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INTELLIGENT CLIENTS: AN ASSESSMENT OF THE NEED FOR SUBJECT MATTER EXPERTISE IN RELATION TO NAVAL IN-SERVICE SUPPORT CONTRACTS

LCdr D.G. Lougheed

JCSP 42

Exercise *Solo Flight*

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> I expect **you** to ensure our ships are built correctly, receive all the proper maintenance necessary to reach expected service life, and that the ships and their installed combat and engineering systems will perform to design specifications.
>
> - Admiral Harvey, Address to USN Maintenance & Modernization Symposium

INTRODUCTION

All navies strive to achieve as much as possible within their allotted budgets. The Royal Canadian Navy (RCN) is facing increasing challenges in maintaining its fleet as platform costs increase while facing pressure to reduce its workforce. Like other navies and the Royal Canadian Air Force, the RCN is turning to large In-Service Support Contracts (ISSCs) to fulfill future maintenance requirements.

The RCN has reached out to those with experience in similar fields such as aviation, in an effort to not repeat the mistakes of others. While there are some lessons that will be able to be directly applied in the Canadian naval context, many will have to be considered within the unique environment that exists within Canada. The organizational structure required to support naval vessels also differs significantly from what is needed to support aircraft. The goal of bundling large numbers of small maintenance contracts into large ISSCs is to achieve economy of scale while reducing the demand placed on the government maintenance infrastructure. Other organizations have moved to pass as much responsibility as possible to industry and have then reduced the sizes of their internal organizations.

The Department of National Defence (DND) should be able to reduce the volume of work required to oversee a reduced number of maintenance contracts. In addition, the workload on the busy Fleet Maintenance Facilities (FMFs) can be reduced as more maintenance work is

completed by Industry. Despite these significant potential savings, DND must retain a strong level of internal expertise within the areas of technical, program management and contracting competences in order to be an "Intelligent Client," otherwise experience has shown that it could take on inordinately high levels of risk that could ultimately have a detrimental effect on operational availability and effectiveness.

This paper will use lessons learned available in the related literature in order to justify the need to sustain high levels of subject matter expertise within our defence establishment at the same time as many roles and responsibilities are planned to be shifted to Canadian Industry. First, the paper will outline the background that has resulted in the move to ISSCs within many militaries. Next, the discussion will cover the different areas where maintenance support expertise is needed to ensure naval vessels achieve the desired operational availability and capability. Finally, the paper will explore the options available to maintain and grow this expertise in an environment where experiential opportunities will be diminishing.

THE RISE OF IN-SERVICE SUPPORT CONTRACTS

DND possesses a fleet of aircraft, ships and land vehicles that cost in excess of $30 billon.[1] Each year these platforms require maintenance to ensure that they are operationally available to allow the department to provide the Canadian Government with defence options. The cost of this maintenance is significant and in 2009-10, the department spent in excess of $2 billion on maintenance alone.[2]

DND's maintenance requirements are divided into different levels based upon the complexity of the task. First line maintenance is normally routine planned maintenance that can

[1] 'OAG', *Report of the Auditor General of Canada to the House of Commons Chapter 5 Maintaining and Repairing Military Equipment - National Defence* (Ottawa, Ontario: Office of the Auditor General of Canada,2011), 1.

[2] *Ibid*., 1.

be conducted by unit staff both at home and abroad. Second line maintenance requires more support and, in the case of a ship, will likely need to take place at a repair facility. Second line maintenance can be conducted by ship's staff or FMF staff or it can be contracted out to industry. Third line maintenance on the other hand requires significant time and effort, such as the overhaul of a large diesel engine, and will normally be completed through contracting to industry. Ships are very complex pieces of equipment with hundreds of integrated systems and hence they require significant amounts of maintenance to ensure that all the required systems are ready when needed to allow the vessel to complete assigned missions.

In the past, DND divided the three levels of maintenance between in-house and industry providers. In the case of the maintenance that was to be contracted out, it was done in a piecemeal fashion that resulted in huge numbers of individual contracts. Things changed during the 1990s when the Department suffered significant cuts to both budget and human resources.[3] ADM(mat) is the group of DND that is responsible for the acquisition and maintenance of the military's equipment. Prior to the personnel reductions of the 1990s, this was a robust organization that contained large numbers of Subject Matter Experts (SMEs) which was able to field large project teams, such as the 300 member strong team that oversaw design and build of warships during the Canadian Frigate Program.

A changing approach to defence maintenance emerged in the late 1990s and early 2000s due to three factors: an increased pace of operations, human resource challenges, and increasing platform costs.[4] Following the attacks of September 2011, all three services saw an increase in operations and hence an increase in wear and tear on equipment. The cuts of the 1990s had diminished the workforce. The other driver was the increasing cost of equipment due to

[3] *Ibid*.. 7.
[4] *Ibid*., 7.

increasing technology and complexity. This pressure has forced ADM(mat) to look to alternate ways to deliver maintenance. Recent internal documents outline the driving factors for the adoption of ISSCs in the Navy: "support to future fleet, alignment with DND strategic initiatives, and resource constraints."[5]

The Air Force has moved to adopt ISSCs quicker than the other two services. The Air Force now selects a prime contractor for each fleet of aircraft who is responsible for most second line and third line maintenance.[6] The Navy was not far behind and the Kingston Class of maritime coastal defence vessels is maintained under a contract awarded to SNC Lavalin.[7] ISSCs have reduced the burden on ADM(mat) but there have been lessons learned along the way.

Canada was not alone in facing these equipment maintenance pressures. The United States, the UK and Australia have all faced similar pressure.[8] Last year, the United States Navy (USN) had the RAND Corporation conduct a study into the increasing costs of surface ship maintenance. The study found that the USN surface fleet does not have sufficient funding to complete all the required maintenance if conducted in traditional manners:

> Department of Defense (DoD) is likely to face years of declining resources as the U.S. government grapples with fiscal challenges. This demand will exert particular pressure on the parts of the Navy establishment supporting materiel procurement and readiness. The Budget Control Act (BCA) of 2011 established budget-enforcement mechanisms intended to reduce federal discretionary spending by more than $900 billion between 2012 and 2021. The BCA has broadly affected budgets within the U.S. Navy. In particular, surface ship maintenance budgets have been cut by an estimated 24 percent between fiscal year (FY) 2013 and FY 2015, with limited relief in sight.[9]

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[5] ADM(mat) FISS, *FISS System Analysis Document* Department of Defence,2014).

[6] CRS, *Review of the Canadian Search and Rescue Helicopter Acquisition (Cormorant)*National Defence,2007), 3.

[7] Dave Perry, "Dollars and Sense: Naval in-Service Support," *Canadian Naval Review* 9, no. 3 (2013), 39.

[8] 'OAG', *Report of the Auditor General of Canada to the House of Commons Chapter 5 Maintaining and Repairing Military Equipment - National Defence*, 17.

[9] Robert Button, Rand Corporation and National Defense Research Institute (U.S.), *Assessment of Surface Ship Maintenance Requirements* (Santa Monica, Calif: Rand Corporation,2015), 1.

In response to this fiscal pressure the USN is moving to reduce the total number of maintenance contracts and has "instituted the practice of awarding a single overarching contract to a prime contractor responsible for depot-level [third line] maintenance work on multiple ships in a class."[10] While the USN does not yet plan to contract out as much of the support function as Canada, they are facing similar pressures and are moving in the same direction.

DND recognizes that it must work closely with Canadian Industry to ensure military equipment is effectively maintained. In an effort to reduce the workload on in-house staff and to allow the contractor enhanced flexibility in how services are delivered, the department is moving towards the use of high level performance based contracts.[11] Performance based contracts are not new to DND but the level at which the specific performance is being described is changing. In the past, individual system contracts would specify performance metrics such as engine parameters or HVAC system output but DND is shifting to contracts that specify operational availability requirements of entire platforms.

Another term commonly in use in ADM(mat) these days is relational contracting. The premise is that if we are going to enter into long term contracts with industry which possess high level performance based goals then we need to develop a relationship of trust with industry. Relational contracts "are agreements that are intentionally incomplete so that the contracting parties have room to manoeuver."[12] Large corporations have been able to benefit from this means of contracting but DND must exercise caution as it and industry have very different goals when it comes to the maintenance of military equipment. While one party will focus on

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[10] Roland J. Yardley, Raj Raman and Rand Corporation, *Impacts of the Fleet Response Plan on Surface Combatant Maintenance*, Vol. TR-358 (Santa Monica, CA: RAND, 2006).

[11] FISS, *FISS System Analysis Document*, 9.

[12] Frank L. Jeffries and Richard Reed, "Trust and Adaptation in Relational Contracting," *The Academy of Management Review* 25, no. 4 (2000), 873-882.

operational availability the other will focus on profit and thus it is vital that DND becomes an intelligent client.

INTELLIGENT CLIENT

Canada is in the process of acquiring several new classes of ships for the RCN and it is the current strategy under the National Shipbuilding Program (NSP) that the new ships will be maintained under ISSCs.[13] ADM(mat) has established the Future In-Service Support Initiative (FISS) to better understand the benefits and best practises surrounding the implementation of ISSCs in the naval context. During FISS's initial work they deduced that determining the right level of subject matter expertise was an important area for further investigation. In a recent position paper, FISS defines this expertise as:

> An Intelligent client refers to an organization that has sufficient competence to clearly specify the requirements for good [sic] or services from an industry provider and accept delivery of those goods and service with a high level of confidence that they meet the original intent and were obtained as good value.[14]

The challenge is determining what level of expertise will be needed within the organization to satisfy this requirement to be an "Intelligent Client." Also what specific domains of knowledge will be needed for Canada to satisfy this requirement?

PROJECT MANAGEMENT

Project management expertise is critical for both in-service maintenance and acquisition of military platforms. DND has identified the importance of this expertise and has been making efforts to increase training and certification of project managers within ADM(mat). Despite these efforts this continues to be an area that is regularly identified as lacking both in Canada and abroad.

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[13] Alanna Jorgensen, "The Future of in-Service Support - Evolution to Flexible and Innovative Ship Support," *Maritime Engineering Journal*, no. 77 (Summer 2015, 2015), 3.

[14] ADM(mat) FISS, *Concept Paper - Intelligent Client*.

Effective project management during both the acquisition and in-service stages is important to successful ISSC implementation and management. Many projects such as the Canadian Search and Rescue Helicopter (CSH) project, factor in ISSCs right from the start.[15] DND aims to realize total support savings of 15% over the lifespan of a platform if the requirements are considered in a more holistic manner.[16] In some successful projects the designer/builder has been awarded both the build and ISSCs. In doing so, the contractor can be provided with a benefit for potentially spending more money at the build which will result in a more dependable piece of equipment in the long term, which will have reduced maintenance costs if the ISSC is based on platform availability. This construct is more applicable to air or land projects as ships are bespoke platforms with a large number of Original Equipment Manufacturers (OEMs) involved.[17]

The planned approach for the Navy is to award the acquisition and support contracts separately. This is the case for the Arctic Offshore Patrol Ship and Joint Support Ship projects.[18] Three different project teams are involved with one for each ship project and then one combined project team responsible for the ISSC.[19] This approach will be more difficult to implement if different contractors win the contracts as there will be increased risk that the support contractor could blame failures to meet contracted availability rates on design/build issues related to the acquisition contractor.[20] This challenge will put added pressure on the project management team and contracting specialists to properly identify risk in order to mitigate it.

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[15] CRS, *Review of the Canadian Search and Rescue Helicopter Acquisition (Cormorant)*
[16] *Ibid.*
[17] Perry, *Dollars and Sense: Naval in-Service Support*, 39.
[18] Jorgensen, *The Future of in-Service Support - Evolution to Flexible and Innovative Ship Support*, 3.
[19] *Ibid*., 3.
[20] Perry, *Dollars and Sense: Naval in-Service Support*, 39.

The CSH project is a good example of the potential dangers involved when the project management team makes errors early on in the project. Chief Review Services (CRS) conducted a review of the project in 2007 which concentrated on certification of airworthiness, in-service support and management of the two main contracts (acquisition and ISS).[21] The project had suffered program delays and low rates of operational availability of delivered helicopters.

CRS found several deficiencies with the project management during their investigation. The project failed to identify several risk factors such as "technical difficulties related to the introduction of a new version of aircraft."[22] The project also failed to take into consideration the potential impact to the ISSC of not having validated maintenance data for the new aircraft. Ultimately, CRS concluded that "involvement of subject matter experts on the technological and project management aspects of acquiring a newly assembled helicopter was not evident in the planning stage" of the project or initial risk assessment.[23]

CRS further found that the CSH project failed to take into consideration lessons learned from previous projects and thus issues recurred. In addition, it was noted that the project failed to properly document its own lessons learned. This is a very basic element of project management that indicates that this project management office was under resourced in terms of personnel.[24]

There are good examples available from other nations, such as the UK Type 45 Destroyer project, where failures in program management had significant consequences. The UK made large cuts to both military and public servants who worked on the acquisition and maintenance of naval platforms while at the same time "encouraging the greater involvement of industry in the

[21] CRS, *Review of the Canadian Search and Rescue Helicopter Acquisition (Cormorant)*
[22] *Ibid*., 18.
[23] *Ibid*., 18.
[24] *Ibid*., 20.

support function."[25] The Type 45 project delivered a smaller number of ships than had been initially intended largely due to program oversight failures. In a journal article on the ship project, strategic analysts Ben Lombardi and David Rudd of Defence Research and Development Canada, point out that the M

OD's project team had insufficient qualified staff and relied on consultants. The team did not verify the overly optimistic project information provided by the ship designer and consultants.[26] The final number of 6 ships produced instead of the planned number of 12 was largely due to "faulty project management."[27]

Industry is involved in the project management of both acquisition and ISS projects for DND. As the Canadian Association of Defence and Security Industries (CADSI) points out, Canadian industry would be happy to take on more project management responsibilities from DND in-house teams.[28] In comparison to ship projects of the past, industry has taken on a much larger project management role. With that said there are project management tasks that should remain in-house as ultimately it is DND that will be accountable for most issues that arise.

Industry will play a critical role in project management in both the acquisition of and maintenance of the Navy's future fleet but that does not excuse DND from possessing ample project management experience of its own. Experiences from recent projects within DND and from other nations show that the department cannot offload risk to industry. Project management expertise will be needed in the establishment of ISSCs during ship acquisition projects and through their service lives. A strong project management team will be able to verify the

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[25] TREVOR TAYLOR, "The Limited Capacity of Management to Rescue UK Defence Policy: A Review and a Word of Caution," *International Affairs* 88, no. 2 (2012), 223-242.

[26] Ben Lombardi and David Rudd, "THE TYPE 45 DARING-CLASS DESTROYER: How Project Management Problems Led to Fewer Ships," *Naval War College Review* 66, no. 3 (2013): 99.

[27] *Ibid*., 114.

[28] Canadian Association of Defence and Security Industries, *Canada's Defence Industry: A Vital Partner Supporting Canada's Economic and National Interests : Industry Engagement on the Opportunities and Challenges Facing the Defence Industry and Military Procurement* (Ottawa, ON: CADSI/AICDS, 2009): 33.

assessments of progress and risk in specific ISSCs in order that the department can intervene at an early stage if issues arise.

CONTRACTING EXPERTISE

The importance of developing effective contracts that will form the framework for in-service support contracts is extremely important. Producing large value government contracts is a complicated process that requires specific training and experience. Public Services and Procurement Canada and DND both have in-house expertise in contracting but both departments have had numbers of personnel reduced. The main advantage of using large ISSCs is the potential to reduce internal workload.

As with the other elements of Intelligent Client, contracting expertise has been a neglected area that has caused both DND and its foreign equivalents challenges during contracting of large equipment programs. Again the CSH project provides concrete examples of the dangers of not establishing a successful contract from the onset. In the case of this project, two separate contracts were established: one for the supplier of the helicopter and another for the ISS contractor. The acquisition contract assumed too much risk as it was developed on the premise that this helicopter was based on an existing airframe that would require limited development. On the other hand, the ISSC was performance based and required the contractor to meet aircraft availability requirements.[29] The two contracts did not clearly delineate maintenance responsibilities in the early stages of aircraft life when there would be a blend of normal maintenance requirements and warranty maintenance. The result was that often neither contractor could be held to account and a hostile environment developed between DND and the contractors. These challenges caused significant delays in the program. CRS recommended that "the appropriateness and contractual effectiveness of the proposed ISS concept for the CSH

[29] CRS, *Review of the Canadian Search and Rescue Helicopter Acquisition (Cormorant)*, 8.

Project should be assessed by technical and contract experts."[30] This is a basic requirement that should have taken place years earlier using internal personnel with the correct levels of expertise.

The UK Royal Navy (RN) has suffered issues with contracting in recent years. In an article of the Naval Engineer, Commander Loring describes the challenges faced by Defence Equipment and Support (DE&S) due to a lack of expertise in the field of contracting.[31] He describes how the Ministry of Defence (MOD) has reduced the number of specialists in favour of generalists. This move has thus reduced the number of contracting specialists and placed the responsibilities upon the technical staff. The unfortunate result is that not only is the contracting ability reduced but the limited time of the technical specialists is being allocated to learning and implementing complicated contracting procedures.[32] This situation resulted in mistakes and forced the MOD to implement burdensome mitigation measures. These new measures require more detailed submissions to higher levels of authority. The end result has been delays in new and updated ISSCs due to excessive bureaucracy and insufficient contracting support.[33]

ISSCs can be in place for decades so it is critical that they are carefully crafted. To achieve the goals laid out by FISS, these contracts must be performance based and flexible.

> We cannot blindly enter into contracts thinking they will be our panacea; the contracts of the future need to be longer-term, performance based, and flexible enough to allow a progressive application of scope within a team approach.[34]

It will be very important for the three services to collaborate in the development of these projects to ensure that lessons learned are shared so that issues do not recur as happened in the Cormorant Project. As was outlined in Commander Loring's article, a lack of personnel with contracting

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[30] *Ibid*., 17.
[31] Andrew Loring, "In-Service Equipment Support - A DE&S Employee's Perspective," *The Naval Engineer* (Spring, 2011), 37.
[32] *Ibid*., 39.
[33] *Ibid*., 41.
[34] Jorgensen, *The Future of in-Service Support - Evolution to Flexible and Innovative Ship Support*, 3.

experience can have twice the impact if contracting duties are placed on the shoulders of already overburdened technical staff.

TECHNICAL EXPERTISE

Developing and maintaining technical expertise in the fields of marine engineering and naval architecture is an expensive endeavour. The problem is magnified here in Canada as the marine sector is relatively small and small numbers of qualified personnel exist in both the private and public sectors. The boom and bust cycle of shipbuilding in Canada has played a significant role in this problem.

Technical experts perform a range of roles during the service lives of naval vessels. They are needed within the navy in order to provide technical advice to command during operations. They are needed in the FMFs to oversee second line and third line maintenance that is conducted in-house. At the headquarters they perform the important duties of systems authorities advising design authorities during activities such as the implementation of engineering changes. Under ADM(mat)'s Naval Material Assurance (NMA) program, certification officers are designated for a range of areas such as structural integrity, survivability, navigation etc.

As the maintenance and development of these Suitably Qualified and Experienced Personnel (SQEP) is challenging and expensive, Canadian Industry is quick to offer to take on these roles. In a 2009 report, the Canadian Association of Defence and Security Industries makes recommendations to Canadian Government concerning the future of Naval and Coast Guard ships. The report specifically addresses the capabilities that exist in industry and recommends that the critical functions of prime contractor, project management, platform and mission system integration, management and control of ship design, and in-service support be carried out by

industry.[35] As organizations such as ADM(mat) struggle to meet their workloads this can sound like an attractive solution.

The UK has gone further down this road than Canada and is attempting to reverse its course in relation to technical expertise. In an assessment of the Astute submarine program, the RAND Corporation outlined the impact of "Whitehall's subsequent decision to reduce both military spending and the government's professional workforce" following the end of the Cold War.[36] The report describes how UK industry took on many of the technical roles that had been done internally by the UK MOD, but unfortunately industry did not in fact possess the technical expertise needed; the private sector and MOD "underestimated the impact of the MOD shifting responsibilities to the private sector, which was ill prepared to assume them."[37]

The pressure to reduce the size of the MOD workforce started in the late 1980s and continued until recent years. In an article found in The Naval Engineer, Commander Loring discusses the challenges to DE&S due to these personnel reductions.

> Management of the Royal Dockyards was transferred to the private sector in 1987 whilst the SDR [strategic defence review] took the function of designing warships and submarines out of the hands of the MOD and largely transferred it to industry. Prior to these initiatives, the MOD Civil Service ran one of the largest and most respected apprenticeship schemes in the country, producing highly qualified engineering technicians to manage ship repair and support in the dockyards.[38]

In addition to the training of technicians, Commander Loring goes on to describe the pool of naval architects and marine engineers that were trained by the Royal Corps of Naval

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[35] Canadian Association of Defence and Security Industries and Canadian Association of Defence and Security Industries. Marine Industries Working Group, *Sovereignty, Security and Prosperity: Government Ships - Designed, Built and Supported by Canadian Industry : The Report of the CADSI Marine Industries Working Group* (Ottawa, ON: CADSI/AICDS, 2009).

[36] John F. Schank et al., *Learning from Experience: Volume III: Lessons from the United Kingdom's Astute Submarine Program* RAND Corporation,[2011b]).

[37] *Ibid*., xi.

[38] Loring, *In-Service Equipment Support - A DE&S Employee's Perspective*, 37.

Constructors. This program provided the Admiralty with "deep expertise backed by the appropriate training to act as the Design Authority as well as that of the Material Duty Holder.[39]

The result of this reduction of technical expertise was a reduced ability to ensure the safety of the fleet. The same reductions had impacted the Royal Air Force and Loring highlighted the inquiry findings from the crash of Nimrod XV230 which identified a failure to properly oversee aircraft safety by technical staff.[40] While Defence Departments can choose to contract many activities to industry, they will always retain ultimate responsibility for the equipment: "responsibility for safety cannot be contracted to industry: it has to remain with the Duty Holders who must have the requisite skills."[41]

In a more recent article from 2014, Vice Admiral Lister the Chief Naval Engineer Officer of the Royal Navy, pointed out that technical expertise in the RN was in a crisis due to the over reliance on industry. He states that the drive "for affordability has generated incoherence between the equipment programme, the support solution and our personnel and training programmes."[42] He goes on to state that "our maintainers' ability to assure available systems has been reduced by support solutions that are excessively reliant on industry."[43] The Admiral goes on to explain that not only is the technical expertise within the Fleet declining due to the support solutions in place but that "pinch points in industry expertise contribute to a reduction in availability and readiness."[44]

The RAND Corporation conducted a study into the issues faced by Australia's Collin's Class submarine program. This complicated program was undertaken by both a military and a

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[39] *Ibid*., 40.
[40] *Ibid.*, 40.
[41] *Ibid*., 40.
[42] Simon Lister, "Engineering our Future: Our Strategy for Naval Engineering," *The Naval Engineer* (Spring, 2014), 3.
[43] *Ibid*.
[44] *Ibid*.

defence industry that was ill prepared to tackle it. Early challenges in the program lead to a lack of effort on the integrated logistics support planning for the class.[45] The report outlines that "problems included an inadequate maintenance regime, poor systems reliability, a need to rely on offshore design authorities and original equipment manufacturers, and technical knowledge deficits in the domestic workforce."[46] The small level of submarine technical expertise that had existed in Australia had dissipated in the gap between the classes of submarines. The report concludes that Australia must do more to maintain a pool of personnel with the expertise needed if complicated naval platforms such as submarines are to be operated and sustained:

> The RAN must plan to provide relevant experiences to potential program managers, sending them to various operations and acquisition-related positions and giving them appropriate education in the academic community. This level of knowledge and expertise in the officer corps allows the RAN to be an informed customer.[47]

For a nation to develop realistic and cost effective long term support contracts, the right levels of technical expertise are needed in-house.

Despite industry advice to transfer the bulk of responsibility to them, DND will be well served to learn from the lessons of the UK and Australia in terms of maintaining technical expertise in-house despite the implementation of long term ISSCs. Technical expertise will be needed in-house to determine contract performance and to perform the role of design authority. Nations such as the UK have attempted to pass both risk and responsibility to industry but these efforts have largely failed. Not only have these efforts impacted the in-service support of platforms but it has also reduced the needed expertise for the acquisition of new platforms.

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[45] John F. Schank et al., *Learning from Experience: Volume IV: Lessons from Australia's Collins Submarine Program* RAND Corporation, 2011).

[46] *Ibid.*, 26.

[47] *Ibid.*, 38.

IMPACT TO ACQUISITION

Acquisition and in-service require knowledgeable personnel with similar expertise. In nations such as Canada, where there can be long periods between ship acquisition, it is easy to forget that personnel with the right levels of knowledge will eventually be needed when the next project arrives. Canadian Industry and DND both find themselves in a similar situation right now as four major naval activities are taking place concurrently: modernization of the Halifax Class Frigates, acquisition of Arctic Offshore Patrol Ships, acquisition of Joint Support Ships and acquisition of Canadian Surface Combatants. DND and Canadian Industry are competing for the same limited pool of people that have the skills needed in project management, contracting and technical fields.

CADSI recognizes this issue and in a 2009 report made it clear that Canada has not procured government ships since the 1990s. It noted: "while certain elements remain of the design capability that produced the last round of new construction the capacity required for new projects for these specific ship types has been much diminished."[48] Rebuilding the skills needed to support government shipbuilding is no small endeavour as "ships tend to be purpose-designed and are much fewer in number compared to air and land vehicles."[49] In the case of the current ship building projects in Canada, companies such as Irving and Vancouver Shipyards have been required to conduct aggressive recruiting campaigns to find the needed SQEPs. Irving has had to seek project managers and technical experts from international sources as they could not find the expertise needed in Canada.

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[48] Canadian Association of Defence and Security Industries, *Canada's Defence Industry: A Vital Partner Supporting Canada's Economic and National Interests : Industry Engagement on the Opportunities and Challenges Facing the Defence Industry and Military Procurement*, 15.

[49] *Ibid*., 2.

Canadian Industry is busy rebuilding a solid base of subject matter expertise due to their involvement in the Naval and Coast Guard ship building projects. Skills and knowledge at all levels are missing and the shipyards are engaged in significant efforts to meet their commitments.[50] DND has been clear to Industry that the plan for the maintenance of future naval vessels is through ISSCs and Industry has taken notice and several contractors are positioning themselves to compete for these lucrative long term contracts.[51] As these additional companies look to add expertise to their teams, the demand for qualified personnel will intensify. The impact is that all players in this field are completing for the same limited pool of personnel and given the track record of boom and bust in Canadian shipbuilding it is difficult to attract personnel from other countries.

DND and Coast Guard suffered large reductions in personnel through the 1990s and additional cuts following the economic downturn after 2008. Both have recognized that with the new projects that are simultaneously under way in both organizations, more expertise is needed and both are hiring additional staff. Industry has noticed that both Government organizations are looking to improve their in-house design capabilities to be better able to establish realistic and affordable requirements:

> In many countries, the government retains in-house design capabilities for at least the Concept Explorations and Feasibility Design phases. There is some evidence that both DND and CCG are now seeing the need to rebuild some level of in-house design capability, at least for Concept Exploration.[52]

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[50] DAVID PUGLIESE, "Problems Surfacing for Canada's Shipbuilding Plan," *Defense News*, sec. 28, 2013.; Patricia Brooks Arenburg, "SHIPBUILDING SCHOOL; Irving Staffers Get Ready for Patrol Vessel Work; about 100 Employees Take Part in Customized Training at NSCC," *Chronicle - Herald*2015.

[51] DAVID PUGLIESE, "Companies Eye Canadian Shipbuilding Support," *Defense News*, sec. 30, 2015.

[52] Canadian Association of Defence and Security Industries, *Canada's Defence Industry: A Vital Partner Supporting Canada's Economic and National Interests : Industry Engagement on the Opportunities and Challenges Facing the Defence Industry and Military Procurement*, 15.

Adding this additional expertise to both organizations will make each a more informed customer who is better able to evaluate contractor designs. These same skills will be beneficial down the road for evaluating future vessel modernization projects as well as performing Design Authority roles to ensure vessel safety.

SME DEVELOPMENT

DND must consider how it will train the next generation of subject matter experts in a performance based relational contracting environment. As industry takes a larger role in the design, build, and support of ships there will be fewer opportunities for members of the Navy and Public Service to gain the experience needed to ensure the department is properly managing vessel ownership risk. The same concern will exist for project management and contracting expertise.

Under the current construct, sailors in the technical trades spend time in the FMFs where they are exposed to second and third line maintenance activities as they work alongside public servants. This experience can be invaluable when a ship suffers a serious equipment failure while on operations far from homeport. If more maintenance is outsourced to industry will these opportunities be diminished? Alana Jorgensen, a key member of FISS, recently identified the need to have training from ISS contractors for DND personnel:

> Full reliance on a contractor in an operational environment is never an optimal situation, so the ISSCs will need to ensure that we safeguard our sailors' competencies through industry secondments or enhanced OEM-style training.[53]

Training of this type must be planned for in the establishment of these long term ISSCs. In the past, DND staff and contractors have at times operated in adversarial environments but if this construct is to work then true relational contracts will be needed where DND and contractor staff

[53] Jorgensen, *The Future of in-Service Support - Evolution to Flexible and Innovative Ship Support*, 35.

can operate in a team environment. This type of environment will allow in-house personnel to gain needed expertise.

DND must resist the temptation to drastically cut in-house personnel to a level that can only sustain ISSCs. As ADM(mat) is currently struggling to man several shipbuilding projects with an already lean workforce it is finding that it lacks the needed human resources. Some surge capability is needed and this extra capacity will allow for junior personnel to learn from senior members of the team.

Navy personnel have access to robust training programs for both non-commissioned members and officers. Each year several officers are sent on post graduate training for both naval architecture and marine engineering. This training is expensive and always under scrutiny. These training and education programs are extremely important if DND is to remain an Intelligent Client.

CONCLUSION

The increasing cost to maintain naval vessels of ever increasing complexity will continue to drive DND to look for more cost effective solutions to the problem of providing vessel maintenance. As has been shown in this paper, this is not a problem that is faced by just Canada but by all western nations including the United States. In-Service Support Contracts have the potential to result in a reduction of total maintenance costs while also allowing reductions in the number of both military and public servants engaged in this activity. However, experience has shown that DND must proceed with caution as it must retain expertise in the fields of contracting, project management and naval technical fields to be an Intelligent Client.

Some nations such as Australia have seen maintenance cost reductions, so this goal is possible if ISSCs are properly implemented and managed. The reductions in both public servants

and military staff that occurred in the 1990s left DND with little choice but to explore the ISSC option if it wished to maintain the same number of platforms with a reduced workforce. Given the current fiscal climate, any significant increases in Government staff is highly unlikely. It would appear that the use of ISSCs is here to stay, so DND must move forward with improving its status as an Intelligent Client.

With so much current activity in the marine sector due to both Naval and Coast Guard ship building a very competitive market has been created for personnel with the desired knowledge and expertise. Government and Industry will be competing for the same people. DND must find ways to be an employer of choice to both retain and attract the needed personnel. As DND moves more and more roles and responsibility to Industry it will become more challenging to retain and develop in-house expertise in project management, contracting and the technical fields. DND must look for creative ways to develop its skills such as integrating closer with Industry to allow both government and industry teams to cross pollinate knowledge and expertise.

DND will always retain responsibility for platform availability and safety. This is why DND must ensure that it is an Intelligent Client in an environment where naval platform maintenance is completed through the use of long term performance based contracts based on a relational construct with Industry. DND must ensure that these contracts are delivering value for money and that the government of Canada has the military options needed as it pursues its policies. Canada and other western nations have attempted to shift risk to industry but it is clear that this strategy is ineffective and irresponsible.

BIBLIOGRAPHY

Australia, Defence Material Organization. "Group Maintenance Contracting Success." Accessed 6 April 2016. http://www.defence.gov.au/dmo/NewsMedia/DMOBulletin/archive/2013-Issue-5/GroupMaintenanceContractingSuccess.

Ben Lombardi and David Rudd. "THE TYPE 45 DARING-CLASS DESTROYER: How Project Management Problems Led to Fewer Ships." *Naval War College Review* 66, no. 3 (2013): 99.

Birkler, John, Gordon T. Lee, Roger Lough, Robert Murphy, David Nicholls, Giacomo Persi Paoli, Deborah Peetz, et al. *Australia's Naval Shipbuilding Enterprise: Preparing for the 21st Century*: RAND Corporation, 2015.

Brewster, Murray. "Federal government's 'perverse' Contract Policies Encourage Industry to Gouge Taxpayers: Leaked report." *National Post,* last modified 13 March 2016, 2016. http://news.nationalpost.com/news/canada/canadian-politics/federal-governments-perverse-contract-policies-encourage-industry-to-gouge-taxpayers-leaked-report.

Button, Robert, Rand Corporation, and National Defense Research Institute (U.S.). *Assessment of Surface Ship Maintenance Requirements*. Santa Monica, Calif: Rand Corporation, 2015.

Canada, Chief Review Services. *Review of the Canadian Search and Rescue Helicopter Acquisition (Cormorant)*. Ottawa: National Defence, 2007.

Canada, Future In-Service Support Initiative. *Concept Paper - Intelligent Client*. Ottawa: National Defence.

———. *FISS System Analysis Document*. Ottawa: National Defence, 2014.

———. *Future in-Service Support System Requirements Document*. Ottawa: National Defence, 2015.

———. *In-Service Support System Description Document*. Ottawa: National Defence, 2015.

Canada, Office of the Auditor General. *Report of the Auditor General of Canada to the House of Commons Chapter 5 Maintaining and Repairing Military Equipment - National Defence*. Ottawa, Ontario: Office of the Auditor General of Canada, 2011.

Canada, Expert Panel on Review of Federal Support to Research and Development. *Innovation Canada: A Call to Action: Special Report on Procurement* Expert Panel on Review of Federal Support to Research and Development. Ottawa: Public Works and Government Services, 2011.

Canadian Association of Defence and Security Industries. *Canada's Defence Industry: A Vital Partner Supporting Canada's Economic and National Interests: Industry Engagement on the Opportunities and Challenges Facing the Defence Industry and Military Procurement*. Ottawa, ON: CADSI/AICDS, 2009.

Canadian Association of Defence and Security Industries and Canadian Association of Defence and Security Industries. Marine Industries Working Group. *Sovereignty, Security and Prosperity: Government Ships - Designed, Built and Supported by Canadian Industry : The Report of the CADSI Marine Industries Working Group*. Ottawa, ON: CADSI/AICDS, 2009.

Jeffries, Frank L. and Richard Reed. "Trust and Adaptation in Relational Contracting." *The Academy of Management Review* 25, no. 4 (2000): 873-882.

Jorgensen, Alanna. "The Future of in-Service Support - Evolution to Flexible and Innovative Ship Support." *Maritime Engineering Journal* no. 77 (Summer 2015): 3.

Lister, Simon. "Engineering our Future: Our Strategy for Naval Engineering." *The Naval Engineer* (Spring, 2014): 3.

Loring, Andrew. "In-Service Equipment Support - A DE&S Employee's Perspective." *The Naval Engineer* (Spring, 2011): 37.

Macdonald, George. “Leadership in an Era of Change and Complexity.” In *Generalship and the Art of the Admiral: Perspectives on Canadian Senior Military Leadership*, edited by Bernd Horn and Stephen Harris, St. Catharines, Ont: Vanwell Pub, 2001, 167-188.

Nicol, Mark. ""Not enough Sailors, Ships that Ground to a Halt and Second-Rate Equipment': Admiral Unleashes a Broadside at Our Broken-Down Navy." *Dailymail,* last modified 24 May 2014.

Patricia Brooks Arenburg. "SHIPBUILDING SCHOOL; Irving Staffers Get Ready for Patrol Vessel Work; about 100 Employees Take Part in Customized Training at NSCC." *Chronicle - Herald,* 2015.

Perry, Dave. "Dollars and Sense: Naval in-Service Support." *Canadian Naval Review* 9, no. 3 (2013): 39.

Puglise, David. "Companies Eye Canadian Shipbuilding Support." *Defense News,*2015, sec. 30. http://www.defensenews.com/story/defense/naval/ships/2015/03/22/canada-naval-ship-support-contract-iss/70145448/.

———. "DND has Lost Track of Private Contractors Doing Repairs, Maintenance: Audit." *National Post,* last modified 29 March 2016. http://news.nationalpost.com/news/canada/canadian-politics/dnd-loses-track-of-private-contractors-doing-repairs-maintenance-audit.

———. "Problems Surfacing for Canada's Shipbuilding Plan." *Defense News*, 2013, sec. 28.

Ross, Dan. "Is Defence Procurement Broken Or is this Normal?" *Frontline Defence* 10, no. 6 (2013).

———. "Remember "Your Rifle was made by the Lowest Bidder"." *Frontline Defence* no. 6 (2006).

Schank, John F., Cesse Ip, Kristy Kamarck, Robert Murphy, Mark V. Arena, Frank W. Lacroix, and Gordon T. Lee. *Learning from Experience: Volume IV: Lessons from Australia's Collins Submarine Program*: RAND Corporation, 2011.

Schank, John F., Frank W. Lacroix, Robert Murphy, Cesse Ip, Mark V. Arena, and Gordon T. Lee. *Learning from Experience: Volume III: Lessons from the United Kingdom's Astute Submarine Program*: RAND Corporation, 2011.

TAYLOR, TREVOR. "The Limited Capacity of Management to Rescue UK Defence Policy: A Review and a Word of Caution." *International Affairs* 88, no. 2 (2012): 223-242.

Williams, Sean. *Service Paper: Fleet Maintenance Facilities as Strategic Assets*, 29 March 2010.

Yardley, Roland J., Raj Raman, and Rand Corporation. *Impacts of the Fleet Response Plan on Surface Combatant Maintenance*. Vol. TR-358. Santa Monica, CA: RAND, 2006.