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WE CANNOT SOLVE OUR PROBLEMS WITH THE SAME THINKING WE USED WHEN WE CREATED THEM : A NEW APPROACH TO IDENTIFICATION AND OPTIONS ANALYSIS FOR DND PROJECTS

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List of Acronyms

BI – Business Intelligence

CAF – Canadian Armed Forces

CBP – Capability Based Planning

CFD – Chief of Force Development

CID – Capability Investment Database

CIPPR - Capital Investment Program Plan Review

CProg – Chief of Programme

DAG – Defence Acquisition Guide

DCB - Defence Capability Board

DDFP - Director Defence Force Planning

DPS – Defence Procurement Strategy

DM – Deputy Minister

DRMIS - Defence Resource Management Information System

DND – Department of National Defence

DWAN – Defence Wide Area Network

HLMR – High Level Mandatory Requirement

ID – Identification phase

IP – Investment Plan

IRMC – Investment Resource Management Committee

IRPDA - Independent Review Panel for Defence Acquisition

IU – Investment Universe

MND – Minister of National Defence

MOD – Ministry of Defence (UK)

OA – Options Analysis phase

PAG – Project Approval Guide

PAP – Project Approval Process

PAPR – Project Approval Process Renewal

PCRA - Project Complexity and Risk Assessment

PD – Project Director

PM – Project Manager

PMB – Programme Management Board

PRICIE - People, Research & Development, Infrastructure, Concepts of Operation and Doctrine, Information Technology, Equipment, Support and Sustainment

PSPC - Public Services and Procurement Canada

SOCD – Statement of Capability Deficiency

SRB – Senior Review Board

SSE – *Strong, Secured, Engaged*

TB – Treasury Board

VCDS – Vice-Chief of Defence Staff

Abstract

Strong, Secure, Engaged, the Canadian Government's latest policy for Canadian defence including the Canadian Armed Forces provides budgetary increases over the next decade to provide for the defence of Canada and the forces international commitments. In order to meet the goals outlined in the plan, the Department of National Defence will need a much more effective and agile means of managing projects to both ensure that the increased budget is responsibly spent and to provide the right equipment to the forces in a more efficient manner. The current system requires an average of 16 years for projects from Identification to Close Out. In order to improve upon this, the Department intends to process more projects in less time for a fourfold increase in the number of projects actuated. This paper examines the current state of the Project Approval Process and current renewal efforts. It then examines how specific industry leaders manage innovation methodology from a procedural, cultural and structural perspective. Methodologies such as Design Thinking, Open Innovation and the programs developed by GE's Menlo Park are assessed for their strengths and weaknesses and applicability to the Department of National Defence. A hybrid system of innovation, a joint governance structure and an investment in technology are proposed as a means of generating greater efficiency out of the current Project Approval Process in order to meet the goals set by *Strong, Secure, Engaged*.

Introduction

In order to meet the objectives defined in *Strong, Secure, Engaged (SSE)*, the new policy set by the Canadian Government to improve and modernize the Canadian Armed Forces (CAF), an injection of new capital into the Department of National Defence (DND) will be required. This necessary budgetary increase will mean the addition of critical new capabilities for the armed forces, enabling them to better meet the challenges of the 21st Century.[2] One critical issue with the new policy that will need to be addressed before the new capabilities can be delivered to the CAF is the process that manages projects at the department. While not entirely without merit, the ability to initiate, process and complete projects in a timely and cost effective manner has plagued DND for generations.[3] Whether it is major capital procurement such as warships, tanks and fighters which cost billions of dollars or enabling capabilities such as software automation, clothing for soldiers or logistical streamlining, the system as it currently exists is long, inefficient and incapable of managing the capacity required to meet the goals of SSE.[4] Therefore, even if the department is infused with new capital resources, there exists a systematic inability to effectively and responsibly spend the new financial boon. This inability to fully spend the department's budget could lead to two separate and equally damaging potentials. First, the inability of the department to effectively spend the budget that they requested will impact the department's credibility to manage the increased amount. Secondly, the inability to provide the equipment, systems and force enablers will directly impact the soldiers, sailors and air personnel who sorely require it.

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[2] Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy,* (Ottawa: Canada 2017), 45.

[3] Alan Williams, *Reinventing Canadian Defence Procurement.* (Montreal: McGill-Queen's University Press, 2006), 60.

[4] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016*, Vol 2, (Ottawa: 2016), 94.

The same issues that impact procurement and project development at the Department of National Defence are not prevalent throughout industry in Canada. In the rapidly progressing and technologically driven private sector, innovation and production are measured in months not years.[5] Companies that fail to innovate and develop new products or means of production, quickly find themselves surpassed by competition. As the military and industry already share many interests in developing and producing new technology or using current systems more effectively, much can be learned from examining private sector innovation means and how they can be leveraged by the department.

DND utilizes the Project Management Body of Knowledge five step process of Identification (ID), Options Analysis (OA), Definition, Implementation and Close Out to manage projects.[6] This process is administered by a system of boards, oversight committees, and administrative requirements that work to ensure transparency, accountability and thoroughness.[7] In order to efficiently manage the increased project throughput required under the expanded SSE directive, National Defence will need to vastly streamline this Project Approval Process (PAP). Efforts are underway to improve the administrative process and reduce the time required for project approvals; however those efforts focus on projects that have been identified, approved and have already moved through over 50% of the process.[8] These improvement initiatives will create some efficiencies but the most effective way to generate the efficiency necessary will be through a reimagining of the Identification and Options Analysis phases of the PAP to increase

[5] David, Perry, *2015 Status Report on Major Defence Equipment Procurements*, (Calgary: Canadian Global Affairs Institute, December 2015), 8.

[6] Project Management Institute, *A Guide to the Project Management Body of Knowledge- Sixth Edition.* (Pennsylvania: 2017).

[7] Perry, *2015 Status Report on Major Defence Equipment Procurements*, 10.

[8] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016*, Vol 1, (Ottawa: 2016), 3.

the number of minor projects initiated by the elements and reduce the time required to move them to Definition and Implementation. The purpose of this paper is to review the current PAP in use at DND and to suggest where small capital investments in specific areas and new modes of innovation could vastly increase the throughput of projects. While beyond the scope of this paper to completely overhaul the PAP, the paper will instead focus on improving the early stages of the process to positively influence the overall time required for projects to be completed.

This analysis will be accomplished in three main parts. Chapter One will first examine the stages of PAP to provide an overview of the current system. Next, the paper will provide a description of the Project Approval Process Renewal (PAPR) initiative which looks to streamline the later stages of the PAP. Chapter One will conclude with a review of the latest independent review by accounting firm KPMG to determine how their ideas can be leveraged to improve the system. Chapter Two will examine how private industry leaders manage innovation and how those methods may be utilized to generate change across three themes of change; cultural, procedural and structural. Chapter Three will then present a potential methodology for DND to incorporate industry innovation techniques with a system of joint governance and a means to leverage technology to enable more effective innovation in a military headquarters. Lastly in Chapter Three, the paper will provide an estimate of the potential savings a new system could generate in budgetary and time aspects.

This paper will not address major capital projects such as the National Shipbuilding Program or the Fighter replacement initiative as these major investments come with their own political, industry and regional economic issues. Work can be done to improve the management and execution of these projects but is outside the scope of this paper. Instead, this paper will focus on the smaller force enabling projects that the Canadian Armed Forces requires to provide

additional capabilities or improve upon the force multiplying effects of existing capabilities. It will examine projects with budgets of between 5 million and 100 million dollars.

As the analysis of this essay will demonstrate, by incorporating new methodologies of industrial innovation, modernizing the business culture of DND, and developing a more technologically driven enterprise, DND will be able to significantly increase the number of projects managed and reduce the time required for those projects to reach Implementation phase from years to months.

CHAPTER ONE: THE CURRENT SYSTEM

Project Approval Process at DND

In order to begin explore how DND should proceed into the future and improve upon its procurement process, an understanding of how the department currently manages projects is necessary. This Chapter will begin with a brief description of the PAP as it exists today with an overview of the project phases and the structure of Boards that oversees it. Chapter One will then discuss the current initiative to streamline the process, PAPR. This initiative focuses mostly on the later phases of Definition and Implementation and is an example of efforts being made by DND to improve the PAP. The PAPR specifically focuses on the process for low risk projects with budgets less than $100 million and which also fall under the approval authority of the Minister of National Defence.[9] In the third section, this chapter will provide a review of the most recent comprehensive and independent review of the process which was conducted by accounting firm KPMG in 2015. The purpose of the review is to focus on key findings of the report that can be leveraged by the department to specifically improve the Identification and Options Analysis phases of the PAP, rather than the entire process.

The Project Approval Process has undergone numerous reviews over the last few decades, including reports in 2000 by the Standing Committee on National Defence and Veterans Affairs which made 38 recommendations.[10] A further 49 improvements were suggested in 2003 to the Minister of National Defence (MND) and again in a 2005 report from Public Services and

[9] Canada. Department of National Defence. *Project Approval Renewal Summary.* (Ottawa: Canada 2017).
[10] Williams, *Reinventing Canadian Defence Procurement,* 1.

Procurement Canada (PSPC).[11] Many of the recommendations were implemented however, they resulted in more administrative accountability with little actual reduction in the time required to process projects.[12] In 2008, the *Canada First Defence Strategy* began an increase in the departments long term spending and established priorities for the future, but the increased funding did not translate directly into an increased capacity to manage those funds.[13] Then, in 2014 Defence Procurement Strategy (DPS) program made changes to improve the procurement strategy by actively engaging with industry experts, publishing the Defence Acquisition Guide (DAG) and establishing the Independent Review Panel for Defence Acquisition (IRPDA). This whole of government approach is designed to deliver the right equipment to the CAF and stimulate the Canadian economy through job creation.[14] Since Alan Williams' review in 2006 of changes made in 1998, he found very little improvement in the timelines required for projects to progress through the system.[15] A review of the Capability Investment Database (CID), the main knowledge management system for projects at DND, today finds the same timelines occurring for newer project as they did in 2006. The similarities in timelines suggests that amendments made in the last decade have yet to demonstrate concrete increases in capacity of project management or in the time required for implementation.[16] Before discussing how to improve the process, an understanding of the current procedures will be necessary.

[11] Public Works and Government Services Canada (PWGSC) was changed in 2015 to the new name of Public Works and Procurement Canada (PSPC). Most of the references in this paper refer the pre-2015 name however for clarity and consistence, the department will be referred to as PSPC throughout.

[12] Ibid., 1.

[13] Canada. Department of National Defence. *Canada First Defence Strategy*. Ottawa: Canada 2007, 11.

[14] Canada. Department of National Defence. *Defence Procurement Strategy*. Ottawa: Canada 2014. Last accessed on March 2, 2018 at https://www.tpsgc-pwgsc.gc.ca/app-acq/amd-dp/samd-dps/index-eng.html

[15] Williams, *Reinventing Canadian Defence Procurement*.

[16] A review of the CID was conducted by the author based on 50% of the projects examined by David Perry and Alan Williams.

The purpose of this chapter is to provide a synopsis of the process that must be followed for ideas and requirements to become projects and eventually systems, services or equipment for the Canadian Armed Forces. It is not meant to be an in-depth explanation of each department, board, administrative procedure and milestone of the 1400-step process. Rather it provides an overview of the PAP required for all projects at DND regardless of size, scope and budget and the most recent measures that have been undertaken to reduce the time required to deliver force enablers.[17]

The PAP is a complex process that involves the full Cabinet of government, the Treasury Board and its Secretariat, DND, Public Services and Procurement Canada (PSPC), and national and foreign defence industries.[18] The process is governed by numerous regulations and laws across the entire government and is fully expressed in the 265 page Project Approval Guide (PAG) published and updated by the DND.[19] The PAP has undergone numerous iterations of scrutiny over the last two decades including two reports from KPMG Accounting, one from the Standing Committee on National Defence and Veteran Affairs in 2000 and a follow up report to the Minister of National Defence in 2003 from the Advisory Committee on Administrative Efficiency.[2021] All of the reports have determined that the process is too long, too complicated and overly risk adverse.

[17] The research for this paper is based upon the state of the PAP in 2015 as the most recent update to take effect was in 2012. The information regarding the PAPR initiative has been updated as of November, 2017 and the recommendations examined in the KPMG report are current as of 2015.

[18] Perry, *2015 Status Report on Major Defence Equipment Procurements*, 2.

[19] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 1, 8.

[20] Williams, *Reinventing Canadian Defence Procurement*, 2.

[21] Canada. Department of National Defence. *Achieving Administrative Efficiency.* Report to the Minister of National Defence by the Advisory Committee on Administrative Efficiency. (Ottawa: Canada 2003).

The first stage of the process is the Identification phase and is partly initiated through the Capability Based Planning (CBP) process, which identifies High Level Mandatory Capabilities that the CAF requires now or will need in the near future (10-15 years).[22] The goal of this phase is to identify a sponsored capability deficiency, estimate the risk of addressing the deficiency or not, identify potential sources of revenue and champion the project to a Defence Capability Board (DCB).[23] The CBP process is a top down approach directed and managed by the Chief of Force Development (CFD). CFD will assign the initial staff to examine a deficiency and then the CFD follows the project throughout the remaining stages as either Chairperson or member of the various review boards to ensure the project addresses the initial identified deficiency.[24]

There is a second method for a deficiency to become recognized, which is through a bottom-up approach. A Statement of Capability Deficiency (SOCD) can be drafted by any organization and is then sponsored by a DND departmental organization (normally at the L1 level) to begin the Identification phase. Once approved by DCB, the goal is then to have the project included in the Investment Plan (IP).[25] The IP follows Treasury Board (TB) policy to ensure that sound governance and fiscally responsible methods are used by governmental departments. The plan is submitted for review to the TB every three years and is a detailed breakdown of all of the department's investment decisions including projects.[26] For a project to be provided with funding for the Definition phase it must make it into the IP.[27]

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[22] Canada. Department of National Defence. *Project Approval Directive.* (Ottawa: Canada, 2012), B.7.3.7
[23] Perry, *2015 Status Report on Major Defence Equipment Procurements*, 2.
[24] Canada. Department of National Defence. *Project Approval Directive.* A.X.8 .
[25] Ibid., PMG 1-17, 4.
[26] Canada. Treasury Board Secretariat. *Policy on Investment Planning – Assets and acquired Services*, (Ottawa: Canada 2018), 6.1.4. Last accessed on April 30, 2018 at https://www.tbp-sct.gc.ca/pol/doc-e
[27] Perry, *2015 Status Report on Major Defence Equipment Procurements*, 8.

In order for this to occur, all project administration must pass through 4 steps directed by the Vice-Chief of Defence Staff (VCDS). First, the project must make it past the DCB who will ensure that it will provide a solution to a defined deficiency or a recognized requirement of the CAF. Then the project staff will identify the High Level Mandatory Requirements (HLMR) for the project which will state in broad terms what the end state of the project will provide. The identification of HLMRs is a crucial step as all future elements of the project will have to be tied through project hierarchy to the HLMR and therefore to the capability deficiency.[28] It is important to remember that this work is based on the initial research done by whoever is assigned to the area of responsibility and not necessarily by project experts. The end result for the project staff is for the project to be approved by the DCB and then moved into phase two. Once senior management has approved the project's Identification phase, the last step can begin. [29] During this step, the Chief of Programme (CProg) organization will examine the project's estimated budget against the Capital Investment Program Plan Review (CIPPR) to determine, based on CBP prioritization of the project and available funds, if and when the new project may be included in the IP.[30] If the project is approved by DCB and CProg and is endorsed by CFD, then it will be added to CIPPR.

Once the project has been added to CIPPR, it becomes part of the Investment Universe (IU), but is not yet part of the Investment Plan. It must first make it past the Director Defence Force Planning (DDFP) who will assess whether or not the project is affordable and achievable. If it is determined that the IP cannot afford the project's inclusion, then the project will return to

[28] Canada. Department of National Defence. *Project Approval Directive*, B.7.5.2 .
[29] Ibid., A.1.1.2 .
[30] Ibid., PMG 1-17, annex A, 1.

the start for re-evaluation. At this point it may be re-scoped, resubmitted in a different year or cancelled outright.[31]

The DDFP will then make a recommendation to the DCB if the project is of suitable value, need and affordability. If the project is approved to move forward, then a funding source needs to be found. If it cannot be funded in the next two years, then the project is placed on hold. The purpose of this delay is to allow for projects to be identified but held off until suitable funding is available in the IP, which can partially explain the length of many projects. [32] The process requires one or two years to complete the Identification phase and then potentially another one or two more years for funding. Based on typical timelines, this is followed by two years in Options Analysis (OA) and two more in Definition, assuming there are no other delays. [33] That means a typical project could be in the works for eight years before Implementation begins, and in that time, staff will be changed over, priorities will change and many projects will be overtaken by technology or changing requirements.

Of note, at this point in the PAP, the project does not yet exist and therefore has no resources assigned to it including a Project Director (PD) or Project Manager (PM). Instead, the activities in Identification are managed within DND by staff on an ad hoc availability basis.[34] This management also includes the analysis of the "People, Research & Development, Infrastructure, Concepts of Operation and Doctrine, Information Technology, Equipment, Support and Sustainment" (PRICIE) aspects of the initiative. All of the project administration accomplished by the project staff requires a significant amount of time, knowledge, and

[31] Canada. Department of National Defence. *Project Approval Directive.* A.1.1.14.
[32] Ibid., A.1.1.15.
[33] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 1, 10.
[34] Ibid., 48.

experience to complete and will inform later essential administration such as Risk Analysis and the Project Charter. [35] The staffs are also responsible for generating a Project Brief that will be used to inform senior level review boards and directorates of the projects existence, its estimated cost envelope and its risks and rewards.[36]

Before the project can advance into the Options Analysis phase of the PAP, project administration such as the Strategy Context Document which contains the HLMR's for the project and the Business Case Analysis are reviewed by the Independent Review Panel for Defence Acquisitions (IRPDA). The IRPDA acts as an "independent third party challenge function" to advise the MND and the Deputy Minister (DM) on investment decisions made by the department. [37] The review panel provides feedback and advice to the project staff and ensures that issues with project administration that the panel identified are addressed. The goal of the panel's engagement with the project is to "ensure that the requirements in the documentation going to the MND or TB for approval are clearly and appropriately stated".[38] The IRPDA will continue to review and engage with the project staff throughout OA to ensure that it continues to address the issues found by the panel. Since the project may have been waiting for a while to achieve this milestone, it will have to be reintroduced to the key stakeholders in the process. The project administration and the project brief will need to be updated and redistributed to the senior management. This update will include a formal brief of the project to the Programme Management Board (PMB) where the PRICIE implications, the appropriateness and suitability of

[35] Canada. Department of National Defence. *Project Approval Directive ,*A.1.1.10.
[36] Ibid., A.1.1.10.
[37] Perry, *2015 Status Report on Major Defence Equipment Procurements*, 10.
[38] Canada. Department of National Defence. *Terms of Reference for the Independent Review Panel for Defence Acquisition.* (Ottawa: Canada 2016) Last accessed on May 1 2018 at www.forces.gc.ca/en/business-how-to-do/irpda-terms-of-reference.page

the project, cost estimations, and the decision matrix to be used in OA will be discussed.[39] Once approved, the project may receive some measure of funding for the OA.

In OA, the details of the project will begin to take shape. First, official project staff will be assigned to the project, starting with a Project Director (PD). The PD will be responsible, with guidance provided by the sponsor, to provide analysis and information on the selected options that were explored. This administration includes the development of the Business Case, the Project Charter, the Risk Management Plan and eventually a draft version of the Statement of Requirement (SOR)[40] and the Project Complexity and Risk Assessment (PCRA)[41]. The PCRA became a critical document in 2009 when a new TB policy came into effect. It changed how the government manages projects from being focused on the cost of the project to one based on the level of risk assumed by it. If projects are assessed as having a lower risk level, then they can be approved by the MND. The approval level change was designed as a time saving measure as the bulk of DND projects fall into this category.[42]

The goal of the ID and OA phase are to gather and present PMB with the right information to be able to choose which direction to take when the project moves into definition. A Senior Review Board (SRB) consisting of the Project Sponsor, Project Leader, representatives

[39] Canada. Department of National Defence. *Project Approval Directive,* A.1.1.22.

[40] The Statement of Requirement (SOR) is a formal document prepared by the project that links the High Level Mandatory Requirements of the project back to the initiating authority of the Capability Based Planning Process. The SOR is reviewed and endorsed by CFD (A.2.1.7). The SOR is drafted in the early phases of project development and the final version of the SOR is completed during project definition. It is the PD's responsibility to maintain the SOR and all changes are required to be approved at the SRB and DCB approval may be required if the changes are extensive. In cases where the scope of a project changes to affect budget or scheduling, the SOR may be required to be submitted to the approving authority of MND or TB. Canada. Department of National Defence. *Project Approval Directive*, A.2.1.7 and B.7.3.8.

[41] Project Complexity and Risk Assessment (PCRA): This process will determine the level that project approval will reside. For scores of 3 or 4, approval remains at TB and for scores of 1 or 2, approval will reside with the MND. Once a submission is made to TB with a full risk analysis and mitigation plan, it will take on average four months for TB to approve. Canada. Department of National Defence. *Project Approval Directive*, A.2.1.5.

[42] Perry, *2015 Status Report on Major Defence Equipment Procurements,* 9.

of the applicable elemental commands and other key stakeholders will be convened and will continue to meet annually. This meeting will brief the key stakeholders on the project status, address any concerns, develop mitigations for impending risks and approve changes to the Project Charter or other administration.[43] At some point in the OA, the IRPDA will again review the project and make its own recommendations for changes to project documentation and the Options Analysis Report and Recommendation. It will be this last document that will inform the Definition stage and the option that the SRB has selected.[44]

For most projects, the work of the definition phase begins as soon as the project is conceived and continues into OA. The Definition phase is mostly concerned with establishing a rough order of magnitude estimate of substantive cost of the project and its high level mandatory requirements. All of the above details are captured in the Project Management Plan that the PD will draft during OA.[45] The Definition Phase of a project "marks the transition from determining what should be done to mitigate a deficiency, to determining how the preferred option will be implemented".[46] The SRB chose an option in OA and now a full project team will be assembled to begin the refinement of the chosen option. The objective of the phase is to conduct a deep dive into the project administration, in particular the Statement of Requirement. A deep dive is essential to ensure that the project contracts that will be bid on by companies have a comprehensive articulated scope and design for the project which permits the government and department to move the project into Implementation with a full understanding of what will be created.[47]

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[43] Canada. Department of National Defence. *Project Approval Directive*, A.3.9.4.
[44] Ibid., A.2.4.1.
[45] Ibid., A.2.5.2.
[46] Ibid., A.3.1.1
[47] Canada. Department of National Defence. *Project Approval Directive*, A.3.1.3

In order to fund this phase and the remainder of the project, a file is required to be submitted to the TB. If the risk assessment completed in OA maintains that the projects complexity risk is below a threshold level and the total dollar cost of the project is below $50 million, then the file can be approved by the MND. If the value of the project exceeds $50 million, then the PD will also have to brief the Investment Resource Management Committee (IRMC) chaired by the DM who is required to approve the necessary changes to the IP.[48] A new methodology for this process has been approved and has begun to take effect in the fall of 2017, which will be discussed further under the PAPR section below.[49]

Projects then move into the Implementation Phase of work having all of the required authorities to enter into contracts with companies and to expend resources on the project. The project is led at this point by the Project Manager who will focus their expanded team on the technical design of the end project and manage the cost, scope and schedule. The PD will continue to act as a liaison between the stakeholders and the project team and engage both in the required project administration such as the annual SRB.[50] Performance management, changes in scope or complexity (risk level) of the project and any major delays or over-runs will all be monitored and reported monthly during a project review meeting and on the CID.[51] Any deviances or issues will be reported either in person or through a secretarial submission to the SRB and if required, to the PMB. [52]

[48] Perry, *2015 Status Report on Major Defence Equipment Procurements,* 8.
[49] Canada. Department of National Defence. *Project Approval Directive*, A.3.9.5.
[50] Canada. Department of National Defence. *Project Approval Directive*, A.4.1.1
[51] Ibid., A.4.1.2
[52] Ibid., A.4.2.1

Lastly, a project enters close-out phase which normally lasts between three to five months. There are project close-outs that last much longer as staffs continue to provide support to the project before handing over to the life cycle managers. Regardless, all projects must end either because they have "been completed, the project has been cancelled or its funding has been withdrawn."[53]

The purpose of this section was to provide an overview of the project process and the extensive administration required to ensure that it is properly managed, transparent and accountable. It is recognized as an overly administrative process which is sighted as one of the major causes of procurement delay. Improvements to the system have been attempted since 2002 but many have resulted in more complexity to the process. As new administration and oversight boards were added to streamline or bring transparency to the system, few have resulted in a reduction in process steps or required administration. [54] Furthermore, the frequent changes in leadership at DND and the Ministry due to elections and the natural career progression of the service, has hampered both projects and attempts to modernize the process.[55]

PAP improvement initiatives since 2006 have mostly focused on establishing new committees or boards to ensure a specific aspect of the cycle was completed efficiently or transparently. These attempts at improving the PAP, such as the Policy on Investment Planning create new administration for the projects that are expected to streamline the process. For example, the Policy on Investment Planning, was expected to reduce the reporting of the overall IP for DND to every three years. Yet it required the creation of the Investment Plan Change Management Process which required an Investment Plan Change Proposal and Investment Plan

[53] Canada. Department of National Defence. *Project Approval Directive*, A.4.2.3
[54] Perry, *2015 Status Report on Major Defence Equipment Procurements,* 7.
[55] Ibid., 7.

Change Impact Analysis to allow a PD to add or change aspects of new or existing projects.[56] These systems require reports to be submitted to CProg who will conduct an analysis based on availability and capacity. The request is then submitted to PMB which can cause project delays if the submission is found lacking in information or if PMB or CProg schedule requires a delay. Unfortunately, the policy initiative did not provide for an increase in capacity to any of the administering organizations and no older steps in the process were removed. [57] This process change is an example of how the process has grown over the decades.

Through each step in the process, project staff, usually the PD, develop and prepare the project concept administration with little to no training. PM's come from a pool of trained individuals but is only assigned to the project after funding has been approved in the Definition Phase. The PD's receive the five day mandatory Project Approval Guide Course which gives an overview of the process though most of the remainder of the learning is experiential.[58] Each new review and overhaul of the system has added steps to the system, while few have removed any. Despite the increase in the processes administration and oversight, the capacity of personnel and training has not increased.[59] The PAPR is the latest attempt to streamline the process that does not add any steps to the process but reduces some of the administrative reporting required in certain cases.

From the above review, three main conclusions can be drawn. First, the process itself is highly complex and requires a significant understanding of how DND operates and experience with the system in order to effectively navigate the process. The administration,

[56] Perry, *2015 Status Report on Major Defence Equipment Procurements,* 8.
[57] Ibid., 8.
[58] Canada. Department of National Defence. *Project Approval Directive*.
[59] Perry, *2015 Status Report on Major Defence Equipment Procurements,* 7.

boards, panels and documentation required for DND and TB have their own and distinct language and format and other than the Project Approval Process Course, there is no formal training for staff new to NDHQ. Second, the process relies too heavily on a small pool of boards chaired by senior personnel. PMB, DCB, and the annual required SRB's all have the same representatives either as chairs or required members. Finding windows in the schedules of all of the senior personnel who need to be in attendance is difficult and not all "acting" representatives have the knowledge or authority to approve issues brought before the boards. Lastly, all of the administration generated as part of the process is completed manually by the PDs or PMs and must be moved through the process by hand for original signatures. Even routine administration can take many weeks to be processed, signed and returned.[60] Few of the attempts to manage this have been success but the most recent initiative, the PAPR, has the potential to succeed. The next section provides an overview of this initiative which is specifically designed to reduce the administration and complexity of the PAP.

Project Approval Process Renewal (PAPR)

In order to address the issues of the PAP identified by Alan Williams in 2006 and to increase the project management capacity of the department, a review of the system was carried out in 2012.[61] The PAPR improvements have just begun to be implemented in 2017. PAPR was initiated with the "goal to reduce a project's cycle time by at least 50% while doubling the throughput and ensuring the processes are both TB compliant, and supported by an effective risk management framework.'[62] The PAPR objective was a significant goal as it equated to a fourfold

[60] This conclusion is based both from interpretation of the sources and from personnel experience of the author who directed projects for CFD from 2015 to 2017.

[61] Williams, Reinventing Canadian Defence Procurement.

[62] David, Perry, *2015 Status Report on Major Defence Equipment Procurements*, 14.

increase in the number of projects started and completed by the department. It did not include any new "PY's", the department term for full time employees, as prior to SSE, no new personnel could be envisioned. The PAPR team developed a plan that would begin with pilot programs in 2014 and expected to implement a new process in 2017.[63] The first step is for the IRMC to begin to group projects by portfolio in the OA phase and, once approved, the entire portfolio will enter into the IP, saving time and administration for projects and boards. Then the PAPR first initiative, the CIPPR, will prioritize project portfolios entering the IP. [64]

Since the goal of PAPR was to increase the number of projects being processed and reduce the time required to do so, the TB and DND agreed to shift low risk projects to the MND for approval. PAPR then negotiated for PMB to be the approving authority for all projects between 5 and 50 million dollars substantive cost. For these projects that fall under the authority for approval of the MND (less than $50 million substantive cost and PCRA of less than two, as of 2014), the PAPR initiative has had a positive impact.[65] Specifically, in the legacy system, after being approved by the SRB, PMB and IRMC and any other boards that needed to stamp their approval on the project, projects had to seek ministry approval at the beginning of the Definition phase. The project would then rerun the gauntlet of boards before seeking ministerial approval to enter Implementation phase.[66]

Phase One of the initiative included the development of CIPPR and aimed to reduce the redundancy of the PAP by removing the requirement for the second ministerial approval if the

[63] Canada. Department of National Defence. *Project Approval Process Renewal Approval.* National Defence Headquarters: file 1273924 October 28, 2016.
[64] Canada. Department of National Defence. *Project Approval Process Renewal MND Conditional Approval Process*. National Defence Headquarters: file 7000-2 (DPAP) May 26, 2017, 1.
[65] Ibid., 3.
[66] Canada. Department of National Defence. *Project Approval Directive*, A.X.7.

projects budget is within +/- 20% of its original budget estimate. For projects whose projected cost is within +/- 10% of the original OA cost estimate, than PMB may approve the project for implementation after a secretarial submission. If it is within +/- 20%, it must present itself to the PMB for explanation of the discrepancy and PMB will decide whether to move forward with the project, revise its scope or cancel it. If it is more than +/- 20%, then a new file must be prepared.[67] This revision to the process itself would save project time by reducing the administrative requirements for the staff as the PAPR also recommends means for the providing better training on the costing process to project staff and the establishment of costing expertise within the department to assist the process. These measures have just taken effect, so any concrete throughput improvement is yet to be seen.[68]

Phase Two of the process is still being investigated but will renegotiate how expenditure authority is managed between DND and TB. The specifics of Phase Two have not yet been established as the project is accumulating data from the impact of Phase One on specific test project portfolios. Once data has been collected and analyzed to discover if the expected time and administrative saving were realized, the project will move forward. [69]

This chapter has so far provided an overview of how projects for services, systems and new equipment are begun and processed within the DND. The process described in this chapter represents 1400 steps from beginning to end and takes an average of 14-16 years for an average project. While the current PAP is not a perfect system, it does create a very transparent and accountable process, although not a rapid one. It can be streamlined when required and it is

[67] Canada. Department of National Defence. *Project Approval Process Renewal MND Conditional Approval Process*, 3.

[68] Ibid., 4.

[69] Canada. Department of National Defence. *Project Approval Renewal Summary*. Prepared for VCDS by Robert Ferguson, 3 August, 2017.

capable of responding quickly when the right prioritization is placed on a project however, that usually has its own costs involved.[70] The PAPR initiative is still new and developing but promises to help streamline the process while remaining TB compliant. With the increased budget and requirements of SSE which are immediate, there is too little time for any drastic overhaul of the process. Rather initiatives like PAPR and those offered by this paper, represent adaptive and agile means to morph the process into a more responsive and rapid system. The 2015 KPMG report elaborates further on issues with the system that can be affected quickly to achieve rapid results.

KPMG Report

The previous sections discussed the current state of the PAP and DND today and measures that have been implemented to improve or streamline the system. Specifically the 2012 PAPR project has managed to eliminate some redundant aspects of the process to ensure that decision-making on projects remains at a level appropriate to where the most accurate information resides. The reduction in a redundancy has the potential to streamline the approval process for projects moving from Definition into the Implementation phase by reducing the administrative requirements to revisit either TB or MND. As has been shown, by the time a project reaches Definition, much of the administrative and effective costing has already been completed and many years have passed since the original requirement for the project was established. In the modern technological environment, eight years will have seen technologies, trends and requirements arise, peak and fade meaning that projects will need to be reevaluated, redesigned or re-scoped.

[70] Williams, *Reinventing Canadian Defence Procurement*, 2.

The latest report on project management at DND commissioned by the MND was compiled by KPMG in 2015 and initiated to examine the PAPR Charter in order to determine the feasibility and applicability of the initiative. The company had reviewed the original PAPR Charter in 2013 and found both Charters contained good recommendations but that few of the initiative's original recommendations had been carried out.[71] The report was chosen for inclusion in this paper as it is the most recent comprehensive independent review of the process and its scope is such that the recommendations apply to both major capital projects such as the National Shipbuilding Program as well as the low-risk, smaller budget projects that are the focus of this paper.[72] The goal of this section is to examine the report's findings in relation to how they impact the ID and OA phases of the PAP.[73]

There are numerous issues that arose from the report and the most applicable to this paper being that there was a "one-size-fits-all" process for all projects. Regardless of scope, budget, complexity or capability requirement, all projects had to go through roughly the same process. The levels of administration and oversight are appropriate for highly complex projects with hundreds of millions or even billion plus dollar budgets. Public scrutiny and the political and economic considerations for such projects warrant a high degree of transparency and oversight. This is not to suggest that less expensive or complex projects don't require oversight but rather a different type.[74]

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[71] KPMG. *Defence Renewal Change Management Services: Project Approval Process Renewal 2016*, Vol 1, 3.

[72] The KPMG report was the second report delivered by the accounting firm. This first was in 2010 and provided almost the same recommendations and conclusions to DND. One of the key differences in the two reports was the second report from 2015 noted that few of the recommendations from the first report had been implemented. Therefore, the second report is the only one chosen for inclusion in this paper.

[73] Ibid.

[74] KPMG. Defence Renewal Change Management Services: Project Approval Process Renewal 2016, Vol 1, ii.

There were other important issues with the process that were discussed in the report and directly relevant to this analysis. Specifically, KPMG found that DND lacked "a business like culture focusing on performance and outcomes with respect to on-time delivery of projects." [75] The size and complexity of the process, which at the time of the report included 1,436 projects in various phases, meant those members of the numerous boards, committees and working groups, could not possibly remain current on all project particulars. The report found that these factors resulted in delays to projects which were not tracked nor were personnel aware of the cost associated with the delays. The focus remained on the process over the performance of the project management team.[76] This lack of business-minded culture also led to unrealistic costing estimates to be pegged to projects despite the fact that the estimates were made in the early stages of the project, which could have been many years prior.[77] Projects were also deemed to be in difficulty when new cost estimates were made that were much higher than originally planned for. This assessment frequently required projects to be restarted or further delayed while more planning was conducted. The root cause of this delay is a tendency to avoid risk rather than acknowledge the core issues which frequently leaves the project team holding responsibility for the poor estimates, though they may be the second or third team to manage that project. [78]

Next, the report found that the process itself was entirely too complicated for personnel to manage effectively. This finding is somewhat indicated in the first section that described the process in its broadest context. The PAP is a myriad of boards and oversight committees, administration and procedures each requiring specific stakeholder buy-in which resulted in the

[75] KPMG. Defence Renewal Change Management Services: Project Approval Process Renewal 2016, Vol 1, 8.
[76] Ibid., 8.
[77] Ibid., 41.
[78] Ibid., 8.

current 1 400 step process, regardless of the size or scope of the project.[79] Furthermore, there is no single entity, person or department solely responsible for a project from inception to close out. All projects require coordination between the CAF, DND, TB and PWGSC as well as internal coordination and oversight between elemental command staffs. This coordination results in an "organizational design" with "numerous handoffs, silos and other inefficiencies that lead to lengthy project cycle times."[80]

Lastly, of significance to this paper, the report found that all of these processes accumulated substantial quantities of information and data that was poorly managed. Much of the project administration that is required still remains paper-driven and requires manual signatures. Just drafting, submitting and tracking this administration requires valuable time that is not spent on other areas of the project.[81] There is also a lack of technologically-driven information management across the process as the main database for projects, the Capabilities Investment Database (CID) is an older enterprise system. Project staffs are responsible to keep all project documentation updated and current on the system, however it is ill-suited for the task.[82] It is a manually manipulated system that houses scanned or uploaded documents, meaning that it is not interactive or even contextually searchable. The report found that an investment in technology to assist in the automated planning of projects would greatly benefit the process. [83]

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[79] KPMG. Defence Renewal Change Management Services: Project Approval Process Renewal 2016, Vol 1, 8.

[80] Ibid., 22.

[81] KPMG. Defence Renewal Change Management Services: Project Approval Process Renewal 2016, Vol 1, 55.

[82] Ibid., 9.

[83] Canada. Department of National Defence. *Capability Investment Database*.(Ottawa: Canada 2014). Last accessed on March 18, 2018 at https://cid.bic.forces.mil.ca/CID/intro_e.asp

This paper focused on the specific finding of the KMPG report that discussed the lack of a business-minded culture at DND, the complexity of the PAP, the paper-driven, manual organizational nature of the PAP and the lack technological modernization. These four areas are of interest to this analysis as addressing them will have a significant and positive impact on the Identification and Options Analysis phases of the PAP. The "one-size-fits-all" methodology of the process is one area that can be improved upon and in many respects already has been, although for different reasons. Projects are now separated into different categories for approval based on their PCRA scores and further divided by cost envelopes. The PAPR phase one also used those categories to streamline one facet of the process that impacts Definition and Implementation.[84] Therefore, projects that have smaller budgets and represent less risk overall to the forces could be permitted to operate under their own process that allows for a more agile and responsive approach to projects while still respecting the TB need for transparency and accountability.

This same separation can allow for a simpler and more manageable process that reduces the steps required to meet the needs of the oversight committees. In fact, a two or more tiered system would allow for greater depth of knowledge to be retained by senior approving authorities. If lower risk projects were managed by a lower level of PMB, SRB, IRMC and other governance boards, there would be fewer projects moving through the bottlenecks. A benefit of this separate level is that it would allow for senior reviewers to gain experience and training by managing the risks of the lower tiered projects and allow the boards more time to properly oversee the projects themselves.

[84] Canada. Department of National Defence. *Project Approval Process Renewal MND Conditional Approval Process,* 3.

Lastly, the department needs to modernize its training and data management. The current system is highly labour intensive and the manual requirements ensure that it will remain out of date.[85] The adoption of a new data management methodology will free up resources and capacity for people to focus on innovation, management and learning. This chapter has laid the groundwork for the DND PAP and the current state of development and improvements to the system. The following chapter will examine how industry manages the same challenges that face DND but attempt to do so with a much more compressed timeline.

[85] KPMG, Defence Renewal Change Management Services: Project Approval Process Renewal 2016, Vol 1, 55.

CHAPTER TWO: INNOVATION IN INDUSTRY

Corporate Models

This chapter will examine modern innovation definitions and models to describe why each one could be an essential tool for the Department to master and a key strategy to remain effective and relevant today. It will first look at innovation as a concept that can benefit the CAF and an initiative in which we are not alone as demonstrated through an examination of innovation development in the United Kingdom. It will then examine three innovation methodologies used by modern industry leaders. These examples are not the only methods in use today but were chosen to represent three themes of change that can be woven into the department's process to streamline the PAP and remain TB compliant.

The three themes discussed below require a procedural change to how the department innovates, a cultural change and a structural change to the DND. The procedural change examines the theory of Design Thinking that fundamentally changes how innovation is managed from start to finish. The second theme will examine innovation from three models that require a cultural change within the department. Lastly, a model will be examined that will require a structural change to how DND manages project innovation. These models will first be defined, then examined for how they could work within the DND framework, and finally evaluated as to their strengths and weaknesses. The purpose of this chapter is to demonstrate the potential of new innovations methodologies that could be adapted by the department rather than to suggest a specific means for the Department.

Why Innovate

Innovation is most frequently associated with corporations who are looking to produce a new product, enhance an existing product or service to reach new consumers, or improve upon

how consumers interact with a product or service. While there are limitless forms that innovation can take, it is generally assumed to be a cycle consisting of both episodic periods of innovation and ongoing or constant periods of innovation. [86] The episodic period begins at the "fuzzy front end" where ideas, problems and solutions meet and are examined through a systematic process.[87] The episodic period is followed by an ongoing process of elaboration and experimentation to test, improve and learn. Failures and false starts can occur during development but in an innovative culture, these are seen as learning opportunities. Finally, a desired output is created, prototyped or recommended depending on the nature of the innovation. In industry, this is usually a new or better product or service. Once delivered, the cycle begins anew with new insights developed from the experimentation phase.[88]

For the concept of Defence, it is less about a consumer of a product or service but rather the end-user. Innovation for Defence is therefore best defined as a "new approach that is applied in fundamentally different ways to create value for the organization and other stakeholders. Thus innovation is directly tied to value creation."[89] It is this value creation that is of interest as it is less about monetary or competitive value between companies and more about the delivery of services, technology and equipment that will allow the Canadian Armed Forces to deliver an effect.

That effect allows Canada and her allies to maintain the critical technological overmatch that is the keystone advantage that the western allies have over other forces. To define what

[86] Peter Skarzynski and David Crosswhite, *Innovator's Field Guide*, (California: John Wiley and Sons Inc., 2014), 75.
[87] Ibid.
[88] Skarzynski and Crosswhite, *Innovator's Field Guide*, 141.
[89] Sang M. Lee, David L. Olson and Silvana Trimi, *Co-innovation: Convergenomics, Collaboration, and Co-creation for Organizational Values*, (Nebraska: Emerald Publishing Limited, 2012), 818.

technological overmatch means, it must first be determined what the current or future military task will be. Then the capabilities required to achieve that task or set of tasks will have to be defined.[90] DND utilizes a systematic capability-based planning technique to ascertain or interpolate what these future tasks (missions) and capabilities may be.[91] Once compared with existing and in-development capabilities of the armed forces, capability gaps or overmatch can be determined. If the capability possessed is less than needed, there exists a gap. If the capability exceeds requirement, there will be overmatch. The critical issue for DND is that as technology and innovation changes, the ability of the forces to identify gaps exists but the system of identifying and procuring technology to provide overmatch is too slow and cumbersome. By the time the system is deployed, entirely new capability gaps exist.[92] In order to decrease the time from identification of a gap to the delivery of a technology to provide overmatch, a more streamlined and flexible approach is required to project management.

The inability to quickly adapt and address capability gaps exists in many industries and governments around the world. The RAND Corporation, a non-profit and non-affiliated company, was engaged to examine this issue in the United Kingdom's Ministry of Defence (MOD) in 2015. RAND identified means by which the government, industry and experts could work together to bring new ideas to reality quicker by "leveraging its resources and working differently with a range of partners".[93] The report submitted by the RAND Corporation identified

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[90] Michael F. Cochrane, *Capability Disillusionment*, (Virginia: Defence Acquisition University, July-August 2011), 24.

[91] Canada. Department of National Defence. *Capability Based Planning Handbook,* Lasted accessed on 5 February, 2018, at http://cfd.mil.ca/site217/Resources/documents/Welcome%20page/Annex%20B_DG%20CSI%20Aide%20Memoire%20-%20CBP%20-%2018%20May%2012.pdf

[92] Cochrane, *Capability Disillusionment*, 24

[93] Freeman, et al, *Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology*, 2.

two types of innovation. The first is radical innovation which involves the introduction of "completely new products, services or processes" and the second being incremental innovation, which involves the gradual improvement of existing products or services, quality, or effectiveness.[94] The study then outlined eight factors that worked in conjunction to enable innovation.

The first factor is the drivers or impetus for the innovation process to be required. These could be social drivers such as an aging population and its impact on recruitment or political drivers such as the emergence of a new threat or adversary. Input resources are the factors that are required to exploit and manage innovation in response to the drivers. These resources are knowledge assets, talent, and capital. Knowledge feeds the innovation cycle, talent is the expertise that "refine, catalyze, apply, share and market" the innovation, and the process is funded by the last input resource of capital.[95]

The next sets of factors are the enabling resources that prevent innovation from operating in a silo, separated from other actors. These include infrastructure such as research and development organizations, support industries and educational institutions. Combined with networks and connections of people, these enabling resources encourage collaboration and mutually beneficial interactions and encourage the exchange of information. Even within the strict security confines of the DND, collaboration with outside industry experts can be managed as this interaction across fields and expertise lies at the heart of an innovation cell. [96]

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[94] Freeman, et al, *Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology,* 9.

[95] Ibid., 13-15.

[96] Freeman, et al, *Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology,* 17.

The framework that links the resources and the drivers together is the culture of an organization and its structure. Culture represents "the pattern or organizational behavior" and is ideally one that is open, trusting and encouraging to experimentation.[97] This openness is not an accurate description of most government military organizations but for an innovation cell experimenting with new ideas, it could be. Structure refers to the work environment within an organization and how it interacts with outside organizations to foster knowledge sharing, innovation and collaboration. Culture and structure work together to form an organization that is highly innovative. However, the organization also requires a philosophy that is open and "seeks to learn from failure rather than avoid it."[98] The RAND study found that the MOD, like most government organizations that are responsible to public opinion, are highly constrained by bureaucratic structures and generally risk adverse. An innovative type of organizational structure is difficult to fully encourage within the constraints of government.[99]

This study resulted in recommendations to the MOD which would be necessary to foster an innovative culture within the department and would require collaboration with industry and educational institutions. The goal was to enable an organization that could harness new ideas and products in a timely manner to provide the capabilities the armed forces need in the modern security environment. They recommended the establishment of an open innovation culture within the department, including adopting structures that reduce the bureaucratic burden on initiatives and make the process simpler.[100] Another recommendation was to improve accessibility to the innovation process for external actors to generate partnerships that go beyond a simple

[97] Freeman, et al, Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology, 18.

[98] Ibid., 18.

[99] Freeman, et al, *Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology,* 19.

[100] Ibid., 27.

customer/supplier relationship.[101] This is an important recommendation as the current system in Canada is not designed to facilitate industry and Defence from working collaboratively until after the procurement process has stated its requirements, solicited bids and engaged contracts.[102] The current system allows the process to be fair, competitive and transparent but prevents a truly collaborative approach. By the time that contracts are finalized, the innovation is bound by preset contractual boundaries.

Lastly, the authors recommended that the MOD create spaces where innovators, inventors and industry can partner to work collaboratively.[103] This recommendation is extremely difficult within the confines of TB policy and fair competition for government contracts but is made more accessible if partnered with university institutions. The report specifically mentioned the University of Waterloo's co-operative education program as an example of an academic institution that has partnered with industry to develop human capital in a directed and innovated space. The funding provided to the university benefits the institution, the students and the industry partners that gain new insight in the most cutting edge technological innovations.[104] Designing a methodology by which educational institutions, industry and the government can openly collaborate is beyond the scope of this paper. However, a long term goal both for innovation at DND and for CAF recruitment, a new system of industry, education and military collaboration should be sought.

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[101] Freeman, et al, *Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology,* 33.

[102] Canada. Department of National Defence. *Defence Procurement Strategy.* (Ottawa: Canada 2014). Last accessed on March 2, 2018 at https://www.tpsgc-pwgsc.gc.ca/app-acq/amd-dp/samd-dps/index-eng.html

[103] Freeman, et al, *Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology,* 40.

[104] Ibid., 70.

Currently within DND, the drivers of innovation are established through the analysis of the Capability Planning Process. This process examines the current state of the CAF and the potential threats to Canada which may arise in the future. The goal is to identify gaps in the CAF that will exist and prevent the forces from achieving either overmatch of an adversary or have the necessary capabilities to accomplish tasks set by the government.[105] If the department is unable to quickly and correctly innovate, it will be increasingly difficult to ever achieve overmatch of an adversary.

The purpose of this section was to ask why innovation was important to DND. Creating innovative end-user products and services in CAF to enable the forces to achieve adversary overmatch in a rapidly changing security environment is the reason. A system is needed that allows for the rapid identification of a "capability gap", what drivers and enablers influence that gap and what mechanisms exist to provide overmatch. The RAND Corporations study provided examples of how cultural and structural changes to a system can facilitate true open collaboration and innovation between industry, government and research to the betterment of all. At DND, this type of change will require not only procedural changes to be made to enable rapid innovation but cultural and structural changes as well. The following section will examine methods by which the department can achieve these aims in order to meet the goals of SSE, beginning with the required procedural changes.

[105] Canada. Department of National Defence. Capability Based Planning Handbook., Lasted accessed on 5 February 2018, at http://cfd.mil.ca/site217/Resources/documents/Welcome%20page/Annex%20B_DG%20CSI%20Aide%20Memoire%20-%20CBP%20-%2018%20May%2012.pdf

Type 1: Procedural Change

This is a methodology recommended to the United Kingdom's MOD, but there exists other means by which new ideas can create value for organizations. The concepts of Design Thinking have been evolving for over 50 years and have been gradually adopted by companies looking for new methodologies to stimulate innovation. While inspiration for Design Thinking is derived from the engineering, architecture and software development fields, the modern usage draws on anthropology, psychology, the arts, and business studies such as those taught at the Rothman School of Management.[106] The cross-disciplinary approach first brought the diverse perspectives and disciplines together to examine new product development in the technology industry. The application quickly expanded to other fields with different needs but similar challenges. At its core, Design Thinking is an approach to problem solving that attempts to be creative yet also systematic in its methodology and is highly collaborative across multiple fields. Due to the origin and iterative development over time, there are dozens of variations that the process has adopted each with unique means of approaching problems from a design perspective.[107]

There are two major phases of Design Thinking: identifying problems and solving problems. The ability to correctly identify the core problem is critical because without a solid understanding of the problem, solutions can end up missing the intended target.[108] This misunderstanding is akin to diagnosing and treating the symptoms of a medical problem while not entirely understanding the root cause of the issue. A patient feels mildly better at the

[106] Abbie Griffin, Michael G. Luchs and Scott K Swan, *Design Thinking*, (New Jersey: John Wiley and Sons, 2016), 3.

[107] Griffin, et al, *Design Thinking*, 8.

[108] Ibid., 2.

treatment of multiple maladies but is not relieved of the underlying cause, resulting in more symptoms. A diagnosis such as this is in the project management field is a potential problem for the projects if they fail to address the correct issue. The end-user of the project sees some of their issues made more efficient or a capability deficiency resolved, however other projects will need to be initiated to address the remainder of unresolved issues. By identifying the correct problem early and designing solutions to that problem, Design Thinking saves time in preventing multiple false starts and produces a better understanding of requirements necessary at later steps in the process.

The second phase, solving problems, is divided into a "create phase" and an "evaluate phase" whereby a concept or set of concepts are developed that attempt to provide an end-user with a solution. The create phase starts with the generation of ideas that work to solve the identified problem and are analyzed against a set of criteria. The goal is to converge on a holistic approach that can be prototyped. It is this prototype that distinguishes Design Thinking as it allows for end-user interaction, iterative improvements and better development of critical requirements.[109] In a DND context, this would inform a more accurate OA and Definition phase, leading to more rapid and less costly implementations phases.

Design Thinking theory requires a "mindset" or a set of principles that need to be included in the process. These mindsets incorporate the idea that the process is "People-centric" and fundamentally shifts the focus away from the technology and form of the end product, to a focus on the "values, experiences and needs" of the end-user.[110] The process is also designed to be cross-disciplinary and collaborative in order to open up the development process to different

[109] Griffin, et al, *Design Thinking*, 7.
[110] Ibid.,9.

perspectives often including the end-user or other experts. This collaboration also allows the process to be holistic and integrative so the designers can consider connections and interactions between multiple ideas. Flexibility and strong communication skills are essential to team members and a "willingness to test ideas, concepts, and prototypes in an effort to learn, unhindered by a fear of failure" is essential.[111] An open mindset is not one that is expected to exist already at an organization but rather is one that can be fostered, trained and encouraged anywhere.

The Design Thinking process commences with a design brief or a short document that informs the design team on the aims and objectives of the project. In a DND context, this is envisioned as the top down directive from a senior departmental joint committee that has prioritized all of the projects being considered at the DND and has provided resources to an innovation team to commence the design process. This brief presents the team with the desired end-state for the project including the end-user, the function of the product and basic expectations of management. The importance of this document is that while concept development normally reflects only 5% of the projects budget, it influences 70% of the end product.[112] In Design Thinking, getting the core problem correct is a crucial step to ending with the right problem to solve.

The next step for the team is to establish the "Personas" of the end user. This means developing a reference tool that accurately depicts the ideal user and establishes the conditions in which the user will use the product.[113] The end product could be a software application for a staff officer in a deployed headquarters or a vehicle maintainer on a base. Both have a unique set of

[111] Griffin, et al, *Design Thinking*, 10.
[112] Griffin, et al, *Design Thinking*, 7.
[113] Ibid., 28.

factors that will impact their approval of a product or service being delivered by the department. These personas are used throughout the process to speed up the development and educate the designers on the how the product may be used. During development, the personas prevent the designers from staying in their comfort zone or from designing for what they know best, themselves. During development, it is difficult to prototype and experiment with every aspect of a product but by keeping the persona of the end-user in mind, the designers can empathize and interpret what may be needed. Lastly, when communicating to others about what has been designed, the personas become a useful tool to bridge gaps between the designers understanding with those outside the project by referencing a well understood element, the end-user.[114]

At its core, Design Thinking is a creative process with the function to identify the correct problem to solve. Design Thinking is not about creating a "beautiful" product although this misconception is understandable based on the application's history. Design Thinking methodology draws its ideology from architecture and art and has been used by consumer product companies such as Apple to create innovative and aesthetically pleasing products. Aesthetics is only one aspect of the design functionality that can arise from the multi-disciplinary approach that the theory espouses. The systematic application of brainstorming and collaborative thinking tends to generate radically new ways of managing issues and developing products. Also, this methodology is completed in a very deliberate, methodical manner that ensures all steps of the creative process are captured and analyzed.[115]

[114] Griffin, et al, *Design Thinking*, 7.
[115] Kees Dorst, Frame Innovation. *Create New Thinking By Design*, (Massachusetts: Massachusetts Institute of Technology Press, 2015), 42.

It is this creative, yet documentable process that makes this methodology so attractive to the type of innovation and project management that DND uses. Design Thinking is ideally suited for problems or opportunities which are not well understood or defined at the start. The technology and applications necessary for the establishment and maintenance of human security are extremely complex and usually represent what are termed "wicked problems" or problems for which an optimal solution may not exist.[116] The level of understanding necessary to design systems, equipment or infrastructure that enables military personnel to accomplish missions is unlikely to exist in one person's mind. The necessary skills and experience required to delve into the problems the DND faces are multi-disciplinary and joint in nature. Design Thinking provides a methodology to extract and organize those ideas and initiatives to establish the core essence of a problem and potential solutions.

Design Thinking is also well suited for dealing in environments that are rapidly changing and where the end-users needs are uncertain. The iterative and incremental nature of the system allows it to adapt and incorporate new concepts, ideas and factors as they become apparent. Technology rapidly progresses during the prolonged period of project development but so does the political, social and security environments. The early stages of Design Thinking allow for incremental improvements in applications while prototyping exposes unexpected criteria which can be adapted and improved.[117] A hypothetical example of this could be the design of body armour for close protection personnel. The early design may take into consideration the stopping capability for different caliber firearms versus the thickness of material, the ability for the material to breathe and keep a wearer cooler in hot climates, and its ability to protect the sides as

[116] Griffin, et al, *Design Thinking*, 187.
[117] Griffin, et al, *Design Thinking*, 3.

well as the front of the wearer. During the development of the product, the social and political environment may consider the percentage of female close protection personnel is too low. The current design and prototype did not take into consideration the effectiveness of the body armor on different body types, in particular the female form. In this case, the end-user was not sufficiently considered and the rapidly changing environment resulted in new requirements to the design. In this case, Design Thinking's agile development structure and prototyping can be amended and the design iteratively altered.

The agility and iterative design functionality demonstrates a possible strength of the theory for DND and how an incremental approach can be potentially beneficially as it avoids placing too many resources too early into projects. Had the project moved through ID, OA and was in the Definition or Implementation phases, then changes become much more difficult and costly to make. The current PAP provides little to no funding for the ID phase of most small projects outside of the personnel assigned to the responsible position. The elements or departments that decide to examine certain needs do so at the recommendation of a project director who has normally produced the necessary documentation themselves. Once approved to be included in the Business Plan, costing estimates and project funding will only take effect in the Definition Phase of the project.[118] By adopting a Design Thinking process, the department could finance an innovation phase to develop the initial administration and costing for the project, develop the end-user personas and create preliminary prototypes for the project. This phase permits a deep exploration of the end product but maintains lower risk for the project and expends fewer resources.

[118] Department of National Defence. *Project Approval Guide*, 31.

Despite its benefits, there are several drawbacks to consider if DND were to implement Design Thinking into the PAP. Design Thinking methodology incorporates the risk of failure into its structure. Each failure does not necessarily mean that the project is unsuccessful or needs to be concluded but rather each failure represents an opportunity to learn and improve on the next iteration. An environment where learning from failure is encouraged would require a certain degree of cultural change at DND and risk tolerance on the part of the department. A systemic change in how failures are understood and lesson derived from setbacks or mistakes would be necessary. Failures may not represent a lack of initiative or effort by the team or an individual and they may not mean that the project is in jeopardy. Rather the lessons of the failure need to be captured and disseminated as a good initial try.

Design Thinking can provide a useful framework for low-risk but high priority projects run by the department particularly where the need for the end product is immediate. It provides a methodology for a small yet diverse team of subject matter experts to quickly identify the problem set, develop potential solutions, evolve a prototype if applicable and generate system requirements quickly. This framework can then accurately and specifically inform the developer in the Definition phase to be able to bring the project rapidly into Implementation. As stated before, it is difficult to reduce timelines in the Implementation phase; however, by conducting a more informed and iterative ID and OA phase, the end product will be achieved quickly and with a product that the end-user will appreciate.

Comparatively, Design Thinking does not lend itself as well to the major capital projects that require multiple teams of experts and multiple levels of research and development. With complex “systems of systems” such as warships or combat vehicles, Design Thinking can be utilized for the sub-systems when new approaches are needed, but for the overall project a more

rigorous and comprehensive planning methodology may be required. This methodology would also benefit from an open and collaborative environment within DND which could be fostered through a cultural change in how DND innovates.

Type 2: Cultural Change

This section proposes three means of fostering a cultural change in order to facilitate better innovation practices within DND. The first technique discussed is open innovation which promotes a collaborative culture that works across streams and specialties to derive new insight from different sources in and outside of an organization. Then Frontline Innovation as instituted at Ericsson Telecom is discussed as a means to solve problems by generating ideas from any level within the company. Lastly, Continuous Product Innovation examines how companies can learn and benefit from success and failure in order to harness the power of an entire organization.

Open Innovation

Open Innovation is an approach developed by Henry Chesbrough in 2003 which was originally developed for companies collaborating with others far outside their own fields. Proctor and Gamble, for example, collaborated with Pringles and a bakery company's edible ink to print text on chips. While not ground-breaking, it demonstrates bringing new ideas to market through innovation.[119] Closed Innovation is the belief that companies require a self-reliant, controlled and systematic approach to innovation that marked the first half of the last century. Chesbrough advocated for a system that actively manages knowledge flow across organizational boundaries

[119] Henry Chesbrough, *The Future of Open Innovation.* (Research and Technology Management, January-February, 2017), 35.

to generate innovation through the access, harnessing and absorbing non-linear knowledge flows.[120]

The methodology described above is similar to the ideas presented by the RAND Corporation to the MOD: to create a culture where varying streams of experts collaborate in an innovation cell to develop new ways of looking at problems. A culture such as this is highly adaptable in a DND context as there already exists a structure for joint interaction across the elements. Working groups, joint committees and organizations such as the CFD exist to foster collaboration and multi-dimensional thinking. However, these exist within the rigid, organizational bureaucracy of the department to develop projects and resolve conflicts between sections instead of as a directed innovation tool set. As stated in the RAND report to the MOD, it is more than the meeting of personnel that makes innovation cells work; it is the structure and culture as well.[121] Open Innovation does show promise to bring new insight into an organization although there are potential issues. If an organization is unable to "invest downstream" to process, test and evaluate these ideas, then a bottleneck occurs where new ideas become overtaken by the next set of new ideas entering the system.[122]

Frontline Innovation

One company that tried to solve this problem was Ericsson Telecom. Ericsson operated a corporate culture that developed a version of Open Innovation called "Frontline Innovation". In their model, anyone, anywhere within the corporation and even from outside, can submit ideas to an innovation process. They utilize a "self-organizing, distributed-accountability, virally spread,

[120] Harry Boer, et al, *Knowledge and Continuous Innovation*, (MCB University Press: International Journal of Operations and Product Management Vol 21, no. 4.), 494.
[121] Freeman, et al, *Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology,* 27.
[122] Chesbrough, *The Future of Open Innovation*, 37.

pull-demand-driven system".[123] In other words, employees are encouraged to submit ideas to a managed web-enabled system both in a top down driven demand cycle and in a bottom-up push process. Managers who wish to generate new ideas can post to the site (demand cycle) to which employees or outside collaborators can provide insight and suggestions. Employees can conversely pose problems or innovations to the site for anyone to see (push process).[124]

These "idea boxes" are then systematically organized to ensure that idea coaches, innovation managers and employees are all engaged to bring the ideas to maturity from conception to execution. The "idea box" approach is labour intensive, but its effectiveness as a collaborative workspace is outstanding as ideas are developed by anyone in the company with the resource of time or budget. Since 2008, over 35,000 ideas have been processed through idea boxes with one in three ideas being implemented.[125] This unique corporate culture allows managers to tap into the collective ingenuity of the entire company and a vast partnership of outside companies who do business with Ericsson.

In a DND context, this is applicable from an "inside the company" perspective as a common network linking all DND employees together already exists, the Defence Wide Area Network (DWAN).[126] The Statement of Operational Deficiency process is one example of a small, bureaucratic system not entirely unlike the Ericsson model where organizations can pass issues (deficiencies) and recommendations up the chain of command.[127] Unlike Ericsson, this process is very administrative and slow, and ideas passed through this system have a high

[123] Skarzynski and Crosswhite, *Innovator's Field Guide*, 106.
[124] Ibid., 104.
[125] Ibid., 102.
[126] Department of National Defence, *Defence Wide Area Network Concept of Operations.* (Ottawa: Canada 2006,) 2.
[127] Department of National Defence. *Project approval Guide*, Annex B, 2.

potential to be lost in bureaucracy. By creating an "idea box" system for DND, the department has the ability to draw on the entire organization, from privates to admirals to generate ideas, post solutions or make recommendations. A well-managed system with dedicated box managers could provide innovative solutions across the spectrum of DND projects without having to engage a single contractor or specialist.

Continuous Product Innovation

A DND adoption of this type of process also harnesses another model of innovation, that of Continuous Product Innovation (CPI). CPI is a means of knowledge management that ensures that efforts, successes and failures to innovate in one area are widely disseminated and shared across corporate divisions. This method provides an opportunity for group learning as well allowing for a project in one phase of development to be innovated by projects in other phases. Projects that exist in early stages such as ID and OA can benefit from lessons learned and innovations made by projects in Implementation. The opposite works as well, as projects in the Implementation phase, if provided with an agile framework, can capitalize on new projects that may have the advantage of being built on newer technology or with new insight.[128] This is a difficult prospect in today's DND project management structure as contractual changes in late-stage development result in schedule or cost overruns. However, an innovative future can be imagined where Open Innovation and CPI are a more normal mode of business management.

The main strength of CPI is that it harnesses the power of an entire organization which not only brings a lot of experience, knowledge and new ideas to the process but also has the benefit of instilling a sense of ownership in those that participate. Ideas and potential solutions

[128] Boer, et al, *Knowledge and Continuous Innovation*, 491.

have the ability to rapidly move from the tactical level to the strategic in moments, avoiding the administrative burden that may keep ideas from rising to the top. The main weakness of this process is that it requires a highly engaged and committed organization that is willing to develop the system, disseminate its functionality and usefulness, and ensure that it is properly managed. In a department that is currently under manned, this could prove a difficult hurdle to overcome.

Type 3: Structural Change

The last innovation methodology to be examined requires a structural change to how innovation could be managed within DND. The Menlo Innovation Ecosystem (Menlo) was developed by General Electric as one means to disseminate Design Thinking into team-based environments, although the concept is adaptable to other innovation methodologies.[129] The concept is centered on multiday workshops, which presents the need for DND to change its structure of managing teams. In this innovation model, teams with an identified problem, idea, or need for a new innovated approach to problem solving engage in a series of workshops designed to draw out the core issues. The first stage in the process is an exploratory team meeting at a specific off-site location. The goal is for the sponsors of the project to brief the team on the nature of the problem, set the makeup of the team and determine the remainder of the workshops required. The first stage is also a chance to identify teams that may be struggling and work with Menlo specialists to develop the way forward.[130]

The second phase is known as "Bootcamp". This multiday off-site workshop develops trust and empathy in the team members in an attempt to "divert from less helpful corporate cultural norms". There is no hierarchy at Bootcamp and team members engage with mentors and

[129] Griffin, et al, *Design Thinking*, 158.
[130] Ibid., 161.

facilitators who are experts at the Menlo system. By the end of the Bootcamp, the team should have a solid understanding of the problem set and an idea of where to proceed including a rough prototype of their design and a research and development plan. They have moved from Identification and Options Analysis and are into product development in less than 5 working days.[131] The key to this phase is instilling in the team the Design Thinking mindset and an understanding of the core issues to be researched.

The team now has one to three months to implement the research phase with the new mindset and problem definition. Research specialists from Menlo continue to monitor and assist, and mentor the team to stay on track but the team is mostly on their own to collect the necessary data. Some interaction with outside agencies such as other governmental departments, industry and suppliers may also occur during this phase.[132] Interaction is where the ideas of Open Innovation can be leveraged to provide greater insight and new perspectives to rapidly prepare for Ideation Camp.

Ideation Camp is the fourth phase where the team returns to the Menlo camp for another week to deep dive into the problem and potential solutions. During this week, the team will summarize their research and brief both the sponsors of the project and the expected customers. For DND, this would be the end-user of the system to get both approval and early buy-in from the key stakeholders. Various reports are expected at the end of this week including a full expression of ideation, advanced prototyping, high level statement of requirements and reports and briefings necessary to move the project into implementation.[133]

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[131] Griffin, et al, *Design Thinking*, 163.
[132] Ibid., 166.
[133] Griffin, et al, *Design Thinking*, 167.

The team's interaction with the Menlo Park camp is at an end, but in a very short period of four or so months, they have identified a problem, researched solutions and hopefully are ready to begin the development of a product or service.[134] Creative endeavors like "Bootcamp" work well in a corporate setting where implementation of the product will lead to its development for a market. However, it may not be entirely applicable in a government setting of bureaucracy, contractual requirements and a need for transparency and fairness. The concept of a Bootcamp is highly intriguing though, as it situates expertise and resources outside the normal confines of NDHQ, thereby creating a new and stimulating innovation environment.

The concept of establishing a place, building or center where projects are fostered, nurtured and developed in concert with trained professionals could work within DND. The military is used to the concepts of team development, joint ventures and working together in close quarters to accomplish a goal. As well, since the problems and capability gaps facing DND are understood normally well in advance through efforts such as the Capability Planning Process, scheduling of prioritized projects to attend "bootcamp" can be managed.[135] Once the capability gaps are known, potential projects are identified and put into priority for the coming future, then a schedule of what teams attend the "bootcamp" and when can be made. Once there, teams have access to expertise, coaching and time to quickly and efficiently develop a plan and the required administration to move forward.

The strength of this type of initiative is the ability to harness the experience and knowledge of a broad spectrum of personnel without the distractions of normal office work.

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[134] Griffin, et al, *Design Thinking*, 167.

[135] Department of National Defence. *Capability Based Planning Handbook*.. Lasted accessed on 5 Feb, 2018, at http://cfd.mil.ca/site217/Resources/documents/Welcome%20page/Annex%20B_DG%20CSI%20Aide%20Memoire%20-%20CBP%20-%2018%20May%2012.pdf

There are no other meetings, pressures or secondary duties that are normally associated with military work. The team has a short and defined time to tackle a problem, establish goals and generate administration. Successes and failures are transparent to the project approval system and the PAP levels of management, which allows for the tracking of early projects and reprioritization of resources if necessary.

The greatest weakness of this methodology is the infrastructure and resources required to begin such an endeavor. Accessing the expertise to act as coaches and mentors, the facility to house the workshops, the infrastructure to allow prototyping and experimentation all requires a concerted and driven effort to establish. Furthermore, this style of innovation is far outside the normal process of a bureaucratic government system and requires the acceptance of a certain degree of risk, and understanding and acceptance of potential failures and false starts that may occur.[136]

Conclusion

DND requires a more effective system to foster innovation. The department needs to adopt a new innovation ideology that will enhance the PAP to deliver a more efficient and responsive procurement process in order to ensure that the forces can maintain overmatch in a transparent and responsible manner for Canada. This chapter examined three methods to innovate within the department and improve upon the time required to manage projects and the quality of the results. These methods require a change to the procedures used for innovation at DND with the model of Design Thinking as an example of how a methodology that focuses on identifying the right problem can result in a better end product. Cultural change was examined to

[136] Griffin, et al, *Design Thinking*, 170.

demonstrate how a more open and inclusive innovation procedure could encourage innovation from all levels and elements of the forces, creating greater buy-in from the end-users and a better product from the developers. Lastly, a structural change was proposed to would develop an innovation environment where subject matter experts and DND project staff could collaborate to rapidly innovate to produce more accurate and defined administration and ideation. Each of the methods offer advantages for military innovation but a hybrid solution combining different aspects of each is needed to blend into the unique environment of the DND. This is due to security concerns, TB compliance and the need to remain accountable and transparent to Canadians. The next chapter will address issues discussed in the various reports and present a potential way forward for DND to create a better, more responsive project management system and achieve the goals of SSE.

CHAPTER THREE: A NEW METHOD FOR DND

Improving a Broken System

The purpose of this chapter is to propose a means by which the Identification phase and the Options Analysis phase of the PAP can be improved to permit more projects to be processed in less time. This chapter will propose a system of new methodologies to incorporate industry innovation techniques with the unique requirements of the current DND PAP to streamline the process. The goal is reduce the time necessary for projects to be approved and move into the Definition phase of the process from years to months. This reduction in time is critical both from a technological adaptation perspective and as a cost saving measure. The goal is not to create a prescriptive directive for a new system but rather to provide a roadmap on how one could be adopted and the benefits of such a system. Greater research and institutional acceptance for the need for change would be required in order to implement a definitively new means of doing business.

Solutions to amend the PAP within a DND framework while remaining TB compliant and transparent do exist. Given the need to improve the system quickly in order to meet the goal of SSE, the three improvement themes proposed focus on procedural, cultural and structural changes with the department that can be adopted in the near term.[137] Procedurally, a hybrid system of project management is proposed that leverages ideas from Design Thinking and Frontline Innovation to increase the pace at which projects progress. This new system is envisioned to allow ideas to be presented to DND and be evaluated, processed and reach the

[137] SSE has been initiated and the budget for DND is being increase between now and 2026. Given the compressed timelines for effecting the necessary changes, in the context of this paper, "the near term" means a new system of innovation and the development of new technology proposed in this section starting immediately and operational within two years.

Definition phase in less than two years. Next, a system of joint governance is proposed for all projects that are modeled on a structure already in place at DND. This governance model requires a cultural change within the department as it proposes managing all DND projects under a joint umbrella. A structural change requiring capital investment in a new knowledge management system is proposed to modernize and standardize how project administration is managed.[138] Lastly, the section will utilize the same accounting methodology employed by KPMG in its 2015 report to DND, to demonstrate the potential cost savings possible in order to justify the reimagining of the current process.[139] It is by no means the only method by which these means could be combined to create an improved ends. It is a demonstration of how moderate and manageable changes within the procedural constraints of the government can lead to significant improvements and savings.

A DND Cultural Change Model for Innovation

The first step in modernizing the process is to formalize and streamline the project management administrative battle rhythm. Battle rhythm refers to the manner in which the various program boards and committees review projects and prioritize them. As described in Chapter One, the CIPPR program is used as the tool to find budgetary opportunities for new projects being initiated. Due to availability of the approval boards, identified future spending room, perceived need and the fiscal year cycle, projects may be required to remain in limbo for a period of three to five years or more before moving forward. This delay has a negative impact on projects as personnel familiar with the project may be posted out during that period and their

[138] This capability development was first proposed by the author in a service paper written for the Canadian Forces College's Joint Canadian Staff Program and amended for inclusion in this paper.

[139] KPMG. Defence Renewal Change Management Services: Project Approval Process Renewal 2016, Vol 2, 65.

replacement may not have the skill, experience or desire to continue on with that project.[140] As well, the technology intended for use by some projects may have advanced significantly in that time frame requiring more work to bring the project up to date.[141] Therefore a means by which projects are identified, managed, advanced and budgeted needs to be in place to permit the progress from ID to Definition and Implementation to proceed without interruption and within a given short timeframe.

The key factor in this process is time. Projects that move through ID and OA only to be shelved while waiting funding in an unspecified fiscal year are already experiencing serious risks to completion. The necessary transfer of people, the progress of technology, and the shifting priorities of senior personnel based on political or social drivers, all act upon projects. Given greater time, it is reasonable to assume the impacts will also increase. If projects are identified, prioritized and processed, it should be assumed that they are essential and therefore shouldn't be dropped simply due to elapsed time and bureaucratic inefficiency. Any that are passed over due to being shelved means that the process will need to be redone but at higher expense due to inflation, the reworking of the project and the higher costs of material. Therefore, projects that are identified and processed, should be considered as essential until some factor other that time proves them not.

The first step in this process needs to be the identification of new ideas, requirements or improvements which is currently the purview of the elemental commands and the SOCD process. While this process is heavily administrative, requiring multiple levels of approval and time, it is also very comprehensive. To draft an SOCD and have it approved, an element must

[140] KPMG. Defence Renewal Change Management Services: Project Approval Process Renewal 2016, Vol 1, 25.

[141] Perry, *2015 Status Report on Major Defence Equipment Procurements*, 2.

research the issue, write a proposal, defend the draft SOCD to a chain of command and eventually submit it.[142] A comprehensive system such as the SOCD procedure ensures that project requirements drafted in this method are well understood and backed by the appropriate department asking for the end product. It is also slow and requires an understanding and certain level of expertise in the system. Many proposals can be lost in the hierarchical chain if they do not have the support of expertise or even a single level of the chain of command. A cultural change at DND could create a second, complementary system adopting ideas from industry.

The Ericsson Idea's Center is a good example of a means to innovate that involves anyone from within a company who has such an idea. A well-managed system such as this at DND would allow any member of the CAF, military or civilian, to propose an idea or problem and provide not only end-user insight but expertise from the operators of the systems themselves. Drawing on the expertise of the entire CAF for suggestions can come in two methods. Issues important to the CAF can be posted for suggestions or issues important to the member can be posted to a portfolio of ideas. This system is responsive, organized and enables buy-in from across a broad spectrum of specialties. While it eliminates the chain of command from the process, individuals or sections that submit ideas are identified and therefore both responsible for their proposals and creditable for their ideas.

These ideas then need to be filtered, assessed and prioritized in an adaptive and responsive method. Each year, the VCDS in concert with the PMB will need to identify and prioritize the projects that will enter into Identification starting that fiscal year. This prioritization

[142] Canada. Department of National Defence. Capability Based Planning Handbook. Lasted accessed on 5 February 2018, at http://cfd.mil.ca/site217/Resources/documents/Welcome%20page/Annex%20B_DG%20CSI%20Aide%20Memoire%20-%20CBP%20-%2018%20May%2012.pdf

should be based on the needs of the CAF and the funding available as projects identified will be given a very specific and strict window in which to progress through the ID and OA phases. Specifically, all projects entering into ID under this program (less than 100 M in total budget estimation and with a PCRA level assessed as a 2 or less) will have less than two years to be approved for Definition and potentially less if the complexity and scope of the project are low.[143] That means less than a year for Identification and less than a year for all the steps required in OA including briefing the project and receiving approvals from PMB. This compressed timeline can be facilitated through the adoption of other corporate innovation strategies in the procedural and structural domains.

First, the department will need to establish appropriately staffed and funded Centers of Excellence for project specific areas. There may be groups of experts residing within the DND structure that can be accessed by project staff that is aware of them but they are not specifically organized or funded for the sole purpose of advancing projects. Projects being prioritized to enter ID will need to be immediately provided with windows in which they must access the centers in order to ensure that an appropriate amount of projects are admitted for center staff to assist. These centers will be staffed by specialists in project management, cost estimation, design and production expertise, and project administration. Project teams will be given access to these specialists to assist them in ensuring that the steps necessary to move on to the next milestone are achieved. Without this access, project staff must learn and inevitably make errors that cost time and money. With the assistance of the Centers of Excellence, common mistakes can be avoided as experienced expertise guides projects and applies the lessons learned from previous projects in an iterative manner. Combined with the elements of standardization and automation proposed for

[143] PCRA is an assessed score out of 5 based on the risk of a project either due to cost or complexity

the CID (discussed below), projects would be provided with a much stronger foundation on which to begin. This reimagined process could incorporate aspects of the Menlo Park "Bootcamps", creating spaces and time for new projects to be developed with the aid of experienced mentors. Incorporating Design Thinking procedures into the early stages of the process would also benefit the projects as the core issues of the problem can be identified and the needs of the end-user assessed which it a central tenant of Design Thinking. These practices lead to better end results and the more rapid generation of project designs.

Once in OA, projects will be able to not only move more rapidly to approval boards, but the products that they have generated such as costing estimates will be much more accurate and reasonable. This improvement will help ensure that the goals established by the PAPR initiative (that project costs remain within +/- 20% throughout Definition and Implementation) are more attainable.[144] Furthermore, the time needed in Definition to confirm or redo the efforts in OA is decreased, which then reduces the time and cost of the overall project. Projects in Definition and Implementation will also have access to the Centers of Excellence and will be able to seek guidance from the experts who are already privy to the projects. Projects that do not meet the timelines set by the process will have to return to PMB for either an extension or cancellation. It will be inevitable that some projects will be cancelled early in the process but the cancellations will reduce the amount of time and capital wasted as the projects will have only been in process for a limited time. Those projects that meet the timeline and achieve PMB and MND approval will enter Definition only two years from initial conception. They will also arrive at this milestone with greater fidelity and be able to move more rapidly into Implementation. This management scheme alone would reduce an eight year process to three and therefore, if all other

[144] Canada. Department of National Defence. *Project Approval Process Renewal Approval*.

steps remain as they are today, projects could be processed in under ten years.[145] The greatest obstacle to the adoption of an innovation system such as this is education and time. In order to be able to present and convince enough decision makers from across DND that a process such as this could work, the need would have to be identified and prioritized from the very top, the senior levels of management would have to be educated as the benefits of the system and then a trial would have to be conducted to prove the hypothesis. If the process to educate and convince senior staff of the potential benefits takes too long, the educators and newly converted senior staff will have been replaced and the process will begin anew. Still more can be accomplished through governance and the adoption of new technology.

Joint Governance

A new means to achieve governance at the department can also be achieved. The current system is comprised of multiple boards and working groups that are not responsible to an overarching system or guidance. Rather projects can be started and completed in silos completely separated from any CAF-wide and aware oversight bodies other than their own SRB and PMB. There exists the possibility that multiple elemental commands can be creating near identical projects at the same time. Efficiencies can be created by ensuring that whenever possible a joint lens is applied to every project. If the project is entirely suitable to only one element, then that

[145] Under the existing system and based on data presented in the KPMG report and David Perry's 2015 review of DND procurement, ID and OA take an average of two years each. This is followed by two years of delay as the project awaits inclusion in a fiscal year budget (on average, although sometimes more). That means six years to reach Definition at a minimum. The Definition phase then requires a reintroduction and modernization of the project to the PMB, DCB and SRB including updated cost estimates. This requires another two years on average resulting in eight years to begin Implementation. Implementation phase timelines vary depending on the scope of the project but the average length of projects at DND is 14-16 years. Therefore, as this paper recommends, a strict timelines of one year for ID and one year for OA followed by immediate funding and the commencement of Definition should be used. Assuming the other innovation ideas are implemented and provide more accurate and timely administration and design to the project, the Definition phase should be greatly reduced allowing Implementation to begin within a year. This reduces the current eight year timeline to reach Implementation to three years.

element can manage the project alone and provide transparency and visibility to all. For some capabilities though, multiple elementals could use the same system to improve cost of purchasing, interoperability and maintenance. A governance structure that guides all projects with a clear mandate, authority and accountability is required beyond the SRB as the current system of boards cannot possibly have a solid working understanding of all of the projects under it. A better system would have a tiered system of governance based on project budget and scope as discussed in section one under the KPMG Report.

There is an example of this type of system that has been developed by the Chief of Force Development that is not directly tied to the procurement process, though it does highly influence a major procurement stream. This initiative is the CAF C4ISR Strategic Vision, Goals and Objectives report issued by the Vice-Chief of Defence Staff in 2016.[146] [147] This document delineates the CAF's plan for the future to manage the "wicked" problems of developing an agile, responsive and well-equipped military force within the C4ISR systems of systems.[148] The goal of the document is to provide guidance and governance that is applicable to the entire CAF for all systems that fall under the C4ISR umbrella. It lays out a series of roadmaps for the development of tools, systems and networks that must be designed with a joint and holistic approach.[149]

This particular framework was chosen to be discussed in this paper as an example of a means to innovatively manage systems across a joint environment. The vison of the VCDS is for

[146] Canada. Department of National Defence. *CAF C4ISR Strategic Vision, Goals and Objective,* Ottawa: Canada 2016.

[147] C4ISR pertains to information networks designed to provide or utilize Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance systems. Canada. Department of National Defence. Canadian Forces Joint Publication 1.0, Ottawa: Canada 2016, 0625.

[148] Canada. Department of National Defence. *CAF C4ISR Strategic Vision, Goals and Objectives*, 4.

[149] Ibid., 9.

a single governance structure to oversee all C4ISR related initiatives to ensure that they work towards a common goal and are integrated across the elements.[150] This governance structure can be expanded to the entire CAF to ensure that joint capabilities are realized whenever possible. A further benefit is that a joint governance system will create a force that is interoperable between national elements as well as with allies and other governmental departments. Governance of this nature also brings together varied disciplines, expertise and experience in order to ensure joint capabilities are realized. This is the type of environment that the models discussed earlier envision and encourage. The governance structure developed to oversee the vast structure of C4ISR domain can be adapted to ensure all projects are managed with common goals and objectives in mind. The CBP process already provides roadmaps of where the CAF's future goals lie, and the multitude of boards that direct projects can be accountable to ensure the maps are maintained and adhered to.

A CAF wide, doctrinally managed roadmap based on the CBP process and prioritized at the elemental commands and VCDS level will provide a governance structure that can align projects into joint streams to ensure that all elements have a coordinated say in the direction projects take. The largest impediment to implementing this type of governance structure is the current elemental silo's that exist. Each element would have to accept binding governance over their projects and spheres of influence. Current, each element is responsive to TB, the MND and PMB but not necessarily to each other or any joint forum. Even the CFD C4ISR governance model provides for no expenditure or other authority that would permit CFD to bring an elemental project into compliance with the roadmap structure.

[150] Canada. Department of National Defence. *CAF C4ISR Strategic Vision, Goals and Objectives*, Annex A, 4.

A New Capability Investment Database

The last concept to be adopted by the department is technological. A new technologically driven format needs to be created that facilitates all the lines of efforts discussed above. Specifically, a format that permits Open Innovation and the generation of new ideas, facilitates a rapid ID and OA process, improves the quality of the administration generated and provides a means of governance. The PAPR initiative has begun to generate greater efficiencies in the process at the Definition and Implementation stages; however the goals set for the department of a 50% reduction in the time required to complete projects and an increase in the number of projects managed, means more needs to be done.[151] As stated, this idea was first proposed in a paper at the CFC and recommends the development of a suite of technological systems to replace the enterprise Capability Investment Database (CID) with a new system to facilitate this goal[152]. This new management tool will standardize and format project administration, provide training and resources to the PD, enable the Business Intelligence (BI) analytic tools, and act as the system of record for all projects

The first two phases of the PAP are on average the longest phases of a project and the purview of the Project Director (PD) who acts as the primary link between the project sponsor, the project staff and the end-user or client of the project. They are responsible for all project documentation such as the charter and statement of requirement and responsible for managing the approval process required for a project to move forward. In the early stages, PD's also develop costing estimates, briefings and the TB files necessary for the project's inclusion in the

[151] Department of National Defence, *Project Approval Process Renewal MND Conditional Approval Process*, 3.

[152] Matthew Mitchell, *A Recommendation To Replace The Capability Investment Database To Complement The Project Approval Process Renewal,* (Toronto: Canadian Forces College Joint Canadian Staff Program Paper, 2016)

Investment Plan (IP).[153] The average posting period for a new untrained PD is two to three years during which, that person must learn the intricacies of the department they are posted to and DND procedures as a whole. They are provided with a short introductory course to the PAP but normally learn project specific requirements such as contracting, cost estimation and drafting project documentation without formal training.[154] An improved and expanded CID will greatly benefit the early stages of the PAP as well as act as a gateway for all personnel relying on the project management field.

A main point of concern identified in the KPMG report was the absence of a complete and centralized information resource system to assist in guiding project staff. The report also identified a lack of department wide awareness of how projects are generated and managed.[155] Currently, the CID acts as the data warehouse for project administration and is the only tool used to deliver that capability. KMPG found that the CID is "ill-suited to the needs of its users" and must be to be replaced with a more comprehensive system.[156]

The first efficiency achieved by replacing the CID will be standardization. The current CID is a database of key project documents such as project charters and budget reports. Project management workflow is a manual, paper driven process requiring all administration (document approvals, updates to minutes, briefings etc.) to first be completed and approved, then scanned for inclusion in the CID. There is no standard format for these documents as they are the

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[153] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 1, 68.

[154] David Perry, *Putting the Armed Back in the Canadian Armed Forces: Improving Defence Procurement in Canada*, (CDA Institute, 2015), 12.

[155] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016*. Vol 2, 85.

[156] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016*. Vol 1, 9.

responsibility of the projects themselves. Nor is there a system to manage the timelines or incompleteness of a project's CID page. Lastly, most CID documents are scanned copies of the originals and therefore cannot be searched or "mined" for data beyond their file name.[157]

The new system would provide a full suite of preformatted templates of all required documentation and reports. The use of forms with content controls such as dropdown menus and text boxes would ensure that the information required is correctly formatted and complete. The ability to add headers, footers or customized project art or tables, ensures that while standardized in format, projects are able to uniquely differentiate themselves. This preformatted documentation would also enable the system to remain up to date and accurate at all times. Out of date or incomplete entries would be highlighted and necessary corrections would be prompted. The currency and accuracy of the system is highly critical as the CID is the system of record referenced by the CIPPR software upon which the department relies for managing its budget, resources and project prioritization. If it accesses an out of date database, the final analysis can be misleading or incorrect.[158] Standardized formatting also enables the site to be searched and analyzed by individuals or BI applications.

Designed as a dashboard, a standardized system would provide real-time data to senior level organizations which is currently lacking. Through graphing, visual mapping and customized analysis, the user-friendly system would allow staffs to identify interdependencies, bottlenecks or troubled projects and respond quickly. Currently, there are no means of looking across all projects without an exhaustive labour intensive survey of all 864 active projects on the

[157] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016*. Vol 1, 57.

[158] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 2, 78.

CID.[159] There is an understandable concern that all of this aggregate information could become a security concern as industry contractors will have access to the database through the Defense Wide Area Network (DWAN).[160] Standardization of complete forms also allows for security caveats to be placed not only on the pages themselves but on certain documents or parts therein which allows content to be analyzed while keeping the specifics secure for authorized personnel only.

Creating a single portal for information sharing is directly associated with the Continuous Innovation theories that advocate for project lessons and data to be shared across all departments.[161] A standardized website allows staff to research and draw lessons from a single source of record that is written in a common format. A standardized and searchable network then facilitates the open sharing of information and provides transparent access to the particulars of projects in order to both learn and provide input, as suggested in the concept of the "idea boxes".[162]

A view across projects with real-time accurate information also accomplishes one of the goals of the *Strong, Secure, Engaged* (SSE) Defence policy. Transparency into departmental budgeting is one of the core principles of SSE which will be vastly improved if a standardized, searchable and user-friendly platform was provided.[163]

A new CID site would also act as a repository of resources for the PD's. As PD's are posted to projects from across the force elements, they rarely have any experience or formal

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[159] Perry, *2015 Status Report on Major Defence Equipment Procurements*, 15.
[160] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 1, 56.
[161] Boer, et al, Knowledge and Continuous Innovation, 491.
[162] Skarzynski and Crosswhite, *Innovator's Field Guide*, 102.
[163] Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy*, 45.

training in project management and their experience is normally at the tactical level vice the operational and strategic. In order to maximize the time available for new PD's to learn their responsibilities, develop proficiency and contribute meaningfully to the project, they must be provided with effective resources as soon as they arrive in the position. Currently, PD's can enroll in a short PAP course that covers the basics of project management. There are other more advanced courses offered by schools such as the Telford Business School at the University of Ottawa in partnership with DND. However, these courses are not available immediately to every PD prior to taking the position.[164]

The above benefits of a replacement to the CID, standardization and education, enable the DND to capitalize on new technology to achieve effects. A third capitalization derives from the ability to analyze and view the data that exists within the system. By standardizing the means in which data is entered into the system, the data becomes "minable" by BI enabled applications. BI technologies are designed to interpret big data in new ways that manual analysis cannot. Through a user interface, the applications can manipulate the data to include reporting, data and process analysis, performance management and predictive analytics. A properly designed CID would be a mixture of structured (formatted) and unstructured (customized text entries specific to each project) data that BI tools are designed to interact with. The process would mine the data and transform it into information for more effective strategic, and operational insights, and decision-making purposes to yield real business benefits.[165] The advances in Business Intelligence and data-driven decision making products provide "off the shelf" access to these tools, inexpensively and with a user friendly design.

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[164] Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy*, 49.

[165] Lian Duan and Li Da Xu, Business Intelligence for Enterprise Systems: A Survey. (IEEE Transaction on Industrial Informatics, Vol. 8, no. 3. August, 2012), 680.

By managing the input of all project data through the standardization discussed above, a suite of tools can be used to look across projects to identify synchronicity, duplication of effort, or interdependencies between projects. Furthermore, a BI powered CID could also be linked to other enterprise DND systems such as CIPPR, SharePoint, and the Defence Resource Management Information System (DRMIS).[166] This interconnected system would enable projects and government to obtain up-to-date visibility on project status, budget expenditure, and documentation which could all be analyzed to provide transparency and insight.

This data is also applicable to improving the speed of innovation in a setting such as a Menlo Park style "Bootcamp". Concept development, design, prototyping and project administration have to be accomplished quickly and efficiently at "Bootcamps" or in the initial phase of a project[167]. Having a searchable repository of other projects and a bank of pre-formatted administration enables much of the administrative effort to be more easily accomplished leaving more time for the core creative work.

Enabling access to a better suite of technological applications will also permit project personnel and senior management boards will be more equipped to prioritize projects under development and new projects vying for resources. One of the key deficiencies noted from the analysis of Defence procurement is that the there is little high-level prioritization of projects leading to waste, duplication and inefficiencies.[168] SRB or PMB committee members who inform prioritization of projects cannot be expected to have enough knowledge on every project across the department and their interdependencies to be able to make informed decisions. The

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[166] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 2, 80.

[167] Griffin, et al, *Design Thinking*, 161.

[168] Perry, *Putting the Armed Back in the Canadian Armed Forces: Improving Defence Procurement in Canada*, 8.

CIPPR program is intended to assist in those decisions, however owing to the inaccuracy and incompleteness of its data sources; it is unable to provide proper insight. A BI enabled CID would be able to look across the entire spectrum of DND projects and provide better data-driven decision making tools to senior levels.

The last major improvement achieved by replacing the CID is enabling it to act as a data repository for all project information. While that is the CIDs current role, it lacks the intelligence to manage workflow documentation and be openly transparent to users. The current CID acts more as a library for document storage which is accessible to anyone on the DWAN.[169] A proper system of record should be capable of determining if documents or required meetings are out of date, overdue or missing entirely and be able to prompt the appropriate personnel to rectify the issue. For instance, SRB meetings for projects normally occur on an annual basis. An integrated, intelligent system will know to expect a meeting to be scheduled within 12 months of the last one. It will prompt the PD for the requirement of a meeting, assist in identifying the key personnel, distribute required pre-meeting documentation and then ensure that the minutes of the meetings and record of decisions are properly completed. All of this is organized and distributed from one trusted source with a permanent record of the transactions. This repository function is especially important given the frequent transfers of PD's in and out of projects. These and other functions could be repeated for all project activity which is the level granularity necessary for a true system of record to function and drive greater accountability and transparency.

The best means to achieve greater efficiency during the ID and OA phases therefore, is by providing a new, technologically enabled replacement for the CID. A new integrated system

[169] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 2, 80.

as described here, would deliver departmental wide standardization of project documentation resulting in higher quality administration produced in less time. A new system would also act as a management and training tool to the Project Directors who are essential to getting projects into the investment plan. By enabling the system with a suite of BI applications, more in-depth analysis of the department's projects is feasible and greater transparency and knowledge is achieved. Lastly, a new system would act as an official system of record for the DND, enabling all of the above functions. This system would also become an enabler of the new innovation initiatives suggested earlier. Having access to the data of projects, resources and training for innovation teams will greatly assist in achieving the shorter timelines necessary to improve ID and OA. The standardization and pre-formatted administration templates for essential project documentation means that project staff can spend more time focusing on the problem rather than the administration.

Cost Benefits

The above procedural, cultural and structural changes to the PAP have another benefit other than just speeding up the process. As KMPG demonstrated in their 2015 report, project staff and administrative boards did not fully appreciate how much the time delays on projects actually cost the government. Every delay caused by inaccurate administration or procedural bottle neck results in cost being incurred from wages, contractual delays, inflation and other sources. Delays also arose from Treasury Board or MND submissions that were incorrect or lacking all required information. The benefit of a renewed CID goes beyond providing a standardized and user-friendly means of administering a project. For example, generating administration such as budget reports to Senior Review Boards (SRB), Project Management Board (PMB) or the TB accurately and correctly has a monetary effect as well.

KPMG determined that if TB submissions for costing were submitted at a higher quality, then the submissions would be validated more quickly. The value of this time, equated to $3.2 million to $5.4 million a year over a ten year period.[170] A similar type of savings could be realized by reducing the amount of time spent drafting documentation or having to resubmit incomplete or inaccurate documentation.

In the example of time/value used above, estimating project costs correctly translated into significant savings. However, there is a severe lack of formal training on how the PAP is actually accomplished and all of the boards and administration required including costing, project design and expenditure documentation. The PAPR project has established a resource cell to assist in developing accurate costing but its role is to act as a pooled resource of experienced costing experts, not to formally train others. PD's will still be required to do much of the cost estimate documentation themselves.[171] In another example, a single portal to assist in drafting administration, training and knowledge management saves time for the PD's. This training and access to resources permits more time to be spent on the project itself, rather than learning by error. KPMG estimated that savings incurred in efficiency due to improvements in just training PD's could amount to $94 million over 10 years, likely more than enough to cover the costs associated with the education.[172]

There are countless areas where time spent working on the project rather than the administration for the project would have a monetary benefit to the DND. The capital saved on

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[170] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 1, 96.

[171] Department of National Defence, *Project Approval Process Renewal MND Conditional Approval Process*, annex B-1.

[172] KPMG, *Defence Renewal Change Management Services: Project Approval Process Renewal 2016.* Vol 1, 89.

time can be reinvested in innovating the next generation of projects, improving the technology and training personnel. If these examples are extrapolated across all 864 active projects on the CID, the savings to the department would be substantial.[173]

Conclusion

The ability to innovate and develop ideas into efficient and effective products is the desired end state of any industry. Without the ability to carry out innovation and production in an efficient and suitably rapid manner, companies would quickly be overtaken by their competitors. In the government, the desire for efficiency, transparency and effectiveness exists but without the external competitive drivers necessary to ensure that innovation and efficiency are achieved. In order to meet the goals set out in *Strong, Secure, Engaged*, the Department of National Defence and the Ministry must be open to adopting new means to rapidly innovate. By looking to industry for inspiration, DND can find unique means to generate new ideas from across the CAF. The department can then utilize its own human resources and outside expertise to build Centers of Excellence and innovation cells focused on developing projects accurately and rapidly. Combining these hubs with an investment in a technologically forward system of record to act as a warehouse for education, project management resources and knowledge management will enable the PAP to execute projects with agility, transparency and with better trained professionals.

The analysis conducted in this paper first demonstrated the long and complex nature of the PAP for generating new force enablers for the CAF. The paper then examined the importance of conducting rapid and agile innovation as means to provide overmatch of future adversaries

[173] Perry, 2015 Status Report on Major Defence Equipment Procurements, 15.

that the CAF will encounter and demonstrated the cost effectiveness of completing the process quickly. The first condition that will need to be met in order to rectify the procurement issue and bring DND closer in line to industrial innovation will require a change in the culture of DND. Procedural and structural changes require foresight, capital and the necessary drivers but without a shift in the cultural environment at DND, procedural and structural changes will not even begin. A greater ability to accept risk and failure as a tool to learn will need to be shaped and a business-like culture of innovation and change will have to be fostered within the department. The end-product of everything the department does ultimately affects the men and women serving in the operational units within Canada and around the world. They deserve a system in which they have the ability to influence and to contribute in order to ensure that they receive the most effective force multipliers possible. The improved responsiveness of a robust innovation culture results in a reduction in time spent advancing projects through the system. This increased processing speed results in capital savings that can be used by the department to fund both innovation and provide greater value to Canadians.

This paper has examined the current state of the Project Approval Process and found it to be overly complicated, excessively redundant and entirely risk adverse. It has also examined how industry leaders manage their own internal innovation to remain relevant in the modern world. By learning from these experts and adopting and modifying their systems for the military, DND can create a responsive, agile process for acquiring new force enablers for the CAF. This can be completed quickly and within the constraints imposed by the TB and the Minister of National Defence. Three concrete proposals to decrease the time required for projects to complete the ID and OA phase of the PAP have been put forth in this paper. The first is the adoption of an innovative methodology that generates the requirements, administration and concepts for new or

improved systems for the forces in under two years. Combining a specific Design Thinking oriented Center of Excellence with the "idea's center" approach will leverage the expertise and experience from across the forces. The end results of this process will be a more appropriate product or service and a more economical system of procurement. The second proposal is to bring all projects under a joint umbrella of oversight to reduce redundant projects and increase interoperability. A joint perspective enhances the whole-of-forces concept espoused by open innovation and engenders a greater "one team" spirit in the CAF. Lastly, DND needs to invest in a new technologically driven system to replace the CID. A system that educates, organizes, and standardizes the project teams and acts a searchable BI enabled system of record is essential for the forces to reduce project management costs and timelines.

The goal of these proposals is to reduce the time required to complete the initial stages of the PAP in order to prevent the projects from being obsolete before they are even delivered. The changes recommended in this paper will also eliminate the need to update administration at each step of the process as the process will only be months long vice years. Most importantly, the changes will create an effective system to deliver the force enablers to the soldiers, sailors and air force personnel that deserve the most current and effective enablers possible in a timely manner. A much expanded vision of how projects are managed will be required to be implemented immediately for the department to meet the goals set out in the SSE.

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