparable fire control systems utilizing American Mk 48 torpedoes.³⁵ The second is that previous positive steps to enhance Canadian capabilities have resulted in closer cooperation with the US, as demonstrated by the success of the west coast Waterspace Management Agreement and Canada's Atlantic Submarine Operating Authority's crucial role in monitoring submarine movement in the high Arctic.³⁶

Such close partnership with the United States, Australia, and Japan would boost Canada's defence sector, which generates C\$10 billion in annual revenues, employs more than 90,000 people, and exports half of its products. Its status as a priority sector in GMAP and International Trade's recent decision to embed a trade commissioner within the Canadian Association of Defence and Security Industries (CADSI) indicates the importance of defence exports to the current government. Opening access to Asia-Pacific markets would benefit the Canadian defence and security industries and increase the exposure of Canadian companies in the region. This venture would provide the government the opportunity to allay concerns expressed by ASEAN and Asian partners over Canada's perceived lack of engagement in the region. Furthermore, greater involvement in a trans-Pacific consortium such as this would bolster Canada's standing among three key members of the Trans-Pacific Partnership³⁷ agreement.



Conclusions

In conclusion, if submarines are fundamental to Canadian defence policy, then Canada must start seriously thinking about replacing the Victoria-class. Such a discussion will not be an easy process, but is all the more important given that the current submarines have a limited operational history and, arguably, have yet to prove to the Canadian public that they were money well spent. Furthermore, they do not feature as part of the recapitalization of the current fleet under NSPS and, as such, additional monies will need to be secured to fund their acquisition. This seems increasingly unlikely in the current fiscal climate. Finally, the Canadian experience with the Victoria-class suggests that Canada should not pursue another orphan class of submarines but instead should partner with another navy to develop a next-generation submarine. While many European models might be attractive, the current submarines do not possess some key characteristics that are unique to the Canadian submarine experience, such as endurance (the journey from Halifax to Nanisivik is almost comparable to the trip to Portsmouth, England). The Australians share some of these strategic requirements for their submarines and, being such a close defence collaborator, therefore would be a good natural partner in Canada's quest for a new submarine.

NOTES

¹ The new Defence Acquisition Guide (2014) suggests that Canada is preparing to extend the service life of the *Victoria*-class submarines from 2026, their original end date, to 2035.

² David Perry, 2014. "Can DND Afford Submarines?" *Canada's Century of Submarines* (thematic panel), Centre for International Policy Studies, University of Ottawa. November 24, 2014.

³ Office of the Auditor General of Canada, 2013. "Chapter 3: National Shipbuilding Procurement Strategy", *2013 Fall Report of the Auditor General of Canada*. Fall 2013. Accessed online at: http://www.oag-bvg.gc.ca/internet/English/parl_oag_201311_03_e_38797.html#hd3a.

⁴ David Perry, 2014. "Can DND Afford Submarines?" *Canada's Century of Submarines* (thematic panel), Centre for International Policy Studies, University of Ottawa. November 24, 2014.

⁵ "Submarines: Past, Present, and Future", Naval Association of Canada (conference). October 2, 2014.

⁶ Unlike the other two submarine incidents, which forced a stop to their operations, *Windsor* was able to continue operating for a while on a single generator in a limited capacity. This slight delay was managed in maintenance and also resulted in an upgraded sonar suite.

⁷ There are over 400 submarines in operation by 41 countries around the world. The Pacific Rim alone will see a 47 per cent increase in 2025. Currently, 154 submarines are under construction and contribute to the over \$225 billion in the next 20 years that will be spent on submarines.

⁸ Vice Admiral (Retired) Drew Robertson, 2014. *Canada's Century of Submarines* (thematic panel), Centre for International Policy Studies, University of Ottawa. November 24, 2014.

⁹ Although other countries such as Sweden and Chile have also provided the USN with submarines for training, Canada is unique in that it is the only country that is as intrinsically vested in continental defence as the United States.

¹⁰ In reference to an upcoming *Sitrep* article for a fuller analysis on defending submarine capabilities against Canadian defence policy.



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- ¹¹ Ian McPhedran, 2014. "Australia to sign new submarines deal with Japan as Prime Minister Shinzo Abe visit Tony Abbott in Canberra", *News.com.au*, July 7, 2014. Accessed online at: <http://www.news.com.au/national/australia-to-sign-new-submarines-deal-with-japan-as-prime-minister-shinzo-abe-visits-tony-abbott-in-canberra/story-fncynjr2-1226980720135>.
- ¹² Tim Kelly and Matt Siegel, 2014. "Japan & Australia consider submarine deal that could rattle China", *Reuters*, May 28, 2014. Accessed online at: <http://www.reuters.com/article/2014/05/28/us-japan-australia-submarine-idUSKBN0E82ET20140528>.
- ¹³ The Diplomat, 2014. Interview with Ross Babbage, *The Diplomat*, May 14, 2014. Accessed online at: <http://thediplomat.com/2012/05/meet-the-diplomat-writers-22/>.
- ¹⁴ *Ibid.*
- ¹⁵ *Ibid.*
- ¹⁶ It is important to note that though Senator Johnston may not have the technical expertise to credibly make this claim, his public statements as a Cabinet Minister (at the time) are worth considering for their political implications.
- ¹⁷ David Perry, CIPS conference, November 24, 2014. Perry also noted that this brackets the internal numbers currently being used by National Defence.
- ¹⁸ Ministry of Defence, 2014. Transcript of Minister for Defence interview with Michael Smyth. Accessed online at: <http://www.minister.defence.gov.au/2014/11/21/minister-for-defence-transcript-interview-with-michael-smyth-891-abc-adelaide/>.
- ¹⁹ Australian Strategic Policy Institute, 2009. "How to buy a submarine: Defining and building Australia's future fleet", *Strategic Insights*, Australian Strategic Policy Institute, October 2009, p. 2. Accessed online at: https://www.aspi.org.au/publications/strategic-insights-48-how-to-buy-a-submarine-defining-and-building-australias-future-fleet/SI_48_Submarines.pdf.
- ²⁰ Paul Kallender-Umezu and Nigel Pittaway, 2014. "Japan, Australia Deal Poses Tech Issues", *Defence News*, June 15, 2014. Accessed online at: <http://www.defensenews.com/article/20140615/DEFREG03/306160010/Japan-Australia-Deal-Poses-Tech-Issues>.
- ²¹ Ian McPhedran, 2014. "New Japanese submarines to cost Abbott Government \$20 billion", *News Corp Australia Network*, September 9, 2014. Accessed online at: <http://www.news.com.au/national/new-japanese-submarines-to-cost-abbott-government-20-billion/story-fncynjr2-1227050682205>.
- ²² Rob Taylor, 2014. "Australia Hints It Will Look Overseas for New Submarine Fleet", *World News, The Wall Street Journal*, November 25, 2014. Accessed online at: <http://online.wsj.com/articles/australia-hints-it-will-look-overseas-for-new-submarine-fleet-1416902288>.
- ²³ Vice Admiral (Retired) Drew Robertson, CIPS conference, November 24, 2014.
- ²⁴ David McDonough, 2013. "Canada's submarines: opportunities for cooperation with Australia", *The Strategist*, Australian Strategic Policy Institute blog, August 2013. Accessed online at: <http://www.aspistrategist.org.au/canadas-submarines-opportunities-for-cooperation-with-australia/>.
- ²⁵ Craig Stone, 2014. "Canadian-Australian Opportunity for Defence Procurement and Industry Cooperation", *CIGI Papers*, Centre for International Governance Institute, January 2014, no. 22, p. 13. Accessed online at: http://www.cigionline.org/sites/default/files/no22_1.pdf.
- ²⁶ John Kerin, 2014. "Germany submarines now appear the safer replacement bet", *The Australian Financial Review*, June 19, 2014. Accessed online at: http://www.afr.com/p/germans_submarines_now_appear_the_GB2ZKVDhcmmlnRJB6BpqI.



²⁷ Defence Industry Daily Staff, 2014. "Norway Pursues New Procurement for Submarine Fleet", *Defense Daily Industry*. December 6, 2014. Accessed online at: <http://www.defenseindustrydaily.com/ula-tech-norways-next-submarine-fleet-07609/>.

²⁸ Claire Corbett, 2014. "Australia's \$60 billion submarine dilemma", *The Monthly*. August 2014. Accessed online at: <http://www.themonthly.com.au/issue/2014/august/1406815200/claire-corbett/australia%E2%80%99s-60-billion-submarine-dilemma>.

²⁹ Brendan Nicholson, 2014. "Choice of navy's new submarine is a \$20bn guessing game", *The Australian*, News, November 19, 2014. Accessed online at: <http://www.theaustralian.com.au/news/features/choice-of-navys-new-submarine-is-a-20bn-guessing-game/story-e6frg6z6-1227127446112>.

³⁰ *Ibid.*

³¹ Saab, contracted by the Swedish navy to build the next generation of their submarines, has yet to build a submarine. The Ocean, DNCS's concept for a new submarine, is barely more than a concept. Critics of the Japanese Soryu-class option have also noted that Japan has no experience in exporting submarines.

³² Ian McPhedran, 2014. "Germany fights for Australian submarine defence contract after Japan makes a bid for it", *News Corp Australia Network*, October 14, 2014. Accessed online at: <http://www.news.com.au/technology/innovation/germany-fights-for-australian-submarine-defence-contract-after-japan-makes-a-bid-for-it/story-fnpjxnk-1227089049784>.

³³ Rick Wallace and Cameron Stewart, 2014. "Technology change to boost Japanese bid to replace Collins subs", *The Australian*, National Affairs, October 21, 2014. Accessed online at: <http://www.theaustralian.com.au/national-affairs/defence/technology-change-to-boost-japanese-bid-to-replace-collins-subs/story-e6frg8yo-1227096593398>.

³⁴ DFATD, 2014. "Minister Fast Concludes Productive Week-Long Trade Mission to Asia". Quote from press release, November 13, 2014. Accessed online at: <http://www.international.gc.ca/media/comm/news-communiques/2014/11/13b.aspx?lang=eng>.

³⁵ Interoperability with the United States and continued use of American weapons systems will likely be a big determinant in Australia's (and eventually Canada's) decision for its next submarine. As a result, who the United States is willing to share technology with will certainly shape the decision-making process.

³⁶ Commander Michael Craven, 2007. "A Rational Choice Revisited: Submarine Capability in a Transformational Era", *Maritime Issues, Canadian Military Journal*, Winter 2006/7, vo. 7, no. 4. Accessed online at: <http://www.journal.forces.gc.ca/vo7/no4/craven-eng.asp>.

³⁷ The TPP is a major free trade agreement in negotiation among at least 12 countries spanning from Japan to Chile that account for 40 percent of the world's GDP.

