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STRUCTURING NAVAL CAPABILITIES FOR STRATEGIC RENEWAL

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Abstract

The Royal Canadian Navy's (RCN's) capability is dependent on the government's means and ambitions for its maritime capability through its navy. The Canada First Defence Strategy, the Defence Procurement Strategy, and Defence Renewal have impacted management of military capability. New changes to the Program Alignment Architecture (PAA), new classes of ship, revitalization of infrastructure, and a new functional models challenge how best to structure RCN business. To be effective, it's important not only for the RCN business model to conform with governance and aligns with the PAA, but it should also be linked to capability output.

An alternative force capability planning approach based on a methodology to define team centric capabilities, contributors, and valuations is proposed along with a method for determining their costs based on existing business processes that support platform-centric models used to acquire replacements for RCN fleets.

While aligning the RCN business to precisely defined maritime capabilities, a means to improve the RCN's management agility is inherent in the methodology. The capability definition used is largely based on RCN readiness doctrine as a reference to define teams within a matrix. The contributor dimension to the matrix includes itemized capability contributors from four categories: Personnel, Equipment, Readiness, and Infrastructure (PERI).

INTRODUCTION

As the military needs of the Government of Canada (GoC) evolve, the capabilities managed within the Department of National Defence (DND) also evolve. Within the Canadian Armed Forces (CAF) there is a continual need to develop new and enhanced capabilities while also sustaining the core capabilities. Management paradigms related to maritime force capability and readiness has been affected by trends in perceived threats and the desire to build capability and readiness in other areas. This paper proposes a structured capability management methodology that would improve coherency and agility within the detailed and complex task of investing, sustaining, and divesting operational capability within the Royal Canadian Navy's (RCN's) strategically dynamic capability profile. Naval capability management by a defined scheme based on operational teams is proposed. This structured team-based capability index is intended to pervade all aspects of naval strategic, operational, and managerial thinking and will leverage functionality capably in existing enterprise systems and constructs. If implemented, it will also enable attribution of costs to each capability team and inform business decisions.

In the post-Afghanistan era of reconstitution, [1] sustaining current fleets while planning resources for their replacement has been difficult amidst the current government policies related to deficit reduction and defence affordability. New economic and legal scrutiny may are feared to contribute delays and overhead to DND procurement projects resulting in decreased overall capability. To ease this pressure, operational tempo of the RCN has dropped considerably since

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[1] Department of National Defence, "Report on Plans and Priorities 2012-2013," 31.
Last Accessed 1 December 2014, http://www.tbs-sct.gc.ca/rpp/2012-2013/inst/dnd/dnd-eng.pdf

2011 while the allocation to the RCN for operations and maintenance has remained relatively static.[2]

Strategic defence thinking in Canada is dominated in the past decade by the experience in Afghanistan but many of those lessons are difficult to apply to the RCN that had little to offer an operation in a land locked country. However, potential for RCN participation in joint naval operations in global littorals and chokepoints in cooperation with our allies remains constant. Canada's current maritime capability is transforming to the demands of patrolling, controlling, and interdicting in the global commons and has even participated in an opposed naval blockade during the Libyan crisis of 2011.

For the past five decades the RCN's assigned missions have consistently been to generate and maintain combat-capable, multi-purpose maritime forces for employment both at home and abroad by operational commanders. The *Canada First Defence Strategy* (CFDS) of 2008 made no changes to the RCN's traditional role when it articulated three roles for the CAF; defend Canada, defend North America; and contribute to international peace and security.[3] The strategic demand and the ability to supply conventional maritime force capability will be examined in terms of the capability pillars of the CFDS.

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[2] *Report on Plans and Priorities 2012-2013*, 30.
[3] Government of Canada, "Canada First Defence Strategy", Last accessed 01 December 2014, http://www.forces.gc.ca/en/about/canada-first-defence-strategy-summary.page

While some of this paper covers relevant strategic guidance and governance, the bulk of it is devoted to improving resource attribution and agility[4] with the capability management processes being developed with DND and the RCN. Naval context will be provided to illustrate capability management concepts with the introduction of a Naval Capability Matrix (NCM). This matrix of capability will provide comprehensive definitions of capability and leverage existing management processes to enhance the information available to defend decisions to invest on any of the four pillars of military capability:

- Personnel;
- Equipment;
- Readiness; and
- Infrastructure.

Capability and Business Management Issues

> *It would be shameful and perhaps dangerous to national security if the billions of dollars committed to defence were even partially wasted.*
>
> - Douglas Bland, *Transforming National Defence Administration*

Naval planners have long considered the classes of ships themselves as capabilities and have largely organized the RCN's institutions to manage the capability pillars of individual classes and their platforms (ships). Notwithstanding the existence of four distinct communities (human resources, materiel, operations, and logistics)[5] that closely match the four capability pillars of the CFDS, classes of naval vessels each have their own sub-community. With over a

[4] David S. Alberts and Richard E. Hayes, Code of Best Practice. *Campaigns of Experimentation Pathways to Innovation and Transformation*, Information Age Transformation Series (Washington, Office of the Secretary of Defense, 2006), 31.

[5] This will become evident through the review of contributing organizations governed by the Defence Services Programme. See Figure 3.1 and *RCN Governance* in Chap. 4.

dozen sub-communities varying in complexity according to various organizations, functions, and the geography throughout the RCN, communications between these communities are spurious and can sometimes fade without formalized contact or connection. Improvements in managed communications across all RCN organizations (as a CAF example) would likely improve capability management efficiency, alignment, and agility.

> The absence of a common, CAF-wide framework and performance metrics for force posture and readiness has made it difficult in the past to measure resource and training inputs and readiness outputs, and to link one concept with the other. Similarly, the current business planning and financial accounting systems do not align well with operational readiness and training outputs. As a result of the low level of visibility into a pan-Defence readiness system, the CAF has been challenged to fully identify and eliminate operational readiness inefficiencies, or adjust expenditures in order to ensure training aligns with evolving operational and policy priorities.[6]

Canadian warships and task groups have mainly been prepared for particular missions by the RCN using a comprehensive management tool used to match the available capabilities with the mission. This is the full listing of combat readiness requirements (CRRs) [7] that can be tailored by the readiness authority and applied during collective training events as part of force generation leading to operational force employment.

Maritime Readiness for the RCN is managed by the national Maritime Component Commander (MCC).[8] This keeps the generation and employment of maritime forces well aligned but alignment of the development function remains a challenge unless high profile systems are being accepted into fleet service. While the RCN is accepting delivery of the mid-life upgrade of its main warship, the new Directorate Naval Capability Introduction (DNCI) has been formed to

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[6] Department of National Defence, ADM(PA). *Defence Renewal Charter: Department of National Defence and Canadian Forces* (Ottawa: ADM(PA), October 2013), 11.

[7] Department of National Defence, B-GN-002-000/RQ-001, CFCD 102(L) RCN Combat Readiness Requirements (Ottawa: DND Canada, 2011)

[8] The Commander of Maritime Forces Atlantic is *double hatted* as the MCC and COS Operational Readiness

facilitate the introduction of new Halifax Class future capabilities and future capabilities delivered in support of the National Shipbuilding Procurement Strategy (NSPS).

A key assumption of this paper is that the four separate capability pillars remain managed largely within their organizational silos and more integrated management is feasible and would be beneficial. Exceptions from silo isolation are when business plans are prepared and higher level guidance is prepared. For example, Commander RCN (CRCN) promulgates planning guidance annually applicable to all pillars but the processes and tools used to inform these cross-pillar impacts remain separated. For example a directive to increase the production of trained RCN personnel[9] later created a fleet bunking bottleneck that resulted in long wait times[10] and reduced sea time requirements for trainees in some navy trades.[11] More effective cross- pillar planning may have opted to recruit navy trades in numbers synchronized to at-sea trainee position availability and maximized maritime capability support from non-sea trades.

Differences between management practices exercised by RCN organizations on the coasts and at naval headquarters (HQ) are evident in several instances. An important example is the tracking of expenditures. In HQ, investment expenditure is largely managed by the Defence

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[9] Vice Admiral D.W. Robertson, *MARCOM STRATEGIC ASSESSMENT 2009* (NDHQ file: 3371-1948-1 (DGMSM/ RDIMS 161788)), 18 Dec 08, 7.

[10] This has been a theme during the annual Career Manager briefs for RCN trades. See D Nav Pers "2011 Combined Briefing All Occupations." http://nshq-qgemm.mil.ca/dnavp-dperm/dnavp3-dperm3/amor-eagm-eng.asp

[11] For distressed technical trades the Qualification Standard and Plan (QSP) has been altered. See Canadian Forces Naval Engineering School: "Maritime Command Qualification Standard and Plan NCS ENG 00344 Head of Department Qualification," 1-2. . http://mfa-hfx-qcms001.forces.mil.ca/nptadmin/uploads/NCS_Eng_AHOD_QSP_7Dec11.pdf

Services Programme while on the coast, force generation expenditures are tracked to an annual allocation by comptrollers within coastal units.[12]

Canada's Auditor General cited several management deficiencies in 2011 that DND has acknowledged.

> National Defence's ability to meet training and operational requirements over the long term is at risk due to weaknesses in implementation and oversight of its contracting approaches for maintenance and repair, deficient management information systems, and the lack of sufficient cost and performance information.[13]

Accordingly, it's suggested that CAF-wide management of all capability pillars should be integrated and make full use of existing enterprise tools.

Large sums of public funds are spent annually on military capability and it's important that comprehensive and accurate information is provided to decision makers. Accurate knowledge of capability management information will help the department invest funds in the capability pillars and inform acquisition of new capabilities to fill developing gaps. If capabilities are allowed to further decay,[14] the political will to invest in infrastructure revitalization may not be there when needed next and further reductions in CAF capability could adversely affect a variety of national interests.

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[12] Rear-Admiral Paul Maddison, *Draft MARCOM Business Plan (MBP) 2011/2012* (NDHQ file: 3371-1948-1 (MSMT / RDIMS 205582)), 25 Nov 10,18.
[13] Office of the Auditor General of Canada, *2011 Fall Report of the Auditor General of Canada, Chapter 5 - Maintaining and Repairing Military Equipment - National Defence* (Ottawa: GoC, 22 November 2011): 2. http://www.oag-bvg.gc.ca/internet/English/parl_oag_201111_05_e_35937.html.
[14] Douglas Bland, *Canada without Armed Forces* (Kingston, McGill Queens University Press, 2004), 110. http://www.queensu.ca/dms/publications/CanadaWithoutArmedForces-Non-Claxton.pdf

Lowered Readiness

Operation APOLLO in 2001 and in Operation FRICTION in 1990 are two examples where the navy has been directed to increase operational tempo and has chosen a course of action on both occasions where future capability is put at risk by burning through spares and directing huge increases in labour to meet the mission preparation effort instead of continuing planned sustainment activities.[15] The long term impact on readiness of shipboard components being worn out and supplies consumed faster than forecasted has been significant.

Many current RCN capabilities and capacities rely on the viability of the Halifax Class frigate to deliver maritime force capability while the Halifax Class Modernization (HCM) program is currently in the middle of a challenging refit, recertification, and retraining period. HCM is replacing many of its shipboard systems chronically plagued by lack of spares during the previous decade but follow-on projects for the class are still required to address obsolescence issues.[16]

The recommendation from Parliament's Standing Committee on National Defence in 2012 was to "… ensure that the Canadian Forces continue to restructure, to increase the tooth-to-tail ratio, and to place the highest priority on combat training".[17] To strengthen the operational

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[15] *2011 Fall Report of the Auditor General of Canada, Chapter 5 - Maintaining and Repairing Military Equipment - National Defence,* 16.
[16] Defense Industry Daily, "Modernizing Canada's Halifax Class Frigates," Last modified 26 May 2014 http://www.defenseindustrydaily.com/modernizing-canadas-halifax-class-frigates-05062/
[17] House of Commons, Standing Committee on National Defence, *The State of Readiness of the Canadian Forces,* December 2012, 24.

"teeth" of the CAF will be to increase actual combat capability.[18] The GoC response to Parliament was DNDs transformation and renewal programs which aim to improve business processes by aggressively targeting corporate and institutional overhead and reinvesting in operational capability.[19] It's considered that, while the administrative tail is considered necessary for readiness, its relative size should be minimized in a balanced fashion with respect to the capabilities required by GoC.

The RCN processes to track readiness status leading to and during operations are mature but the status tracking quality effectively ceases when the operation ends.[20] The pitfall in this approach is a discontinuity in the known readiness status of individual systems, naval trade persons, and other capability team contributors when they are inevitably called upon again at the beginning of another readiness cycle.

The HCM program is having its maximum effect felt in 2014 and 2015 with over half of the twelve frigates in various stages of refit but the class should recover by 2018 when HCM is scheduled to complete. With destroyer availability nearly at an end and replacement options not yet certain, it's apparent that some major maritime capabilities, such as area air defence (AAD), will be gapped for a considerable time.

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[18] John T. Bennett, "Report: U.S. Last in Combat Gear Output Per Spent Dollar," Last modified 15 March 2010, http://www.defensenews.com/article/20100315/DEFSECT04/3150309/Report-U-S-Last-Combat-Gear-Output-Per-Spent-Dollar

[19] Department of National Defence, "Report on Plans and Priorities 2014-2015", 80, Last accessed 01 December 2014, http://www.forces.gc.ca/en/about-reports-pubs-report-plan-priorities/2014-toc.page

[20] Department of National Defence, "NAVORD 3250-7 Operational Deficiency (OPDEF) Reports," Last Accessed 01 December 2014, http://rcn.mil.ca/navord-omar/default-eng.asp

The RCN's tanker replenishment ships are no longer operational.[21] This reduces flexibility and preparedness to conduct global naval deployments and Canada is compelled to rely on its allies for a critical component to a naval task group. Replacement action has been approved to meet *CFDS* readiness objectives but another considerable capability gap must be endured in the interim.

Revitalization Cost Increases

The *CFDS* states the GoC's commitment to Defence and displays past annual increases that have effectively doubled spending in the last twelve years.[22] While part of the increase can be attributed to sustaining operations in Afghanistan, increasing demands to replace aging fleets across the CAF have contributed to these additional costs. When the Afghanistan expedition shrank in 2011, the CAF entered a reconstitution period where the operational tempo has been reduced to make more resources available to revitalize equipment, infrastructure, and personnel.[23]

Military costs increase as new capabilities are demanded to mitigate the current threat environment. The *CFDS* informs that costs for capability are spread amongst the four pillars as; 29% for readiness, 12% for equipment, 51% for personnel, and 8% for infrastructure. Selection

[21] Department of National Defence, "Royal Canadian Navy begins transition to the future fleet," 22 September 2014, http://www.navy-marine.forces.gc.ca/en/news-operations/news-view.page?doc=royal-canadian-navy-begins-transition-to-the-future-fleet/i0dsk248
[22] Department of National Defence, "Canada First Defence Strategy," 27 July 2013, http://www.forces.gc.ca/en/about/canada-first-defence-strategy.page
[23] *Report on Plans and Priorities 2012-2013*, 10.

of military equipment, however, has an additional impact due to its demand for specially trained personnel, logistics, and infrastructure to support it.

Beyond the four pillars of the *CFDS*, the GoC must revitalize the Defence Team, including itself and industry. The enormous cost to retool the domestic defence industry is anticipated to have economic and political benefits but will also will also delay and or reduce Defence buying power. For the RCN, the business context includes up-front investment to the shipbuilding program.

The National Shipbuilding Program Office (NSPO) stood up to manage overhead inherent in defining processes to deliver the new warships under the NSPS. Efforts borne by NSPO to deal with audits, for example, can be considered as an additional overhead cost but these efforts typically increase in proportion to the size of the program. In his review of the NSPS, Canada's Auditor General expressed concern that DND obtains the military ships it needs to protect Canadian interests instead of protecting budget caps under affordability criteria.[24]

Mandated government policies such as buy-Canadian[25], job creation, regional industrial benefits, multi-layered scrutiny, and affordability criteria have become important considerations for the Defence Programme. To maximize the value of this buying power it's important to preserve the competence of project teams who must understand GoC and CAF complexity. Size

[24] Office of the Auditor General of Canada, "2013 Fall Report of the Auditor General of Canada, Chapter 3, National Shipbuilding Procurement Strategy," Last modified 26 November 2013, http://www.oag-bvg.gc.ca/internet/English/parl_oag_201311_03_e_38797.html#hd3d

[25] Public Works and Government Services Canada, "Build in Canada Innovation Program (BCIP)," Last modified 14 November 2014, https://buyandsell.gc.ca/initiatives-and-programs/build-in-canada-innovation-program-bcip

and composition of project staffs, however, are at risk due to plans to remain are current staffing levels.[26] Finally, to rationalize raising budget caps to meet the multiyear ambitions of revitalizing the CAF has become a difficult economic exercise due to the uncertain valuation of military capability.

Delayed Procurements

The GoC requires DND's programme of planned procurement under the *CFDS* to be scrutinized by Public Works and Government Services Canada (PWGSC) for reasons of public funds accountability and fairness when tendering work to industry. The Defence Programme is also scrutinized by Treasury Board for affordability and Industry Canada for meeting targets on domestic industrial growth. DND's previous efforts to engage these GoC bodies, industry, and academia were part of developing the concept now embodied by the Defence Procurement Strategy (DPS).[27]

The DPS [in many ways resembling a larger instantiation of the NSPS] has three key objectives: delivering the right equipment to the CAF and the Canadian Coast Guard in a timely manner; leveraging our purchases of defence equipment to create jobs and economic growth in Canada; and streamlining defence procurement processes.[28] The DPS objective to enable procurements to proceed faster and in a more efficient and coordinated manner is supported by several GoC departments.

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[26] *Report on Plans and Priorities 2014-2015*, 85.
[27] *Report on Plans and Priorities 2012-2013*, 40.
[28] Public Works and Government Services Canada, "Defence Procurement Strategy," Last modified 22 December 2014,
http://www.tpsgc-pwgsc.gc.ca/app-acq/stamgp-lamsmp/sskt-eng.html

The history of naval procurements in Canada includes large and expensive capital projects that each had difficulties getting started. In its early years, the project management office (PMO) for the Canadian Patrol Frigate (CPF) Project was supported by clear requirements to support the Cold War effort. By contrast, a moratorium on all DND contracting in the 1960's cancelled the General Purpose Frigate project that rebounded soon after to deliver the Tribal Class destroyer.[29]

Summary

The RCN's capacity of its personnel to train, sustain, and keep pace with technological developments is impacted by the current revitalization effort. The capability management challenges presented above are complex and could benefit from a more structured approach with additional level of detail beyond what is currently available. Using the DPS to meet the intentions of the *CFDS* will require refinements to current Defence management processes and their tools to increase capability in a timely fashion. The DPS, *CFDS* and other key strategic documents are the subject of the literature review upon which Defence governance and capability management is currently based and for which team-based alignments will be proposed.

[29] Cdr Pat Barnhouse, RCN (Ret.), "On the Trail of the Navy's 'Holy Grail'," Last Assessed 1 December 2014, http://www.cntha.ca/images/Otherdocs/mej/mej-73.pdf

LITERATURE REVIEW

This chapter will explore the strategic planning documents from the GoC that have shaped the management of capability in the CAF. The Canada First Defence Strategy (CFDS), the Defence Procurement Strategy (DPS), and the Defence Renewal (DR) plan are considered the key contributors to the strategic context of defence that guides the levels to which the CAF will be equipped and staffed and what the force structure and its capabilities are likely to resemble. Supporting documents to these strategies and critical reviews are included.

Canada First Defence Strategy

The CFDS was first released in 2008 containing the CAF roles, missions, and describing the four military capability pillars. These missions mainly implicate our complex defence relationship with the United States[30], our membership in the NATO alliance, and our desire to contribute to international stability. Serving a common planning purpose, the *CFDS* has been quoted and referenced in virtually every DND planning document since 2008. The six core missions[31] provided for the CAF are:

- Conduct daily domestic and continental operations, including in the Arctic and through NORAD;
- Support civilian authorities during a crisis in Canada such as a natural disaster;
- Support a major international event in Canada, such as the 2010 Olympics;
- Lead and/or conduct a major international operation for an extended period;
- Respond to a major terrorist attack; and
- Deploy forces in response to crises elsewhere in the world for shorter periods.

[30] Eric M. Uslaner, review of *The Decline of Deference: Canadian Value Change in Cross-National Perspective*, by Neil Nevitte, *Canadian Journal of Political Science* 30, no. 2 (June 1997), 371-373.
[31] *CFDS*, 10.

A criticism about the amount of publicly-released background information on the *CFDS* seems warranted when the GoC claims it is based on a comprehensive plan but doesn't really provide one. In 2009, a former Vice Chief of the Defence Staff (VCDS) commented that the absence of a strategic framework from the *CFDS* where CF contributions to overall Government defence and security objectives should have been identified or prioritized. He also commented on the absence of the *CFDS* addressing sustainment of core capability in the interim before new systems are delivered.[32]

The means available to GoC and DND to deliver on the objectives of the *CFDS* is a concern. Further, the bottleneck where the program fails to be moved by sufficient staff in projects and corporate support is also impacting *CFDS* objectives in addition to insufficient funding. In 2012 the GoC announced that $3.5 billion in capital equipment funding would be re-profiled into the future, demonstrating an effort to make the investment plan timetable more realistic. For DND to meet the *CFDS* ambitions with a suitable Investment Plan that meets Treasury Board approval is a challenge currently without a solution.[33] While *CFDS* funding is seen as a growing gap, especially since the federal budget in 2014 released information that defence savings were a major contribution to lowering the national debt, the capital equipment share of the defence budget spending has dropped to the lowest level since 1977/1978. This represents a significant loss of purchasing power.[34]

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[32] Lieutenant-General (Ret'd) George Macdonald, "The Canada First Defence Strategy – One Year Later," 10, Last accessed 01 December 2014, http://www.cdfai.org/PDF/The%20Canada%20First%20Defence%20Strategy%20-%20One%20Year%20Later.pdf

[33] David Perry, "The Growing Gap Between Defence Ends, and Means: The Disconnect Between the Canada First Defence Strategy and the Current Defence Budget," 2, Last accessed 01 December 2014, http://www.cdainstitute.ca/images/PerryBudgetJune2014.pdf

[34] *The Growing Gap Between Defence Ends, and Means*…, 1.

While policy statements have been issued in 2005 and 2008, Canada's last Defence White Paper was published in 1994. The policy direction remaining for the CAF is considered[35] sparse and outdated and should be replaced with an unambiguous statement of what is expected of the CAF, how the CAF will be structured, and what resources will be available to them in the future. However, the preparation of strategic documents to shape defence policy have had little impact because the Prime Minister (PM) has not been bound to them showing that defence policy production in Canada is a very ad hoc process.[36]

Douglas Bland's study for Queens University School of Policy Studies in 2004[37] has some interesting similarities to the *CFDS*. The *CFDS*' four pillars of military capability are very comparable to Bland's description of military capability as "the product of effective equipment, trained personnel, appropriate doctrine, command and communications systems, and logistical support which, when used in unison, enable the commanders to accomplish missions."[38] His warnings that capability will continue to erode due to insufficient resources to train personnel and insufficient plans to replace equipment made a strong case to improve defence policy to support increased investment in the CAF.

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[35] The Hill Times Online, "With new budget, new challenges, it's time for a new Defence White Paper," Last accessed 10 December 2014, http://www.hilltimes.com/policy-briefing/2012/05/28/with-new-budget-new-challenges-%E2%80%A8it%E2%80%99s-time-for-a-new-defence-white-paper/30889

[36] Douglas Bland, *Everything Military Officers Need to Know About Defence Policy-Making in Canada*, David Rudd, Jim Hanson, and Jessica Blitt, *Advance or Retreat? Canadian Defence in the 21st Century*, (Toronto, The Canadian Institute of Strategic Studies, 2000), 15.

[37] *Canada Without Armed Forces?*, 105.

[38] *Canada Without Armed Forces?*, 105.

Defence Procurement Strategy

> *According to a 2009 economic analysis commissioned by Industry Canada, if there were to be additional costs for building ships in Canada as opposed to offshore, then those costs should also factor in the wider economic benefit to Canada and be offset accordingly. The Strategy does not include a provision for the regular monitoring of the expected additional cost or the benefit to Canada.*[39]
>
> - Office of the Auditor General of Canada on *National Shipbuilding Procurement Strategy*

As the result of four years of intensive consultation with industry, Canada's new Defence Procurement Strategy (DPS) reflects a holistic approach to defence acquisition reform with both industry and the CAF consulted in order to calibrate the DPS toward the greatest benefits for both.[40] This consultative process is intended to give the government more confidence in DND's requirement and cost estimates which have previously been problematic.[41] Previous acquisition practice had been for GoC to keep industry relationships at arm's length to avoid the appearance of unfairness in a competitive procurements process but the DPS would replace this approach with a structured framework for industry that includes early engagement and relationship building with industry.

The 2014 federal budget announcement changed the defence expenditure processes according to the new Defence Procurement Strategy (DPS) but it remains unclear how the Deputy Minister Governance Committee (DMGC), or the Defence Procurement Secretariat will

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[39] *2013 Fall Report of the Auditor General of Canada, Chapter 3, National Shipbuilding Procurement Strategy,* 16.
[40] Canadian Defence & Foreign Affairs Institute, "Canada's New Defence Procurement Strategy: Has the Pendulum Swung Too Far?," 2, Last accessed 10 December 2014, https://d3n8a8pro7vhmx.cloudfront.net/cdfai/pages/380/attachments/original/1414214295/Canadas_New_Defence_Procurement_Strategy.pdf?1414214295
[41] Murray Brewster, "Military Procurement Canada: Tories Try To Fix Broken System," *The Huffington Post*, 04 July 2014, http://www.huffingtonpost.ca/2014/02/05/military-procurement-canada-conservatives_n_4729462.html?utm_hp_ref=email_share

fit into the established Cabinet governance structure.[42] At the time of writing only the Defence Analytics Institute (DAI), which establishes a third-party defence procurement analysis, has been established. The DAI will advise on potential economic benefits of individual procurements so that they meet both the CAF's needs and increase the competitiveness of Canadian firms in the global marketplace.[43] Regardless, the DPS will need to manage the complexity of large Defence projects and avoid contributing to delays when GoC approvals are required.

The concept of early industry engagement is a centrepiece of the DPS but failure to implement it successfully may put the entire strategy in jeopardy. It also remains to be seen just how far the government is prepared to go in building industry relationships and modifying its current competitive procurement approach.[44] DPS concepts are predicted to make it difficult for GoC to demand maximum cost-efficiency in terms of value-for-money while maintaining close and supportive relations with industry. It's also doubted that premium costs paid by GoC to domestic industry will be balanced by the economic benefit expected.[45]

A key component in the development of the DPS was commissioning a special advisor to the Minister of PWGCS to report on how best to maximize the overall benefit of the government's *CFDS* investment. This involved identifying and supporting key industrial capabilities (KICs) to enable Canada's defence related industries to better meet the operational requirements of the Canadian Forces while generating sustainable economic growth. In order for

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[42] Canadian Defence & Foreign Affairs Institute, "Canada's Defence Procurement Strategy: An End or a Beginning?," 10, Last accessed 10 December 2014, http://www.cdainstitute.ca/images/VimyPaper20.pdf

[43] Public Works and Government Services Canada, "Minister Finley Announces the Establishment of an Interim Defence Analytics Institute," Last modified 19 February 2014, http://news.gc.ca/web/article-en.do?mthd=tp&crtr.page=1&nid=816749&crtr.tp1D=1

[44] *Canada's Defence Procurement Strategy: An End or a Beginning?,* 4.

[45] *Canada's New Defence Procurement Strategy: Has the Pendulum Swung Too Far*?, 2-4.

KICs to be effective, it was recommended that GoC should make changes both to its demand-side defence procurement policies and to related supply-side programs that support defence research and development (R&D) and technology transfer.[46]

To support industry's ability to plan, GoC has published the Defence Acquisition Guide (DAG), which lists the DND equipment procurement intentions even though some have not been brought forward for GoC approval. Moreover, the intentions in the DAG are subject to change as national and international strategic circumstances evolve, as technologies emerge and mature, and as priorities continue to be refined and evolve.

Defence Renewal

A series of delays and failed plans to re-equip the military have become embarrassing for the GoC.[47] Bland claims that a better process will produce better results and changing the government's policy intentions into credible outcomes cannot be accomplished if administrative organizations and methods are unsuited to the task.[48] These assumptions are behind DND's renewal vision to become a leaner and more efficient organization that finds ways to free-up resources applied to unnecessary pursuits, reinvest them in operational capabilities and readiness, and deliver the best military capability at the best value for Canadians.[49] These renewal goals

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[46] Tom Jenkins, *Canada First: Leveraging Defence Procurement Through Key Industrial Capabilities: Report of the Special Adviser to the Minister of Public Works and Government Services* (Ottawa: Public Works and Government Services Canada, 2013).
[47] *Military Procurement Canada: Tories Try To Fix Broken System.*
[48] Douglas Bland, *A National-Level Transformation, Transforming National Defence Administration,* Claxton Series No.6, (Kingston, ON: Queens University School of Policy Studies, 2005), viii, http://www.queensu.ca/cidp/publications/claxtonpapers/Claxton6.pdf
[49] *Defence Renewal Charter*, 5.

intend to deliver an effective and accountable system for making strategic-level decisions which will challenge senior government executives and military officers to meet their established performance measures. Its expected DND will emerge from DR a more effective, efficient and nimble organization.[50]

DR intends to transform governance such that the Deputy Minister (DM) and the Chief of the Defence Staff (CDS) issue annual planning guidance to the Defence Team in addition to the *CFDS*. L1s will then be able to shape and integrate their respective plans and directions[51] in a manner that can more tangibly be linked to the delivery of a strategy.[52] DR also intends to deliver a CAF-wide framework for force posture and readiness to enable resource and training inputs to be linked and measured against readiness outputs.[53] To achieve this, the DR Charter recognizes that current business planning and financial accounting systems will require alignment to the forthcoming CAF-wide force posture and readiness framework.

Major savings opportunities are not readily apparent within the large and complex overhead structures that exist at DND and obvious measures have already been taken. Further measures would be based on analysis of a sound and comprehensive business architecture,[54] an effective business performance management system, and an integrated enterprise-wide business environment. Further savings are therefore considered to depend on business intelligence capabilities supported by robust and modern information technologies and a sound, purpose-

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[50] *Report on Plans and Priorities 2014-2015*, 1.
[51] For example, the Commander of the RCN issues annual planning guidance. It was referred to as *capability planning guidance* and has transitioned to *business planning guidance*. See Chapter 4.
[52] *Defence Renewal Charter*, 20.
[53] *Defence Renewal Charter*, 11.
[54] PAA is the GoC's Program Alignment Architecture that connects its departments centrally. One exists for Defence.

designed, governance, management and leadership framework. Without effective investment continuing, the downward slide of the CAF capability will have little to slow it down if lower overhead and further savings are not effectively guided and offset.[55]

Allied Capability Management

The Technical Cooperation Program (TTCP) is continuing development on a guide to Capability-Based Planning (CBP) that would describe the core concepts of CBP for implementing a system for long-term force structure planning. The aim of the guide is to provide a common understanding of CBP amongst TTCP nations [56] and establish some principles for its use. TTCP offers a definition of CBP as follows:

> "This method involves a functional analysis of operational requirements. Capabilities are identified based on the tasks required… Once the required capability inventory is defined, the most cost effective and efficient options to satisfy the requirements are sought."[57]

The US Department of Defence (DoD) sponsored the Command and Control Research Program (CCRP) to gain understanding of the national security implications of the information age. The CCRP aimed to bridge the operational and technical communities, and contributed research and analysis publications on command and control (C2) theory, doctrine, applications, systems, the implications of emerging technology, and C2 experimentation. The CCRP contributions to capability management are valued by this paper given they are responsible for

[55] Charles Davies, "Defence Transformation and Renewal: Teeth, Tails and Other Myths," 8, Last accessed 10 December 2014, http://www.cdainstitute.ca/images/VimyPaper18.pdf

[56] The TTCP countries are U.S, U.K, Canada, Australia, and New Zealand. See http://www.acq.osd.mil/ttcp/

[57] The Technical Cooperation Program Joint Systems and Analysis Group Technical Panel 3, "Guide to Capability-Based Planning,"1, Last accessed 10 December 2014, http://www.acq.osd.mil/ttcp/reference/docs/JSA-TP-3-CBP-Paper-Final.doc

developing concepts such as agile C2, information superiority, and network-centric operations or warfare (NCW).[58] The agility aspect has been a particularly supportive concept to organizational transformations that were applicable to US military operations in Afghanistan and Iraq.[59]

Capability management in the United Kingdom has evolved a concept known as Through Life Capability Management (TLCM). Their paradigm speaks to a shift in acquisition focus from equipment to capability where the relationships between front line users, capability sponsors and suppliers have changed significantly. They have also identified Defence Lines of Development (DLoDs) that give the UK Ministry of Defence a reference to consider existing and planned capabilities, maturity levels, and quality of service [performance] assessments in a consistent planning fashion.[60]

The Australians have a similar approach to the British where capabilities are analysed in dimensions called Fundamental Inputs to Capability (FICs).[61]. These FICs are to be managed practically within a defined financial envelope where a deficiency in any one FIC adversely impacts the whole.[62] Australia has also pursued a risk-based framework for military capability

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[58] The Command and Control Research Program, "About the Program (1994-2011)," Last Accessed 10 December 2014, http://www.dodccrp.org/html4/about_main.html

[59] David J. Kilcullen, "New Paradigms for 21st-Century Conflict, The need for a grand strategy for combating terrorism" 41, Last accessed 10 December 2014, http://iipdigital.usembassy.gov/st/english/publication/2008/05/20080522172835srenod0.8730585.html#axzz3PbNUVHup

[60] Abideen Tetlay, "Through Life Capability Management Perspective for Framework Development for Assessing and Measuring System Maturity, System Readiness and Capability Readiness using Architecture Frameworks," 4-6, Last accessed 10 December 2014, https://dspace.lib.cranfield.ac.uk/bitstream/1826/5644/1/Through_Life_Capability-System_Readiness-2010.pdf

[61] Australian FICs are: Command and Management, Organisation, Major Systems, Personnel, Supplies, Support, Facilities, and Collective Training. See *Defence Capability Development Manual*.

[62] Australian Government Department of Defence, "Defence Capability Development Manual," 5, Last accessed 10 December 2014, http://www.defence.gov.au/capability/Outputs/_pubs/dcdm.pdf

planning designed to achieve the best and most controllable outcome for the lowest possible price.[63]

Whole of Government Approach

Canadian efforts to develop the 'comprehensive approach' through joint, interagency, multinational and public (JIMP) participation were sponsored by the GoC prior to 2004.[64] This concept evolved into the Whole of Government (WoG) approach that contains the Defence Team as a core element.[65] The United Nations has also recognized the need for a civilian-military coordination (CIMIC) policy and NATO leaders recognized the value of the comprehensive approach involving political, civilian and military instruments and agreed to establish a civilian crisis-management capability at NATO Headquarters.[66]

The Whole of Government (WoG) framework maps the financial and non-financial contributions of federal organizations receiving appropriations by aligning their program activities to a set of high level outcome areas defined for the GoC. Alignment of strategic outcomes and their corresponding program activities to the WoG framework makes it possible to calculate spending by GoC outcome area.[67] For example, the GoC outcome for 'the promotion of peace and security, freedom, democracy, human rights and the rule of law throughout the world,

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[63] *Defence Capability Development Manual*, 19.
[64] Lieutenant-General Andrew Leslie, Mr. Peter Gizewski, and Lieutenant-Colonel Michael Rostek, "Developing a Comprehensive Approach to Canadian Forces Operations," Last modified 27 August 2008, http://www.journal.forces.gc.ca/vo9/no1/04-leslie-eng.asp
[65] *CFDS*, 3-4.
[66] North Atlantic Treaty Organization, "A "comprehensive approach" to crises," Last accessed 10 Dec 2014, http://www.nato.int/cps/en/natolive/topics_51633.htm
[67] Department of Finance, *The Road to Balance: Creating Jobs and Opportunities*, (Ottawa: Service Canada, 2014)

and to provide Canadian representation abroad' is achieved through the provision of military and police support, services to Canadians abroad, and international diplomacy. Information released by the GoC indicates that roughly 85% of the resource for this outcome was allocated to DND in 2013.[68]

The Department of Foreign Affairs, Trade, and Development (DFATD) funds a variety of programs[69] relevant to defence. These globally focused programs contribute to international stability and counter terrorism and often require collaboration with DND in the WoG approach. Any Canadian response to a crisis in fragile and conflict affected areas throughout the world will generally involve the DFATD's Stabilization and Reconstruction Task Force[70] (START) as the GoC's center of expertise for stabilization and reconstruction. These START deployments could take Canadians into harm's way in pursuit of Canada's foreign policy [71] and their capabilities should be managed similarly to those of the CAF. While the CAF must manage capabilities necessary to prevail on a conventional modern battlefield, managing WoG capabilities should also be possible with the methodology for defining, valuating, and costing RCN capability described in this paper.

[68] Treasury Board of Canada Secretariat, "Breakdown of actual spending on A safe and secure world through international engagement by program activity," Last modified 11 July 2014, http://www.tbs-sct.gc.ca/ppg-cpr/ps-dp-eng.aspx?Rt=1054&Pa=1252&Gc=1731

[69] Foreign Affairs, Trade and Development Canada, "Funding Programs," Last modified 23 June 2014, http://www.international.gc.ca/department-ministere/funding-financement.aspx?lang=eng

[70] Foreign Affairs, Trade and Development Canada, "Stabilization and Reconstruction," Last modified 03 March 2014, http://www.international.gc.ca/start-gtsr/index.aspx

[71] Foreign Affairs, Trade and Development Canada, "Canada's foreign policy," Last modified 08 December 2014, http://www.international.gc.ca/cip-pic/index.aspx

The Canadian arctic expansion may include the opening of the northern sea routes by international shippers.[72] Sensitivities over disputed territories in this region have influence over Canada's plans to protect its arctic interests. However, a more anxious situation exists in the Asia-Pacific region where territorial disputes threaten the stability of this strategically important region to global commerce and may compel Canada to increase its commitment of maritime forces in that region.[73] Accordingly, Commander RCN (CRCN) made certain to acknowledge the Minister of National Defence's (MND's) public comments linking CAF activities in the Pacific with access to Asia-Pacific trade forums that support one of Canada's long term vital interests.[74]

Defence implications for national security are significant but DND's role is primarily to support Public Safety Canada. This relationship is defined in GoC policy maintained by the Treasury Board Secretariat (TBS) along with definitions such as 'national interest' and 'critical services'.[75] TBS definitions for security roles of all responsible Departments and agencies helps establish the various national security relationships that are encompassed in the WoG approach.

Canada ranked fourteenth in the word in 2013 for the size of its economy ($1.518 T) and had $687.8 B in federal revenue. In the face of global economic uncertainty the GoC has made the economy its priority[76] with two main components: supporting jobs and growth; and returning

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[72] World Maritime News, "LNG Tanker Ob River Prepares for Northern Sea Route," Last modified 31 October 2012, http://worldmaritimenews.com/archives/68204/

[73] The Canada-UK Colloquia, "The Shifting Centre of Global Gravity: Britain, Canada and the North Pacific," 15, Last accessed 10 January 2015, http://www.queensu.ca/canuk/sites/webpublish.queensu.ca.canukwww/files/files/2012Report.pdf

[74] Dave Perry,"Interview with Vice-Admiral Mark Norman," *Canadian Naval Review* 9, no. 3 (2013), 11.

[75] Treasury Board of Canada Secretariat, "Policy on Government Security," Last modified 01 April 2012, http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=16578&section=text#cha3 accessed 20 Feb 14

[76] National Defence and the Canadian Armed Forces, "Minister Nicholson speaks at Conference on Defence and Security," Last modified 24 April 2014, http://www.forces.gc.ca/en/news/article.page?doc=minister-nicholson-speaks-at-conference-on-defence-and-security/hrx9b4g4

to budget balance.[77] Accordingly, Canada's deficit dropped $16B to a nearly balanced budget in 2014 and direct program spending in Economic Action Plan 2014 is projected to remain broadly in line with its 2010–11 levels. The Defence Program, however, is a significant exception to this claim with $3.1 billion removed and promised to be returned after 2019.[78] Defence implications of the 'jobs and growth' policy may be further decline "if defense administrators are directed to produce military capabilities only for the benefit of home based industries, then considerable resources will be expended simply in carrying out this type of policy."[79]

[77] *The Road to Balance: Creating Jobs and Opportunities,* 241.
[78] *The Road to Balance: Creating Jobs and Opportunities,* 260.
[79] *Transforming National Defence Administration,* 3.

CAPABILITY GOVERNANCE FRAMEWORKS

Governance in this paper considers the authorities and processes defined by public policy that control budgets, allocations, and expenditures of public funds on defence. In this chapter the governance frameworks from the GoC policies relevant to the challenge facing DND to meet the objectives established in the *CFDS* will be presented. The existing frameworks that influence and govern the GoC's military capability management and its practices and processes will inform later recommendations within a naval context.

The combined military and civilian executives who serve the Minister of National Defence (MND) through a hierarchical line organization with traditional chains of command are shown in Figure 3.1. Only the DM and the CDS report to the MND and are considered Level Zero (L0s). The L1s consist of Associate Deputy Ministers (ADMs) and flag ranking military officers who report to the L0s. Financial issues, material issues, science and technology, and personnel issues are managed by L1s including the ADM-Financial and Corporate Services (Fin CS), ADM-Materiel (Mat), ADM-Science and Technology (S&T), and the Chief of Military Personnel (CMP) respectively. This governance structure includes a robust public service organization that supports military L2s who receive capacity and assemble the CAF capability that provides the most significant measure of Defence output.

The VCDS is the L1 responsible for DND governance. The Chief of Force Development (CFD) and the Chief of Programme (CProg), who prepare and manage TB funding requests for the DM's review, report to the VCDS. The processes defining how to manage the Defence

Services Programme (DSP) are published as the Project Approval Directive (*PAD*)[80] and maintained by CProg.

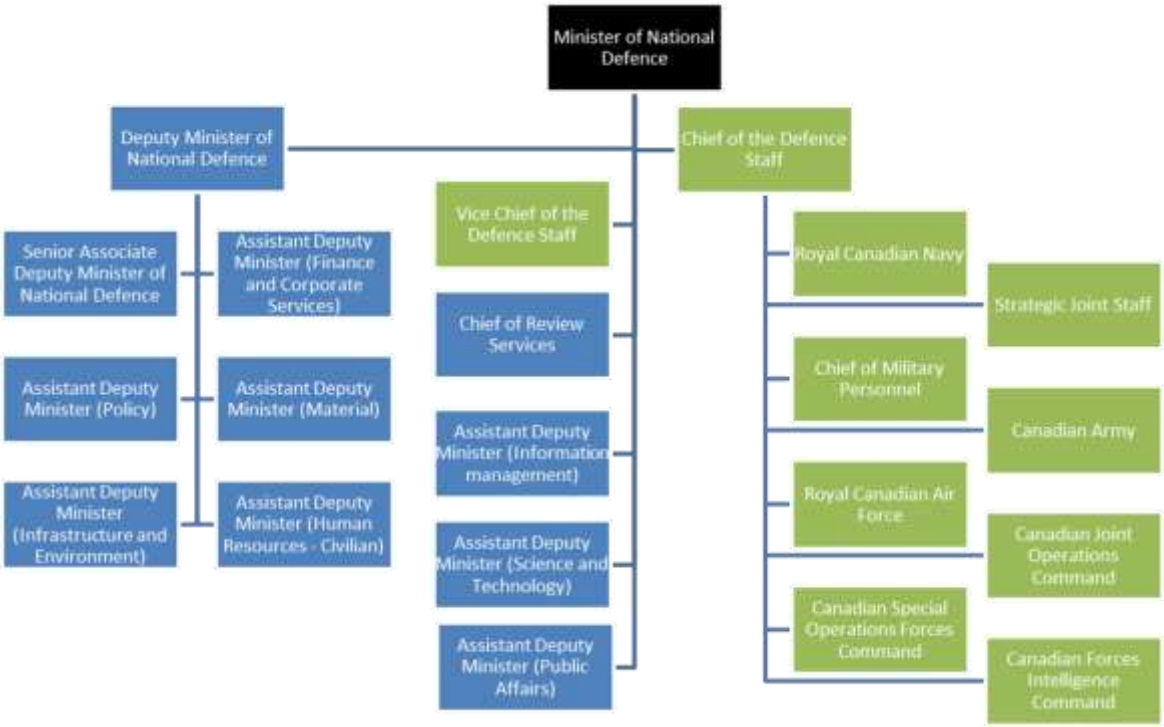

Figure 3.1: DND Organizational Chart

Source: Director of Defence Force Planning[81]

The Defence Planning and Management (DP&M) Framework[82] as the overarching structure used to manage the DSP in cyclical phases. DP&M framework includes seven interdependent processes shown in Table 3.1. Of particular interest is the Capability Based Planning (CBP) process description from a whole of DND perspective. Alignment of these

[80] Vice Chief of the Defence Staff, "Project Approval Directive (PAD) 2011-2012," Last modified 21 June 2012, http://vcds.mil.ca/sites/page-eng.asp?page=11611
[81] Vice Chief of the Defence Staff , "Department of National Defence (DND) Organization Chart," Last modified 17 March 2014, http://vcds.mil.ca/sites/intranet-eng.aspx?page=4394
[82] Vice Chief of the Defence Staff, "DP&M Definition and Purpose," Last modified 18 March 2013, http://vcds.mil.ca/sites/intranet-eng.aspx?page=4160

DP&M processes is proposed with the use of a common methodology to define capability. A naval example is provided in Chapter 5 of this paper.

The DSP governance model (Figure 3.2) is updated regularly to ensure efficient and effective management of the DSP. The MND makes the final DND submission to Treasury Board (TB) for funding approvals for the DSP. Figure 3.2 shows a functional organization but it requires the support of the line organization (Chain of Command) of Figure 3.1. Amendments to the Financial Administration Act (FAA) were reflected in December 2012 with the establishment of the Defence Strategic Executive (DSX) Committee co-chaired by DM and CDS who approve the *Corporate Strategy* listed as an output in Table 3.1 Note that Defence Finance Committee (DFC), chaired by the DM, approves the financial framework as the foundation for the DSP, the *Force Capability Plan* and the initial FY financial allocations to the L1s.

The Investment Resources and Management Committee (IRMC) enables the DM and the CDS with strategic oversight of existing DSP governance portrayed in Figure 3.2. The IRMC aligns all investment and resource decisions to Defence's Report of Plans and Priorities (RPP) by promoting effective management of financial allocations to answer immediate and longer term capability and capacity pressures demanded to sustain and transform. It remains challenging, however, to effectively justify and estimate costs for future fleet acquisitions without a precise contextual description of the capability

Table 3.1 Defence Planning and Management Framework Processes

DP&M Process	Process Output
Strategic Planning	provides a Corporate Strategy (under development), consisting of the overall strategic vision and long term strategic objectives, to steer planning and decision-making to deal with defence challenges that may emerge in the future
Capability-Based Planning	produces the Future Security Environment (FSE) and "capability targets and gaps" of the DND/CF (i.e. Force Capability Plan (FCP), formerly Strategic Capability Roadmap (SCR)) consistent with Defence policy - the Canada First Defence Strategy, and the departmental-level Corporate Strategy
Integrated Risk Management	involves identifying, assessing and mitigating risks, based on senior management's level of tolerance
Resource Planning	involves analyzing Defence priorities and establishing resource priorities over multiple planning horizons, including the immediate planning cycle. Includes investment planning and business planning
Investment Planning	5-20-yr horizon; produces an affordable, long-term, strategic-level plan for Defence's investments and divestments
Business Planning	1-3-yr horizon; produces Strategic Planning Guidance (SPG) (current), or a Corporate Plan (future). Establishes annual plans and priorities and balances the investment in sustaining ongoing operations and activities with the investment required to modernize the Forces
In-Year Management	involves monitoring the progress against the Corporate Plan (coming soon), managing the impact of significant issues and new requirements and adjusting resources in response to new pressure
Performance Management	outlines the structure and focal areas (using the PAA) for measuring performance in the DND/CF through which senior management monitors the achievement of results and reports on performance
Government Reporting	through the Report on Plans and Priorities (RPP) and the Departmental Performance Report (DPR)

Source: Vice Chief of the Defence Staff, "DP&M Core Processes," Last modified 18 March 2013, http://vcds.mil.ca/sites/intranet-eng.aspx?page=4160

requirements that relate to the platform. Currently, this is achieved through successive refinement stages[83] without the benefit of a common capability definition methodology to support the *Force Capability Plan* referred to in Table 3.1 and Figure 3.3 and would align capability definitions to budgets.

[83] Public Works and Government Services Canada, "Backgrounder on the National Shipbuilding Procurement Strategy (NSPS) - Year 2: A Status Update," Last modified 19 November 2014, http://www.tpsgc-pwgsc.gc.ca/app-acq/sam-mps/ddi-bkgr-10-eng.html#no5

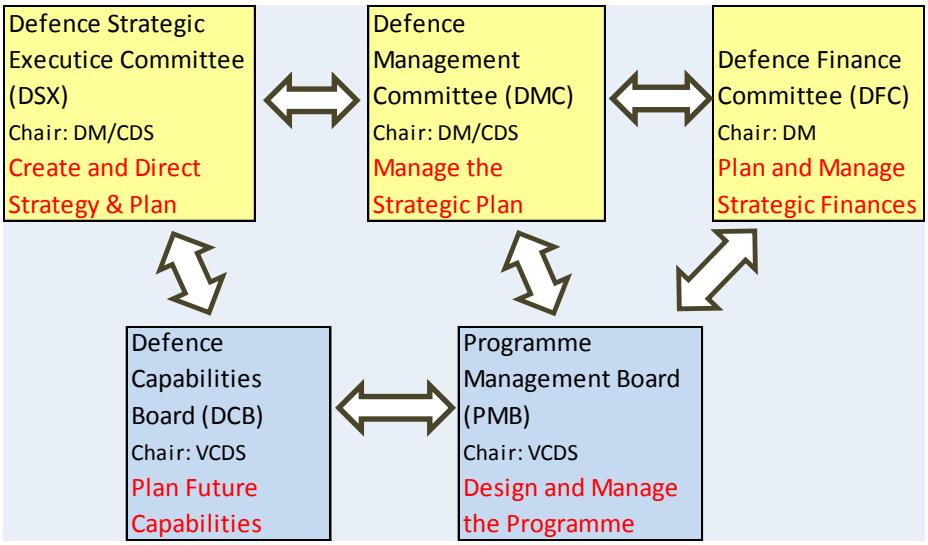

Figure 3.2: Defence Services Programme (DSP) Governance Model

Source: Project Approval Directive Chapter 15 Part 4

Capability Based Planning

Capability Based Planning (CBP) process is applicable to all new equipment purchases and policy states that DND will no longer start capital equipment projects from a blank page because of the extensive CBP analysis that exists.[84] CBP is further described as the assessment of a set of planning scenarios that depict a range of domestic, continental and international situations in which the CAF anticipates conducting operations across the full spectrum of conflict.[85] High Level Mandatory Capabilities (HLMCs) of major projects are validated at the Defence Capabilities Board (DCB)[86] shown in Figure 3.2 but procedures to assess HLMCs are poorly defined and not available. This paper suggests a structured set of military capabilities would serve the DSP governance model with context to communicate how the capability fits

[84] *Project Approval Directive (PAD) 2011-2012*, 10.
[85] Brent Hobson, "Obsolescence Challenges, Part 3 Identifying Future Capability Requirements," *Canadian Naval Review* 4, no.4 (Winter 2009): 10.
[86] Chief of Force Development, "Defence Capabilities Board," Last modified 20 November 2014, http://cfd.mil.ca/sites/intranet-eng.aspx?page=14951

with existing, future, and joint capability and (with valuation) how it could strategically serve the national interest.

The *PAD* provides a scheme for identifying a complete list of capability components for each capability. People, Research & Development, Infrastructure, Concepts of operation and doctrine, Information Technology, Equipment, Support and Sustainment (PRICIE) are the DND-defined aspects of achieving a full capability.[87] PRICIE characteristics have been simplified in the *CFDS* as capability pillars of Personnel, Equipment, Readiness, and Infrastructure, also known as PERI.

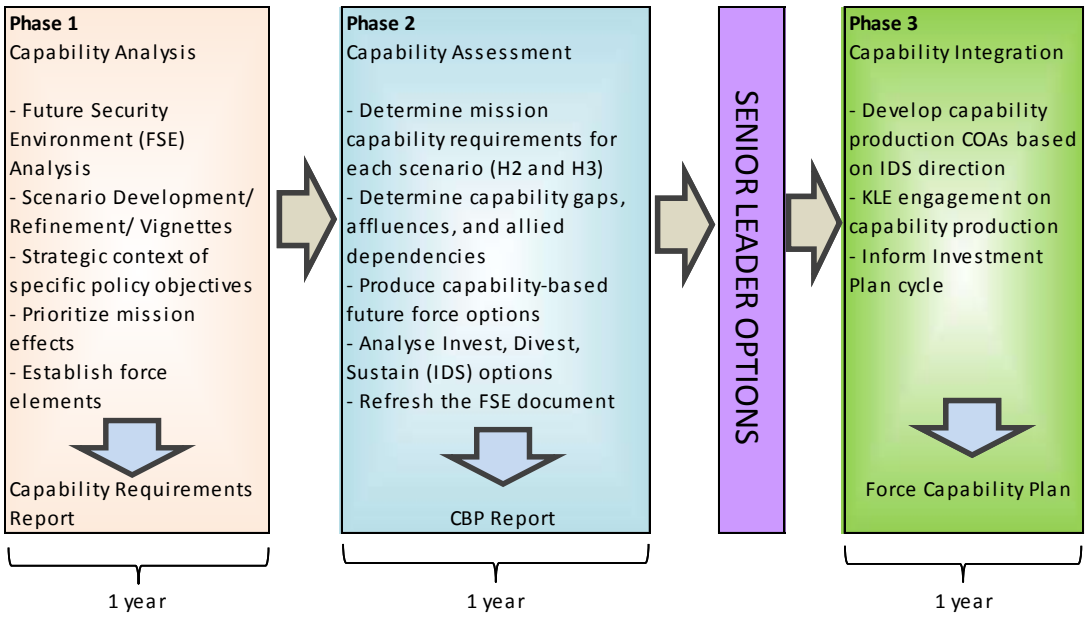

Figure 3.3: DNDs Capability Based Planning Process

Source: Directorate of Capability Integration (VCDS/CFD/DGCSI)[88]

[87] *Project Approval Directive (PAD) 2011-2012*, 14.
[88] DGCSI – Director General Capability Systems Integration. KLE – key leader engagement. See DGCSI website http://cfd.mil.ca/sites/intranet-eng.aspx?page=14077

A high level capability and costing framework has been developed by Director General Capability and Structure Integration for DSP governance. This model recognizes the significance of the resource consumption by overhead organizations such as management, command, and support required to support the *Ready Force* and seeks a funding balance amongst them through investment and capability plans. Five resource types have been identified for the purpose of the costing framework: Personnel, NP, O&M, Capital, and Infrastructure.[89] National Procurement (NP) funding is used for capability sustainment and in-service support activities and includes the supply of spare components and coverage of extensive equipment maintenance and overhaul costs. Operations and Maintenance (O&M) funding is used to provide consumable food, fuel, and materials required by deployed military forces or by forces being generated at home. The other three are self-explanatory.

CMP is the functional authority for all military personnel matters including pay and individual training. Inherent in the CMP's responsibility is ensuring sufficient numbers of trained individuals are available across the CAF for readiness events leading to operational employment. CMP relies on stakeholder input from each military environment branch regarding employment tempo, force and occupation structures, forecasts of capability requirements, and career variables such as attrition and intake that impact the health of each occupation. The primary forum for garnering this input is the Annual Military Occupation Review (AMOR) which recommends changes to military personnel policies and processes to address any forecasted CAF shortfalls.[90] Defence Renewal intends to support CMP as the primary stakeholder for the Individual Training

[89] Chief of Force Development, "DG CSI Operating Procedures Aide Memoire," Annex A, Last modified 07 January 2013, http://cfd.mil.ca/sites/intranet-eng.aspx?page=15020
[90] *Combined Briefing All Occupations.*

& Education (IT&E) of CAF personnel by developing a pan-CAF IT&E architecture to create efficiencies and enhance effectiveness of IT&E delivery.[91]

The Capital Program is the most significant part of the IP and has major and minor projects for the acquisition of new equipment assets, for significant life extension of existing assets and to enhance capabilities of existing assets. The major capital projects governed by the National Shipbuilding Procurement Strategy (NSPS) and the DPS are: Arctic Offshore Patrol Ship (AOPS), Joint Support Ship (JSS) and (notionally) Canadian Surface Combatant (CSC). Management of these naval capital programs is supported by the Naval Board (see Figure 4.1) with oversight by the DCB. Tools for managing DNDs capital program include the capability investment database (CID) that serves as searchable repository for capital project documents and the Defence Resource Management Information System (DRMIS) for executing financial transactions.

Defence Budgets

In 2013, the GoC spent approximately 1.25% of Gross Domestic Product on the DSP ranking us 83rd globally in military spending. By comparison, the United Kingdom spends at twice this ratio and ranks 28th globally.[92] From a low of $11B in 1997, Canadian military expenditure rose steadily to a high of $24.5B in 2011 before dropping back near $18B in 2014.[93]

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[91] The Defence Team, "Defence Renewal Plan," 60, Last modified 12 December 2014, http://defenceteam-equipedeladefense.mil.ca/defence-renewal/index-eng.asp

[92] Central Intelligence Agency, "The World Factbook," Last accessed 10 January 2015, https://www.cia.gov/library/publications/the-world-factbook/

[93] Stockholm International Peace Research Institute, "SIPRI Military Expenditure Database," Last accessed 10 January 2015, http://www.sipri.org/research/armaments/milex/milex_database/milexdata1988-2012v2.xsls

However, after years of neglect, some of these increased expenditures were necessary to retroactively address depleted supply and equipment replacement. Paying retroactively, however, is not desired by GoC officials who have grown accustomed to using DND's budget for political advantage.[94]

The GoC requires DND to manage its DSP expenditures by a defence Program Alignment Architecture (PAA). The PAA is hierarchical in nature and rolls up all DND programs and sub-programs into strategic GoC outcomes.[95] This paper is concerned with reviewing the management practices within DND's sphere of influence such that Defence resources are adequate for the capability expectations and managed effectively. The end user of the resource types and capability pillars is the Canadian Joint Operations Command (CJOC) or the Strategic Joint Staffs (SJS) who control budgeted O&M funds for routine operations but the bigger shares are budgeted for readiness, human resources, and material acquisition and support as indicated in Figure 3.4.

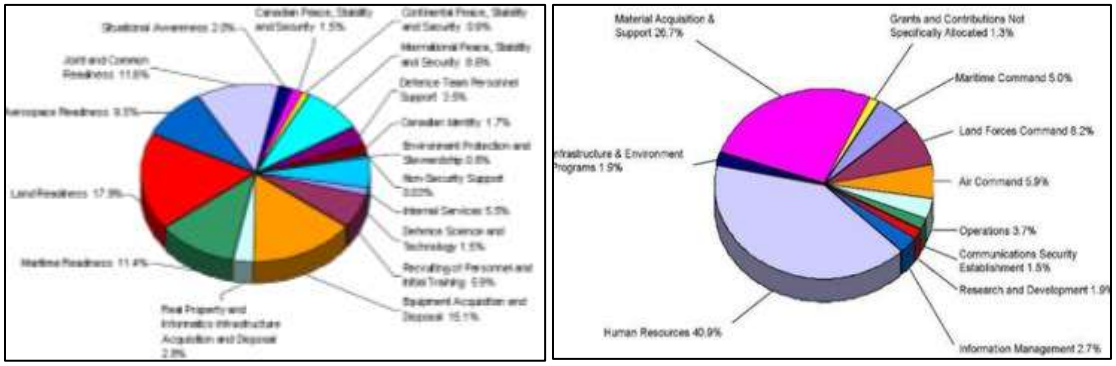

Figure 3.4: 2013 and 2005 Spending by PAA program

[94] Murray Brewster, "Canada's National Defence Budget Reductions Deeper Than Thought," *The Huffington Post*, 11 January 2014, http://www.huffingtonpost.ca/2014/09/01/canada-national-defence-budget_n_5748156.html?utm_hp_ref=canada-budget-2014

[95] *Report on Plans and Priorities 2014-2015,* 5.

Source: ***Report on Plans and Priorities 2012-2013***

Making note of the two PAA schemes in Figure 3.4 used to display 100 % of DSP demands from 2005 and 2013, a striking contrast in the schemes is apparent. Notably, the biggest pieces from 2005's profile (Human Resources and Material Acquisition and Support) are not covered in 2013's profile. These PAA changes make the task to analyse capability costs between 2005 and 2013 more difficult, and, at a granular level, impossible. Without a defined and enduring structure to define capabilities and their constituent components, decisions on investing, sustaining, or divesting specific capabilities will be lacking context. In addition to context, the structured capability definition framework would enable attribution of cost and valuation information to specific capabilities.

To manage any one particular capability, it's implied that one must understand the full-up costs to equip, train, and sustain that military capability. While force capability activity has been has been much discussed lately (development, generation, and employment), the contributors to capabilities have not. This is intended to change with the revisions to the PAA in 2014 that bring 'force elements' and 'capability elements' into focus.[96] The four capability pillars of the *CFDS* are still considered a necessary part of the scheme to determine the full-up costs of a capability including the acquisition, sustainment and training to be managed within a consistent and sufficiently detailed force capability definition.

Budget management is driven annually by funds demanded from existing portfolios under the DSP. Given that defence portfolio definitions have formed around the PAA, the L1

[96] *Report on Plans and Priorities 2014-2015,* vii.

organizations, the military trades, and the platforms employed in operations; modifying the portfolio definition should not be considered lightly. Regardless, realignment of budget and business portfolios to a capability-centric structure is encouraged because military capabilities are the essence of the CAF's value. The alternative is to simply replace existing platforms and systems as they wear out and justify the new acquisition with the old argument.

Defence Enterprise Management

Defence Resource Management Information System (DRMIS) is an integrated, engineering, maintenance, supply, and finance information system that supports corporate processes including procurement, and workforce management. DRMIS is an enterprise resource system that has been used exclusively by DND for procurement and finances since 2007 and fulfills the accountability demands of the FAA. The DRMIS modules shown in Figure 3.5 represent version 6.0 in 2012 when a major update to *Real Estate Management* was rolled out along with and significant updates to those modules colored green. Modules which have strong relevance to this paper include *Financials, Materials Management, Asset accounting, Project Systems,* and *Business Intelligence*.[97]

DRMIS was established to manage all DND's accounts, track all transactions, and attach necessary information to each account and transaction. The delivery of DRMIS aimed to support Defence processes and GoC requirements and process refinement continues with input from the

[97] Department of National Defence, DRMIS Defence Resource Management Information System Enabling the transformation of supporting operations," Last modified November 2012, https://www-304.ibm.com/events/wwe/grp/grp011.nsf/vLookupPDFs/Canada%20DND%20DRMIS%20Update/$file/Canada%20DND%20DRMIS%20Update.pdf

user community to the DRMIS Centers of Excellence. The development of DRMIS has recognized that combining specialized knowledge of Defence business processes with established accounting practices and enterprise software knowledge would lead to an improved method to manage expenditures on military capabilities. With continuing improvements and increased usage, DRMIS intends to provide improved situational awareness on status of equipment readiness with improved asset management, a common view of life cycle equipment support costs, and support to capability-based planning.[98]

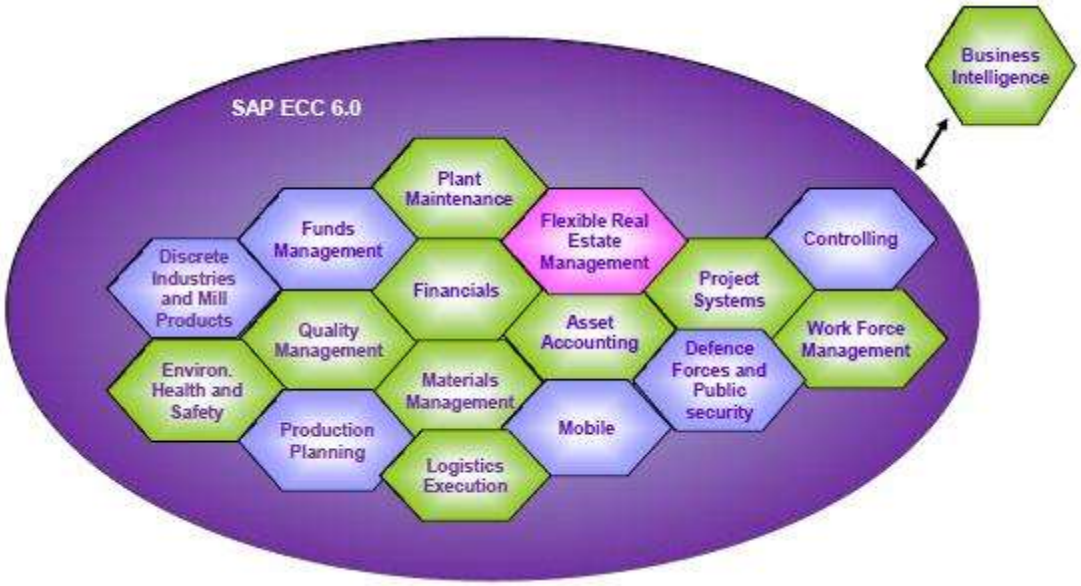

Figure 3.5: DRMIS functionality modules

Source: ***DRMIS Defence Resource Management Information System Enabling the transformation of supporting operations***

DRMIS provides an environment to organize funds and projects into a structure that mirrors the desired management structure and an ability to better gather an aggregate of costs associated to a capability. Defence financial management simplified for the purposes of this

[98] *DRMIS Defence Resource Management Information System Enabling the transformation of supporting operations*, 9.

paper equates funds that exist in DRMIS Financials and Funds Management[99] to the five resource types managed by the VCDS to run the DSP. Again, these are Personnel, NP, O&M, Capital, and Infrastructure. Funds exist to record expenditures (or receipts) and there are several funds applicable to each resource type. For example, civilian pay (C105) is separate from military pay (C103) but they both contribute to the Personnel resource. Funds are further distributed according to rules of the FAA to cost centers and projects.

The DRMIS *Plant Maintenance* module provides the engineering processes necessary to control fleet and system configuration, and manage engineering data such as maintenance and modification history. Combining *Plant Maintenance* with *Materials Management* provides an ability to manage system technical readiness based on the availability of repairable and consumable components. The RCN has been using this enterprise software for material support processes since 2005 and they have matured to DND/CAF-wide processes for second line maintenance performed at the depot level and first line performed at the unit level.

The *Project Systems* module in DRMIS is used to manage a variety of capital and NP projects, portfolios, and programs and contains an important mechanism that enables the expenditure of resources (funds). A DRMIS project consists of several types of objects. First is the Project Definition as the binding framework for all organizational elements within a project. Here one can manage variables that affect the entire project. Next is the work breakdown structure (WBS), a hierarchical outline of an undertaking described in the Project Definition object. The WBS forms the basis for the organization and coordination of a project and consists

[99] Department of National Defence, "Fund Descriptions," Last modified 27 March 2014, http://admfincs.mil.ca/dfpp,

of various WBS elements. Standard templates for projects exist in DRMIS that can be copied as required to create new projects or modify existing ones. Standardization is one method of ensuring that projects are structured effectively to make processing more transparent, enable the comparison of projects, and facilitate project reporting and controlling.[100]

The *Business Intelligence* module supplements reporting on data native to the DRMIS processing environment but it delivers reports with a variety of common applications such as Microsoft Excel. *Business Intelligence* functionality allows extraction of specified DRMIS-entered data to populate custom reports. The report's validity is supported by having the data source originate from the Departmental system of record for finance and material status.

CAF Doctrine

As a foundational component of capability, doctrine retains concepts applicable to the myriad of levels, pillars, and resources of any military capability. *Canadian Military Doctrine*, as the volume from which all other CAF doctrine flows, describes the components of military power and relates them to a WoG approach where the individual elements of military power are more interactive and complementary.[101] It also explains the employment of military power within a comprehensive approach framework as the new norm at all levels of war, from the

[100] Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (Project Management Institute Inc.: Newton Square, 2000): 58.
[101] Department of National Defence, B-GJ-005-000/FP-001, *Canadian Forces Joint Publication CFJP 01 Canadian Military Doctrine* (Ottawa: DND Canada, 2011), 2-4.

strategic to the tactical level where the national interest is supported by military objectives. To organize meeting these objectives, six capability domains[102] are defined in Table 3.2.

Table 3.2 Capability Domains

Domain	Capabilities
Command	Command support, communications, joint effects targeting
Sense	Intelligence, surveillance and reconnaissance
Act	Aerospace effects production, land effects production, maritime effects production, special operations effects production
Shield	Force protection
Sustain	Sustainment, support services, movements, theatre activation and deactivation
Generate	Force generation

Source: B-GJ-005-000/FP-001 Canadian Military Doctrine, 2-7.

Doctrinal specialities amongst the three environments (land, air, sea) are to be expected. Land has nominally led the nation in some common and enabling types of doctrine development while air and sea capabilities expand into their environments influenced by proliferation of new technologies and expanding threats. CAF-wide guidance on doctrine development [103] provides an essential element in developing and generating the capabilities necessary to meet emerging

[102] *Canadian Military Doctrine* defines the six capability domains, also mirrored in the *PAD*.
[103] Department of National Defence, A-GJ-025-0A1/FP-001, *Canadian Forces Joint Publication CFJP A1 Doctrine Development Manual* (Ottawa: DND Canada, 2011), 2-4. http://publications.gc.ca/collections/collection_2011/dn-nd/D2-253-2009-eng.pdf

threats by guiding the use of operational scenarios to assist CBP through software modelling with the ability to predict outcomes similarly to traditional war gaming.[104]

At a higher level, strategic scenarios provide guidelines for capability planning and development. [105] Continuous effort, however, is required due to changing factors such as new adversaries, new policies, new technologies, changes in force structure, and new doctrine developed elsewhere (lessons learned). The system of integrated processes that identifies necessary changes to existing capability and articulates new capability requirements for the CAF is defined by doctrine as force development (FD).[106] FD comprises CBP, capability management, and capability production. Also, force employment (FE) is defined as the command, control and sustainment of generated forces on operations and force generation (FG) is the process of organizing, training and equipping forces for FE.

Doctrine has helped shape the issues of capability management with definitions of capability domains from Table 3.2 and defined context of FD, FG, and FE. Doctrine also informs the context for capability contributions from pillars, and helps to define interrelated FG levels.[107] Having a better understanding of the FG organization and its needs will assist alignment of FD processes to FG and assists the maturation process of select capabilities. Delivering capability options from FD to FG with science-based evidence to enhance particular capabilities driven by a changing security environment[108] is also shaped by doctrine.

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[104] *Doctrine Development Manual*, 1-2.
[105] Defence Science and Technology Organisation, "Model-Based Military Scenario Management for Defence Capability," Last accessed 10 January 2015, http://www.dodccrp.org/events/9th_ICCRTS/abstracts/173.pdf
[106] *Canadian Military Doctrine*, GL-3.
[107] *Canadian Military Doctrine*, 5-9.
[108] Defence Research and Development Canada, "Defence and Security S&T Strategy," 17, Last modified 10 December 2014, http://www.drdc-rddc.gc.ca/en/publications/defence-st-strategy.page

Military Capability Valuation

How Canada values its military capability is a multifaceted question that can be debated politically or strategically and has a different result according to one's perspective. The average Canadian polled had placed disaster relief as the highest CAF mission priority and put search and rescue as second while enforcing sovereignty and fighting terrorism were placed significantly lower. A DND source said that such polling data is "interesting" but has little long-term effect on the department and the Canadian Forces.[109]

The CAF output of skilled war-fighters operating as a cohesive unit with technical competence and tuned equipment worked into a technologically dominant Ops Team is the essence of the value of military force.[110] The usefulness of any particular Ops Team, however, depends upon the ability of the defence institution to draw appropriate support from each of the four capability pillars and sustain it through an operational cycle. The structured processes of creating and maintaining the capabilities inherent in CAF operations are shown in Table 3.1. As a further means to guide investment, it's recommended that valuation management be incorporated into the DP&M framework of Table 3.1.

The capability valuation methodology depicted in Table 3.3 holds the valuation perspective from the GoC and Parliament since they control the investment plan and the resources assigned to DND. Joint CAF doctrine definitions presented in Table 3.2 provide capability descriptions that are expanded into capability teams to demonstrate valuation

[109] David Pugliese, *Defence Watch* (blog), 18 January 2012, http://blogs.ottawacitizen.com/2012/01/18/canadians-getting-tired-of-foreign-wars-dnd-told-its-time-to-concentrate-on-missions-closer-to-home/
[110] *Transforming National Defence Administration,* 7.

methodology shown in Table 3.3. These can be further expanded into sub teams and this will be shown for the RCN in Chapter 5. Valuation results for each capability are intended to insert more strategic planning into the DSP and insulate decision making from political influence. The cost of each capability is also presented in Table 3.3 and the methodology for determining capability cost is shown in Chapter 5.

Table 3.3 Capability Valuation Methodology

Domain	Capability (Team)	Capability Sub-Teams	Cost	DND Priority Match	GoC Defence Outcome Match	GoC Other Outcome Match	Valuation Result
Command	Command support	TBD	$	score 1	score 2	score 3	team total
Command	Communications	TBD	$	score 1	score 2	score 3	team total
Command	Joint effects targeting	TBD	$	score 1	score 2	score 3	team total
Sense	Intelligence	TBD	$	score 1	score 2	score 3	team total
Sense	Surveillance	TBD	$	score 1	score 2	score 3	team total
Sense	Reconnaissance	TBD	$	score 1	score 2	score 3	team total
Act	Aerospace effects production	TBD	$	score 1	score 2	score 3	team total
Act	Land effects production	TBD	$	score 1	score 2	score 3	team total
Act	Maritime effects production	Chapter 5	$	score 1	score 2	score 3	team total
Act	Special operations effects production	TBD	$	score 1	score 2	score 3	team total
Shield	Force protection	TBD	$	score 1	score 2	score 3	team total
Sustain	Sustainment	TBD	$	score 1	score 2	score 3	team total
Sustain	Support services	TBD	$	score 1	score 2	score 3	team total
Sustain	Movements	TBD	$	score 1	score 2	score 3	team total
Sustain	Theatre activation deactivation	TBD	$	score 1	score 2	score 3	team total
Generate	Force generation	TBD	$	score 1	score 2	score 3	team total

To determine a valuation result for a capability there are three broad criteria proposed as indicated by headings in Table 3.3. The capability's match to DND's priorities and GoC's Strategic Outcomes for Defence should not be difficult because the *Report on Plans and*

Priorities provides annual priorities[111] and analysis of the Defence Programs with respect to GoC Strategic Outcomes for Defence. Lastly is the capability's match to GoC's Strategic Outcomes for Programs other than Defence. The Deputy Minister Governance Committee (DMGC) of the Defence Procurement Strategy (DPS) is appropriately positioned to assess valuation impacts from other Programs.

A core element of the DPS approach is rated and weighted Value Propositions (VP) for defence procurement projects. Industry bidders will be motivated to put forward their best industrial plan for Canada, as these contract bids will be scored favourably if they lead to improved economic outcomes such as strengthened Canadian key industrial capabilities (KICs) and enhanced productivity in Canadian firms.[112]

Each capability team (and sub-team) comprising a portion of the measurable output of the CAF would receive a valuation result and cost. These would be analysed in terms of the level of GoC ambition and gaps between what is required and what is currently possible. The redesigned PAA, intended to be a more functional expression of the integrated means by which Defence outputs and outcomes are achieved, when combined with the new Defence Business Model, will facilitate business process renewal initiatives within Defence.[113]

The challenge of determining capability cost will be met by dissecting capability into contributor components. Capability contributors, however, can be defined in at least three methods that are currently supported by policy: the four pillars of the *CFDS*; the PRICIE

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[111] *Report on Plans and Priorities 2014-2015*, 9-13.
[112] *Canada First: Leveraging Defence Procurement Through Key Industrial Capabilities*, 35.
[113] *Report on Plans and Priorities 2014-2015*, 13.

components of *PAD*; and the force generation components of *Canadian Military Doctrine*. These were considered to be essentially the same but the pillars from *CFDS* were selected due to the prominence of this policy and the similar 'PERI' concept also found in the *PAD* as an IP resource allocation concept.[114]

[114] *Project Approval Directive (PAD) 2011-2012*, 140.

RCN CAPABILITY MANAGEMENT

By virtue of its long coastline and reliance on globally based sea-borne trade, Canada must ensure the protection of global sea supply routes. Canada's interest in sea control and sea denial operations is also driven by stated intentions to protect its maritime approaches from smuggling, trafficking, and pollution, and also provide search and rescue and opportunities for scientific research.[115] The sea supply routes that transit through the Persian Gulf, for instance, are vital to our European Allies and important to Canada's trade. Canada's contribution to protect this sea supply route has been RCN ships with embarked helicopters and boarding parties through Operation OPOLLO, Operation ARTEMIS, and Combined Task Forces interdicting unlawful activity and providing an effective deterrent to maritime threats throughout that region.[116]

The RCN is the end user of all the assets and resources acquired to deliver the naval capability required by the GoC. To generate combat capable forces, the RCN must receive from the four capability pillars of the *CFDS.* The RCN's business plan, through the use of ten intermediate output groups (IOGs), ensures coverage of all pillars. The readiness pillar, however, dominates the RCN allocations due to resources from other L1s that cover most of the core military and civilian personnel costs and the ongoing capital investments.

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[115] National Defence and the Canadian Armed Forces, "Canadian Surface Combatant (CSC)," Last modified 02 December 2013, http://www.forces.gc.ca/en/business-equipment/canadian-surface-combatant.page

[116] Martin Ewence, "Presence and influence: Western Naval power in Gulf security today and tomorrow," *IHS Jane's Navy International* (March 2014): 16-17.

RCN Governance

Strategic rework on the governance structures of the RCN has been underway for the last several years. This has resulted in some significant changes to decision making bodies and the creation of new positions under the Navy Transformation initiative.[117] The CRCN chairs the Naval Board which is the senior executive decision making body[118] of the RCN shown in Figure 4.1. Lower tiers of the RCN are also represented in Figure 4.1 but separate governance organizations of coastal formations are omitted. DND-wide processes shown in Table 3.1 and governed by bodies shown in Figure 3.2 are implemented by governance in Figure 4.1 for the RCN.

[117] Rear-Admiral Mark Norman, *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016* (NDHQ file: 3371-1948-1 DNBP / RDIMS # 242503, 19 July 2012): Annex E.
[118] Vice-Admiral P.D. McFadden, *Naval Board – New Terms of Reference* (NDHQ file: 3371-3250-1 DGMSM / RDIMS 178564, 27 August 2009)

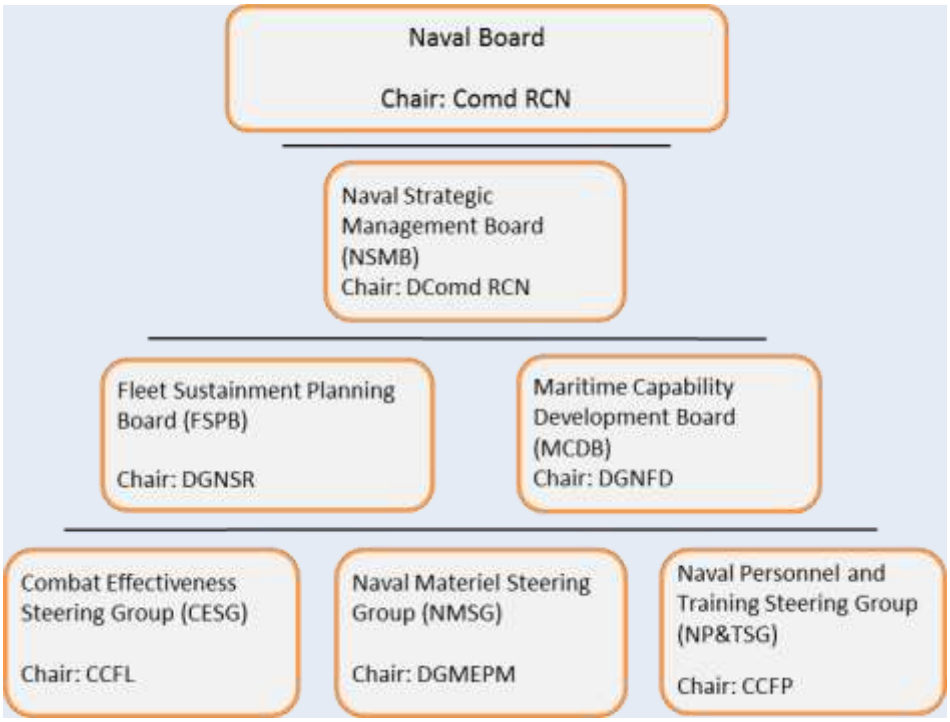

Figure 4.1 RCN Governance Tiers

Source: Director Naval Strategic Management, NMSB Minutes, Feb, 2014

The CF Transformation report recommended the rationalization of the RCN Force Generation (FG) structure and Navy Transformation intends that the RCN's structure evolves effectively.[119] These initiatives will adjust staffing assignments of all RCN-related civilian and military employees into high-priority activities and eliminate redundancies by creating single national authorities for key capability management process and activities. Accordingly, Navy Transformation has created the following new authorities:

- The Commander Naval Training System (CNTS) will consolidate the five naval schools under a single authority.
- Single Fleet Scheduling and Readiness Management Authority will consolidate MARPAC and MARLANT functions into a single authority within MARLANT.

[119] Department of National Defence, "Navy Transformation: Adjusting to deliver a revitalized Navy," Last modified 27 July 2013, http://www.forces.gc.ca/en/news/article.page?doc=navy-transformation-adjusting-to-deliver-a-revitalized-navy/hgq87xtc

- Directorate New Capability Introduction (DNCI) will serve as the primary point of contact for coordinating the introduction of new platforms and systems into service. The creation of DNCI within MARPAC will be the key to a centrally managed, focussed effort in support of new capability introduction from capital projects. [120]

The transformation towards a 'One Navy' continues to involve the realignment of the RCN's core processes to fulfill CRCN role as principal maritime advisor to the CDS and manager of naval capabilities. Assignment of pan-naval authorities for specific elements of maritime capability management should facilitate the RCN becoming more strategically agile and adaptive for future challenges. [121]

Ongoing changes to naval governance often require an updated governance model for the RCN and the functional governance scheme recently approved in principle by the NSMB and shown in Figure 4.1 may undergo further adjustments in this transformation cycle. The proposed FG functional model consists of three pillars: Material, Training, and Production of Warfare Competencies. Each pillar would be designated to a responsible officer and governed by a specific board as follows:[122]

- DGMEPM, in his role as Chief Engineer to CRCN, would be responsible for the Material pillar. This pillar would be supported in its governance by the Naval Materiel Steering Group (NMSG).
- Comd MARPAC, in his role as CNTS, would be responsible for the Training pillar. This pillar would be supported in its governance by the Naval Personnel and Training Steering Group (NP&TSG) shown in Figure 4.1.
- Comd MARLANT would be responsible for the Production of Warfare Competencies pillar. This pillar would be supported in its governance by the Combat Effectiveness Steering Group (CESG) shown in Figure 4.1.

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[120] *Navy Transformation: Adjusting to deliver a revitalized Navy.*
[121] *Interview with Vice-Admiral Mark Norman*, 11.
[122] RAdm M.F.R. Lloyd, *Naval Strategic Management Board 02/2014 Minutes* (NDHQ file: RDIMS #322218): 7, http://rcn.mil.ca/repository/exco-reex/mspb-cpsm/RDIMS_322218.pdf

These pillars strongly relate to the capability pillars indicated previously in the *CFDS*. Additional work on this functional model continues according to direction provided by the NSMB. To avoid confusion in the interim, their names are related by Equipment to Materiel, Personnel to Training, and Production of Warfare Competencies to Readiness.

Maritime force capabilities are found within one of two naval Formations, Maritime Forces Atlantic (MARLANT) and Maritime Forces Pacific (MARPAC). These Formations bring together the four pillars of capability in the form of warships, port facilities, naval personnel, garrison facilities, range facilities, auxiliaries, and headquarters staff necessary to generate various maritime forces according to the level of ambition established by government. Formations are governed and supported by the Naval Staff Headquarters (NSHQ) under the leadership of CRCN who manages capability with the 10 year Navy Plan and addresses important navy issues with the support of the Naval Board.

Naval Force Development

Naval Force Development (FD) has recently been articulated to consist of the four functions "conceive, design, build, and manage" the delivery of new RCN assets and capabilities.[123] Director General Naval Force Development (DGNFD) is accountable for development of new capability from defence science (concepts and prototypes) and supporting investment decisions by managing requirements and operational deficiencies. DGNFD is supported by the Maritime Concept Development & Experimentation Coordination Group

[123] *Naval Strategic Management Board 02/2014 Minutes*, 6.

(MCDECG) who are given the mandate to manage the development of concepts and support experiments required to support capability acquisition decisions.[124]

DGNFD provides Maritime Science and Technology Programme Guidance (MSTPG)[125] to ADM(S&T) to meet specified scientific objectives that support FD. In the naval context, these are organized as the five programs and sixteen projects known as the Naval S&T Portfolio[126] shown in Figure 4.2. Endorsement of this portfolio by DGNFD and the Defence Capability Board represents planned scientific activity by Defence Research and Development Canada (DRDC) primarily aimed at supporting the naval component of the Investment Plan but also has provisions to conduct research and development as requested by CAF/RCN clients throughout the year.

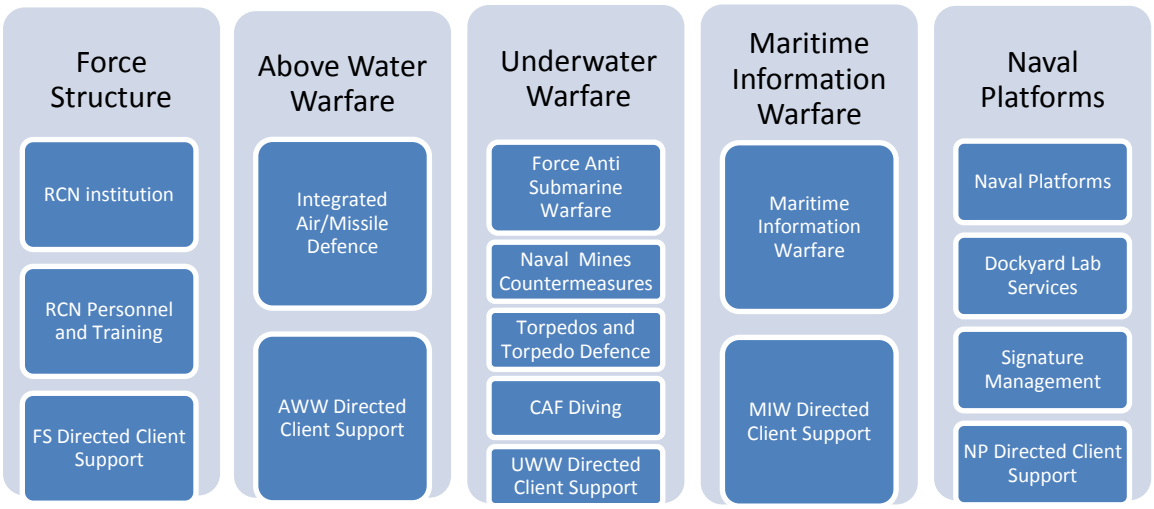

Figure 4.2 Naval S&T Portfolio

Source: *Formulating the Navy S&T Projects Status and Next Steps*

[124] Department of National Defence, "NAVORD 3771-13 Concept Development and Experimentation," Last Accessed 01 December 2014, http://rcn.mil.ca/navord-omar/default-eng.asp
[125] Commander Royal Canadian Navy, *Maritime Science and Technology Programme Guidance (MSTPG)* (NDHQ file: NSHQ RDIMS OTT-PKS #226237) 07 March 2014.
[126] Steven Hughes, *Formulating the Navy S&T Projects Status and Next Steps* (Ottawa: DRDC Director S&T Navy 10 Dec 2013)

S&T activity faces the challenge of strategically selecting research and promoting technology that will have an operational impact. The assessment of technology impact is based on a maturity model that requires test and/or operations in the appropriate environment in order to gain understanding. A systematic approach to understanding technology impacts was developed by National Aeronautics and Space Administration (NASA) and was adopted by DRDC.[127] It defines nine specific Technology Readiness Levels (TRLs) with maturity ranging from initial research to established commercial products. NASA also defined challenges applicable to advancing a technology to a higher TRL. The ability to transition technology developments produced by efforts such as the Naval S&T Portfolio portrayed in Figure 4.2, to CAF operational capability is a selection process facilitated by DRDC[128] for any defence or security domain.

RCN Doctrine

The Canadian Forces Maritime Warfare Centre (CFMWC) manages the RCN's maritime doctrine development but contributions from DGNFD and ADM (S&T) are also regularly solicited. Like other elements of force, naval doctrine is required in order to conceptualize and maximize the effects of maritime capability. Naval doctrine is provided through NATO authorities as Allied Tactical Publications (ATPs) for a host of C2 scenarios where preparations

[127] National Aeronautics and Space Administration, "Mitigating the Adverse Impact of Technology Maturity," Last modified 27 July 2012, http://www.nasa.gov/offices/oce/pmchallenge/library/2007-presos.html
[128] Defence Research and Development Canada, Defence and Security S&T Strategy *Science and Technology in Action: Delivering results for Canada's Defence and Security* (Ottawa: Government of Canada Publications, 2014), 21.

for tactics are made but the RCN develops its own doctrine for ship-internal capabilities[129], single ship operations, or refinements to tactics. For the purposes of this paper, only the unclassified doctrine and its impact on capability management is of interest. Besides various Naval Orders (NAVORDS), primary RCN doctrinal documents of interest include the following:

- Ship's Standing Orders (SSOs), and
- Combat Readiness Requirements (CFCD 102);
- Readiness and Sustainment Policy (CFCD 129).
- Individual Training and Education Policy[130], and
- Naval Material Management System (NaMMS).

NAVORDS issued in 2014[131] reflect the recent Naval Transformation and highlight a consistent adherence to the 'Five F' functional model developed with VCDS/CProg as part of the *DND/CF Business Management Model*. Three of the five functional lines of effort (FD, FG, and FE) have already been defined by CAF doctrine but RCN doctrine expands upon this and includes definitions of Force Management (FM) and Force Support (FS). FM includes governance, administration, financial controls, and enterprise oversight. FS is described as logistical and technical support to equipment maintenance and garrison support functions for CAF personnel.[132]

Halifax Class frigate remains central to the development of most maritime doctrine. As a multi-role frigate capable in several maritime warfare areas, identification and prioritization of capability deficiencies is a complex task guided by class Concept of Employment (CoE) and

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[129] *NAVORD 3771-13 Concept Development and Experimentation*
[130] Gold Book and Blue Book targets are promulgated annually for naval training establishments. See Department of National Defence, "NAVORD 4500-0– Royal Canadian Navy Individual and Collective/Operational Training Policy," Last Accessed 01 December 2014, http://rcn.mil.ca/navord-omar/default-eng.asp
[131], Department of National Defence, "NAVORD 5760-1 Organization and Establishment," Last Accessed 01 December 2014, http://rcn.mil.ca/navord-omar/default-eng.asp
[132] *NAVORD 5760-1 Organization and Establishment*

Concept of Operations (CONOPS). These concepts are found in the Class Plans[133] that describe capabilities of the physical warship. For example, the modernization of the Halifax Class has driven a review of its CoE.[134] This review will continue beyond the acceptance of the HCM project while the RCN attempts to maximize the operational use of new capabilities of the class.[135] The key HCM requirement document,[136] however, makes no reference to the Capability/Readiness Matrix provided by CFCD 129 and provides no evidence to dispel the criticism that no framework exists [in widespread usage] to manage RCN capabilities and from which development and procurement activities could align.[137]

Naval Requirements Management

Naval requirements management is concerned primarily with the Capability Based Planning (CBP) process as shown within the DP&M Framework of Table 3.1. Managing the requirements is balancing known and perceived threats against the national interests and the ambitions of the GoC and involves all planning horizons. The RCN manages requirements through the Director of Naval Requirements (DNR) within the DGNFD organization. DNR is assisted in managing requirements by the operational readiness authority (MARLANT/N5) who maintains a listing of capability deficiencies.[138] Statements of Operational Capability Deficiency

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[133] Director Maritime Equipment Programme Management (Major Surface Combatant), "Halifax Class Plan," Last modified 18 September 2012, http://admmat.mil.ca/dgmepm/dmcm_halifax/en/halifax_class_plan1_e.asp
[134] VAdm Norman, *Naval Board 02/13 Minutes* (NDHQ file: RDIMS #309540) http://mshq.mil.ca/repository/dgmsm-dggsm/gov-gouv/nb-cm/NBEC_MINUTES_SEP_13.PDF
[135] Department of National Defence, "NAVORD 3333-0 Maritime Operational Test and Evaluation Authority Roles and Responsibilities," Last Accessed 01 December 2014, http://rcn.mil.ca/navord-omar/default-eng.asp
[136] Chief of Maritime Staff, *Statement of Operational Requirement (SOR) Halifax Class Modernization (HCM)* (NDHQ file: RDIMS 98460-v14-OTT_PKS.DOC): 11.
[137] *Obsolescence Challenges, Part 3 Identifying Future Capability Requirements,* 14.
[138] Department of National Defence, "NAVORD 3009-3 Statement of Operational Capability Deficiency (SOCD)," Last Accessed 01 December 2014, http://rcn.mil.ca/navord-omar/default-eng.asp

(SOCDs) are key documents to inform strong leadership necessary to guide acquisition projects that exploit advances in technology and continue adding capability to the force. [139]

The principal threats to global maritime security recently compiled by Janes Navy International [140] are considered to significantly threaten Canada's vital maritime interests in shipping, ocean conservation, and resources.[141] A recent decline in Canada's overall maritime operations capacity is exacerbated by the decline of the technological advantage previously enjoyed[142] and the emergence of new technologies that threaten the RCN's ability to control the maritime domain. For example, the proliferation of quieter submarines[143] demands a renewed assessment of the under-water warfare (UWW) requirements to sense, act, and shield in the underwater environment.

New naval capabilities, by virtue of their extreme expense and high profile, are subjected to bureaucratic and political criteria for their selection and approval. Indeed, former MND Brooke Claxton once warned military officers[144] about tempering requirements to the reality of finite financial resources and political acceptance when making pitches to government for new equipment or additional personnel. Also, the constraint where DND/RCN planners must design

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[139] Public Works and Government Services Canada, "PWGSC Project Complexity and Risk Assessment (PCRA) Tool and Manual," , Last modified 20 November 2014, http://www.tpsgc-pwgsc.gc.ca/biens-property/sngp-npms/pcra-ecrp/intro-eng.html

[140] *Presence and influence: Western Naval power in Gulf security today and tomorrow*, 16-17.

[141] Laurence M. Hickey, *The Canadian Navy and Domestic Maritime Enforcement* (Halifax: Centre for Foreign Policy Studies, 2011): 109.

[142] David Owen, *Anti-Submarine Warfare: An Illustrated History* (Annapolis: Naval Institute Press, 2007): 210.

[143] Grace Jean, "Diesel-Electric Submarines, the U.S. Navy's Latest Annoyance," Last modified April 2008, http://www.nationaldefensemagazine.org/archive/2008/April/Pages/AntiSub2301.aspx

[144] *The Political Role of the Military: An International Handbook*, Constantine Panos Danopoulos, Cynthia Ann Watson (Westport: Greenwood Press, 1996): 44.

to a budget number as opposed to building a bottom-up design from capability based requirements is difficult to overstate.[145]

In addition to the DSP's procedural constraints, it seems the navy's plans must not be seen as an increase in the present capability while providing adequate security for Canada's ocean domain.[146] The acquisition of Joint Support Ships (JSS), for example, was originally scoped to greatly enhance the RCN's capabilities to support forces ashore with strategic sealift, a modular hospital, and floating littoral region headquarters.[147] The 2013 selection of the Berlin Class for JSS, providing little of these capabilities, prompted retired Commodore Lerhe to comment, "It would be good enough for the naval-supply function. It would not be as good as the full-up, joint-support ship." [148]

Naval Investment Plan

DGNFD is accountable to CRCN for management of the naval portion of the IP and co-ordinates the directorship of naval acquisition projects by applying Capability Based Planning (CBP), requirements management, and applying SOCDs to the management of naval capital projects. The major capital projects of the National Shipbuilding Procurement Strategy (NSPS)

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[145] Brian Stewart, "Analysis Brian Stewart: How not to rebuild Canada's navy," *CBC News*, 21 March 2013 http://www.cbc.ca/news/canada/brian-stewart-how-not-to-rebuild-canada-s-navy-1.1369459

[146] Peter T. Haydon, "Canadian Naval Future: A Necessary Long-Term Planning Framework Institute for Research on Public Policy," 12, Last modified November 2004, http://irpp.org/wp-content/uploads/assets/wp2004-12.pdf

[147] Elinor Sloan, "Military Transformation: Key Aspects and Canadian Approaches," 8-9, Last modified December 2007, http://dspace.cigilibrary.org/jspui/bitstream/123456789/10319/1/Military%20Transformation%20Key%20Aspects%20and%20Canadian%20Approaches%202007.pdf?1

[148] The Canadian Press, "Navy considers modified designs for new supply ship," Last modified 10 March 2011, http://www.ctvnews.ca/navy-considers-modified-designs-for-new-supply-ship-1.617026

will manage the replacement of two classes of ship and introduce a new class for Arctic service.[149] RCN sources indicate that surface fleet investment required will be approximately $100B over the next 30 years.[150]

The offices of major navy projects have been subjected to several DND internal and external GoC audits and the RCN has established a policy for assisting the coordination of these audits.[151] For example, the JSS project manager under ADM(Mat) estimated the acquisition budget as $2.6B and 30 years of crewing and operating the ship to cost $4.5B. DND's Chief of Review Services (CRS) supported this estimate;[152] however, the Parliamentary Budgets Officer (PBO) suggested the acquisition cost will be significantly higher.[153] The Auditor General (AG) of Canada stated that rigid cost restrictions have forced the RCN to make capability trade-offs for JSS.[154] This inflexibility is detrimental to agile capability management that can address emerging naval operational capability requirements and support government ambitions outlined in the *CFDS*. Also, the AG believed it likely that the CSC project would remain constrained with an imposed cost ceiling.[155]

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[149] *Backgrounder on the National Shipbuilding Procurement Strategy (NSPS) - Year 2: A Status Update*.
[150] *Backgrounder on the National Shipbuilding Procurement Strategy (NSPS) - Year 2: A Status Update*.
[151] Department of National Defence, "NAVORD 1370-5 Audits by External Agencies Including Office of the Auditor General (OAG) of Canada and Chief Review Services (CRS) Department of National Defence," Last Accessed 01 December 2014, http://rcn.mil.ca/navord-omar/default-eng.asp
[152] National Defence and the Canadian Armed Forces, "Internal Audit of Joint Support Ship (JSS) Project," Last modified 01 November 2011, http://www.crs-csex.forces.gc.ca/reports-rapports/2011/176P0934-eng.aspx#obj
[153] Office of the Parliamentary Budget Officer, "Feasibility of Budget for Acquisition of Two Joint Support Ships," 1, Last modified 28 February 2013, http://www.pbo-dpb.gc.ca/files/files/JSS_EN.pdf
[154] The Canadian Press, "Navy supply ships set to become political lightning rod," Last modified 06 January 2013, http://www.cbc.ca/news/politics/navy-supply-ships-set-to-become-political-lightning-rod-1.1393466
[155] *2013 Fall Report of the Auditor General of Canada, Chapter 3, National Shipbuilding Procurement Strategy,* 19.

Contrary to replacement projects, the AOPS project will deliver an entirely new fleet with new capabilities. Its additional challenge to defend requirements, however, is offset by its strong political patronage. Regardless, it should be noted that the Canadian Center for Policy Alternatives considers the GoC is heading for disaster with AOPS because they are being built to satisfy the wrong requirement and are a compromise vessel suitable neither for an arctic nor offshore patrol vessel role.[156] In reverse of the normal proposals, AOPS was first envisioned by GoC and pitched to a reluctant RCN that had been chronically under-funded in relation to its demands but, eventually, an adequate statement of the requirement was articulated by the RCN to support the arctic capabilities desired by the GoC.

The naval National Procurement (NP) program is part of the naval IP and provides logistics support required to sustain existing naval equipment. It is governed by the DSP and administered by DGMEPM as recurring projects that are updated every 5 years and given a yearly allocation for ongoing in-service support (ISS).[157] Significant in-year consultation occurs between MEMP, DGNFD, and Formation staff to deliver a flexible and effective NP program that is more than four times larger than the RCN demand of $150M for engineering, maintenance, and equipment. [158]

Naval Business Management

[156] Michael Byers and Stewart Webb, *Titanic Blunder Arctic/Offshore Patrol Ships on Course for Disaster*, (Ottawa: Canadian Center for Policy Alternatives, April 2013):6.
[157] ISS includes a variety of activities, materials, and data to provide equipment maintenance, spares, overhauls, data handling and management.
[158] Cmdre M.J.M. Hallé, ‘’Maritime Equipment Program Plan, FY14 – FY16,” 100, Last modified 18 June 2013, http://admmat.mil.ca/dgmepm/documents/Maritime_Equipment_Program_Plan_MEPP_FY_14_16.pdf

The Resource Planning process listed in Table 3.1consists of a long term component and a short term component. The long term component (Investment Planning) was covered in the previous section while the shorter term focus of Business Planning is covered here.

With the changes to naval governance driven by Naval Transformation, CF Transformation, Force Posture& Readiness Review and the Defence Business Management Capability Project, there was also the requirement to develop an integrated and enhanced Business Management Model in support of the updated governance model. VCDS/ CProg staff requested RCN assistance with providing detailed requirements for the *DND/CF Business Management Model*. Therefore, the Naval Business Management Working Group was stood-up in 2012 with the mandate to develop an integrated Business Management Model, associated processes, rules and supporting software tool(s), to include Business Planning (BP), Financial Management (FM), Workforce Management (WFM), Performance Measurement (PM) and Risk Management (RM). [159]

CRCN submits the overall RCN business plan to obtain O&M funding sufficient to meet the maritime readiness requirements established by the DSP governance structure in Figure 3.2. Employment of these forces on named operations is covered by funds administered outside of the RCN's Business Plan (RCNBP). These readiness requirements are funded through the PAA introduced earlier. The PAA is hierarchal and is articulated to a level useful by the naval business planners as shown by the relevant Sub Program and Sub-Sub Program expansion shown in Figure 4.3. However, it should be noted that Figure 4.3 will need to evolve in response to the evolution of the PAA in 2014.

[159] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016,* E-2/3.

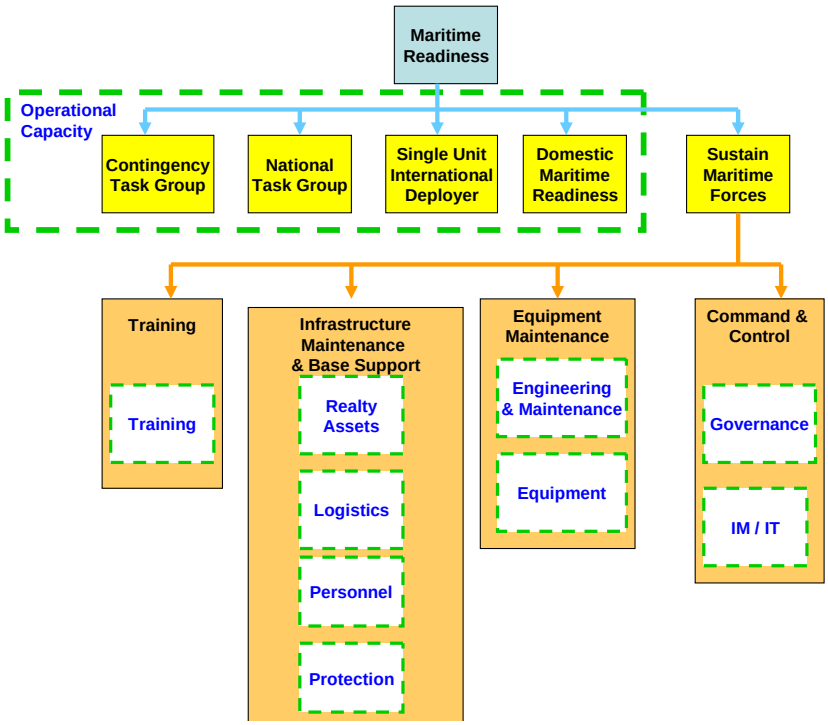

Figure 4.3 PAA Alignment to RCN Readiness Program Output

Source: *Draft MARCOM Business Plan (MBP) 2011/2012*, 5.

Maritime Readiness was a Sub-Program of the PAA with five Sub-Sub Programs that supported a Strategic Outcome where DND wass ready to meet GoC defence expectations. These five Sub-Sub Programs of Maritime Readiness are shown related to ten Intermediate Output Groups (IOGs) in Figure 4.3. IOGs are shown with dashed outlines in Figure 4.3.

Total RCN demand to support the Maritime Readiness sub-program is submitted to CRCN by the L2 Commanders in each naval organization. These L2 demands are provided in response to CRCN-issued business planning guidance. This guidance is based upon the incorporation of any new capital equipment, the readiness levels desired, and the tempo of

deployments based on forecasted exercise and operational commitments.[160] Maritime Readiness has been managed in a manner that allows flexibility to align the available materiel, financial and personnel resources in any given budget year to precise readiness outcomes in terms of platforms, warfare capabilities, and individual ships' systems. To accomplish this, the tiered readiness discipline in the RCN has become an essential management tool. [161]

Development of the RCN Business Plan (RCNBP) consults historic annual expenditures and looks for changes that have occurred in the most recent business cycle. The RCNBP's purpose is primarily to obtain O&M funds, but other resources are still included. A consistent theme in the RCNBP for past several years is the adherence to ten Intermediate Output Groups (IOGs). The IOGs are used to divide allocations, report on Formation expenditures, and manage RCN risks.

Formations enter all cost plans into DRMIS and assign each cost item either to a Cost Centre (CC) and/or Work Breakdown Structure (WBS) element of a DRMIS project.[162] DRMIS provides the enterprise accounting functionality to roll up cost plans from L3 to L1 for the total RCN demand and roll back down with funding allocations. At the L1 and L2 levels within the RCN, initial allocations by IOG are planned, monitored, and adjusted on a quarterly basis. The bulk of funding is expended at the L3 level. Funds can be reallocated between organizations but requires approval from one level higher according to the rules of the FAA. [163]

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[160] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016*, 2/12.
[161] *Interview with Vice-Admiral Mark Norman*, 11.
[162] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016*, E-3/3.
[163] Department of National Defence, "MARLANTORD 1901-2 Formation Governance - Organization and Accountability in MARLANT," Last modified 16 October 2013, http://halifax.mil.ca/marlantords/index.html

The 2013 costs of the five Sub-Sub Programs of the Maritime Readiness Sub-Program accounted for 11.4 % of the DND budget.[164] The $900M [165] allocated to Maritime Readiness is shown further divided by the ten IOGs in Figure 4.4. These IOGs have made it possible to report according to the PAA scheme for the RCN shown in Figure 4.3. Assessing the IOG allocations shown in Figure 4.4, it becomes apparent that enormous contributions of personnel (permanent employee salaries) and equipment (capital and NP) to maritime capability are not included in the RCNBP.

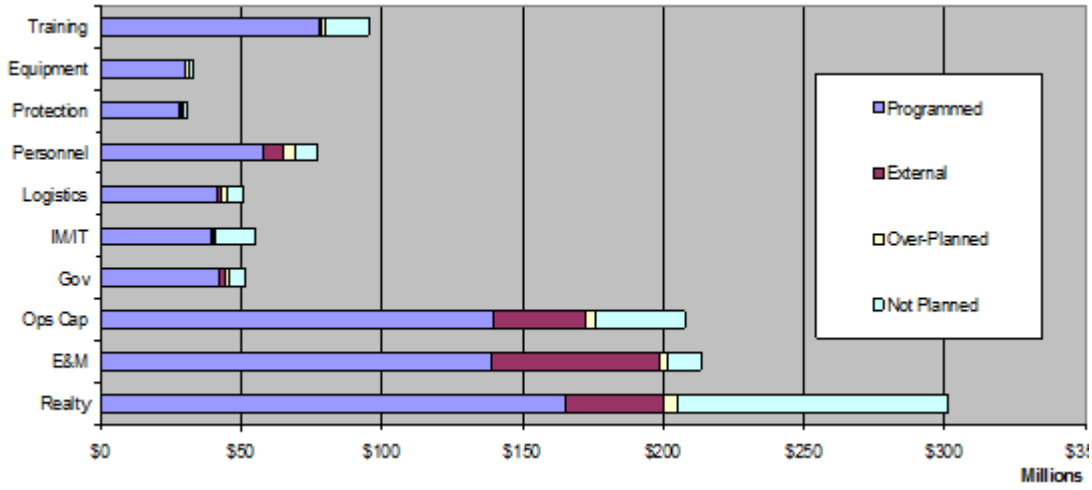

Figure 4.4 Budget for Maritime Readiness PAA Sub Program by IOG

Source: *Draft MARCOM Business Plan (MBP) 2011/2012*, 6.

To attribute all resource contributions to maritime capability from all resource types (Personnel, NP, O&M, Capital, and Infrastructure) requires an integrated management structure for all contributing resources. However, the capability elements shown in Figure 4.3 and their costs shown in Figure 4.4 only show part of the DND contribution to maritime capability. The

[164] *Report on Plans and Priorities 2012-2013*, 30.
[165] *Draft MARCOM Business Plan (MBP) 2011/2012*, 5.

personnel contribution, for instance, of approximately 9000 military personnel and 4000 civilian personnel serving on the two naval bases is approximately 7% funded by the Personnel IOG in Figure 4.4, with the vast majority of the salaries managed through CMP and ADM(HR-Civ). A similar situation exists with the equipment and infrastructure pillars of maritime capability where ADM(Mat) and ADM(IE) manage the bulk of those contributions. While separately managed capability contributions makes it challenging to manage the capability as a whole, long standing agreements between L1 organizations have enabled the contributions to produce necessary capability outputs. With only the O&M resource firmly within the control of the RCN, other contributing L1 organizations resources are implicated by their functional plans.[166]

Naval Personnel

The CRCN is designated the occupation authority and training authority for naval occupations. The occupation authority is delegated to Director General Naval Personnel (DGNP) to manage the navy family of occupations. There are forty CAF trades identified as capable of operating in a sea environment while only nineteen can be considered hard sea trades. DGNP is supported by occupation modeling and demographics information developed and collected by researchers within ADM (S&T). DGNP also receives vital information from the naval training establishments who provide individual training and education (IT&E) to produce naval tradespersons and officers that advance to the operational functional point (OFP) status.

[166] *Project Approval Directive (PAD) 2011-2012*, 141.

The Naval Training System (NTS) encompasses all facilities, training aids and support equipment, and the personnel involved in the support, establishment of standards, management, analysis, design, development, conduct, evaluation, validation and verification of individual training, collective training and education for the Naval Defence Team.[167] Comd MARPAC, newly designated as Comd NTS, is also delegated as the RCN training authority responsible for the planning, development and conduct of all Regular and Reserve Force IT&E and professional development.

The IT&E conducted within the NTS produces the OFP personnel who satisfy the personnel pillar of maritime capability in accordance with CFDS guidance. Collective training is considered part of the readiness pillar of the CFDS and is managed by Comd MARLANT, through N5, although NTS supports, at times, with instructors and facilities. The NTS IT&E challenge is to meet OFP production goals, specified for all naval trades and qualification levels and the NTS business plan is expected to align with the Training IOG according to current business planning guidance.[168] The Training IOG represents the total NTS training budget shown in Figure 4.4 as $80M.

The ability of the RCN to support operational tasks depends heavily on the availability of trained (OFP) personnel to fill necessary shipboard billets and begin conducting collective training as a readiness activity. While it's expected that a shift from a ship-centric to a sailor-centric fleet FG competency model will better maintain core war fighting competencies for

[167] *NAVORD 4500-0 Royal Canadian Navy Individual and Collective/Operational Training Policy*, 2.
[168] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016,* Annex C.

ship's crews,[169] the availability of trained naval personnel is affected by several factors such as the size and composition of the ship and shore based naval establishment, the status of any vacancies, manning priority, and the production rate of the NTS.[170]

The overall RCN establishment of has been fairly static in recent years but its composition has been dynamic. The impact of staffing major projects, for example, has been offset by the retiring AOR and Iroquois Class platforms. While the RCN consistently claims to operate in an environment of insufficient military and civilian personnel resources,[171] RCN establishment pressures have been pushed to CMP and VCDS for resolution resulting in priority for RCN recruiting between 2008 and 2011. Combining this with an improved retention rate, the trend of increasing RCN establishment vacancies has recently reversed to one of improvement and growth.[172]

[169] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016*, 2.
[170] 38th Naval Personnel Working Group Agenda and Plan, 21 Jan 09
[171] Vice-Admiral P.D. McFadden, *MARCOM Capability Plan (MCP) 2010* (NDHQ file: 3371-1948-1 (MSMT 2 / RDIMS #199522, 27 July 2010): 4.
[172] *Draft MARCOM Business Plan (MBP) 2011/2012*, 13.

Naval Equipment

The RCN's capital equipment is provided and supported by the maritime division of ADM (Mat) headed by Director General of Maritime Equipment Program Management (DGMEPM). The Naval Materiel Steering Group (NMSG) shown in Figure 4.1 annually promulgates the Naval Material Support Plan (NMSP) that forms the agreement between the CRCN and DGMEPM of planned activities and formalizes the relationship between Class Program Managers in DGMEPM and the Class Requirements Authorities in DNR.[173] Class Program Managers manage the design, sustainment, configuration, and replacement of systems comprising the class of warship and collectively received a 2014 budget of $92M for capital acquisition and $650M for NP.[174] This large annual NP expenditure on equipment sustainment is expected to attract input from the Defence Procurement Secretariat and industry for the sustainment approach to be taken for each fleet.[175]

While DGMEPM's mandate is to provide the RCN with a modern, technically ready, and well-supported Canadian naval fleet with system level and platform level capabilities,[176] the RCN performs its own technical verification of the equipment capabilities. The Naval Materiel Assurance (NMA) policy directs the activity necessary to provide confidence that a ship, as an integrated platform system, will meet technical performance, safety, and environmental requirements of the materiel state of the item(s).[177] NMA has recently addressed the cumulative

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[173] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016,*
[174] *Maritime Equipment Program Plan, FY14 – FY16,* 67,71.
[175] DGMEPM presentation at CADSI Navy outlook day 8 Apr 14
[176] *Maritime Equipment Program Plan, FY14 – FY16,* 7.
[177] NaMMS, p. 2-2-1
http://admmat.mil.ca/dgmepm/documents/Naval_Material_Management_System_Manual_NaMMS.pdf

effect on materials of being generated to progressive levels during each cycle of its lifespan by invoking baseline standards.[178]

The Class Desk in the MEPM organization manages the Class Plan which identifies the systems comprising the baseline design version of the ship and includes references for performance, maintenance, upgrades, and disposal. The Class Plan links the class requirements to CONOPS and provides performance specifications in relation to the capability of an equipment group or system. Separate dynamic portions of the Class Plan capture the capability insertions that are regularly applied to warship systems.[179] Class plans additionally contribute to defining the equipment organization component of naval force structure.[180]

A key tool used to manage the systems configured into a warship is the Naval Equipment Index (NEI). Throughout the RCN, the NEI has enabled the efficient identification of systems, sub-systems, and higher level super-systems (equipment groups) that comprise several levels in the hierarchy in naval equipment family tree. The NEI has greatly contributed to establishing a naval equipment data structure and the processes to manage modifications, transfers, or maintenance to the equipment in this structure. The super-systems and their NEIs from the Iroquois Class are provided in Table 4.1. This listing represents the Iroquois Class destroyer in its entirety and could also serve to represent any similar class of ship. For example, comparing the super systems listed in Table 4.1 to those for the Halifax Class, they line up exactly in their description.

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[178] Department of National Defence, "NAVORD 3000-0 Materiel Baseline Standard (MBS) – Surface Ships-Policy," Last modified 23 April 2013, http://rcn.mil.ca/navord-omar/default-eng.asp
[179] IROQUOIS Class Plan Standing Document Version Draft 0.7 February 2009
[180] *Canadian Military Doctrine*, GL-3.

Table 4.1 Naval Super-System Identification

Super-system description	Assigned NEI Number
naval information system (Navis)	E-46-729
hull systems	E-28-562
main propulsion system	E-24-160
main refrigeration and HVAC systems	E-29-131
primary electrical power generation and distribution system	E-26-189
secondary electrical power generation and distribution system	E-38-100
machinery control and surveillance systems	E-48-118
electronic warfare equipment group	E-58-170
command and control equipment group	E-60-104
underwater combat system	E-69-600
naval external communication system	E-51-305
domestic systems	E-85-180
marine enginering auxiliarry equipment group	E-27-336
aircraft support equipment group	E-39-100
interior communication and alarm signal group	E-52-100
surface and air weapons system	E-70-100
deck and hull equipment group	E-28-180
damage control system (CBRN) Generic	E-77-147
workshop equipment group	E-49-269
navigation system equipment group	E-57-380

Source: IROQUOIS Class Plan Standing Document Version Draft 0.7, February 2009

The ability to manage equipment acquisition costs at the system level is enabled by consistent formulation and oversight of acquisition projects that clearly identifies the equipment deliverable. Management of equipment sustainment costs, however, is constrained by the legacy formulation of sustainment projects and the complexity of the NP allocation process. Any changes to naval equipment management would also require NEI consideration for continued benefits from the established numbering scheme for ship classes, equipment groups (super-

systems) and associated systems. This scheme has already been populated in DRMIS Plant Maintenance module and supports the full range of sustainment activity including procurement, supply, configuration data management, and maintenance history.

Sustainment of equipment is largely performed with the NEI-based data structure and toolset provided by DRMIS. It's assessed that the intent of the NMSP is to further develop this sustainment functionality into life cycle management of systems and roll it up into life cycle management of super-systems. These are also known as equipment plans which are further rolled up into Class Plans. Their continued implementation in DRMIS is considered a necessary step towards aligning competencies required to support current and future equipment.[181]

Additional material management benefits are possible from the continued use of DRMIS.[182] The built in functionality of enterprise driven relational database characteristics will continue to be leveraged by DRMIS Centers of Excellence throughout the RCN. Managing the equipment pillar of capability where complex equipment systems are employed requires the ability to separately track the material status of multiple system components. Financially, the material assets and their support costs can be viewed in variety of useful ways, possibly better linking operational and materiel support communities.

Major projects of the NSPS that are delivering JSS, AOPS, and CSC platforms are those that require GoC approval beyond the authorities delegated to DND by virtue of the complexity

[181] *Maritime Equipment Program Plan, FY14 – FY16,* 31.
[182] *DRMIS Defence Resource Management Information System Enabling the transformation of supporting operations,* 9.

and risk profile.[183] Major projects for the RCN with GoC oversight are managed in a separate Division of ADM(Mat) headed by the Director General Major Project Delivery Land and Sea (DGMPD(L&S)). DGMEPM support to DGMPD(L&S) ensures that sustainment considerations are incorporated into the development of technical requirements used for platform and system acquisition.[184]

Naval Readiness

Readiness has recently been defined as flexibility and preparedness of the fighting fleet to deploy in response to GoC direction.[185] As previously mentioned, the tiered readiness discipline in the RCN has become an essential management tool to prepare the fighting fleet to deploy but this paper intends to provide a better understanding of how these tiers affect resources. Maritime Readiness is assigned to the RCN to manage with the resources given but the most recent performance result (78.2%) corresponds to performance results in maritime acquisition (61.5%)[186] and represents a drop in performance from previous years.[187]

Readiness governance in the RCN has been evolving with Navy Transformation. At the operational level, the CRCN's Assistant Chief of Staff (ACOS) for Operational Readiness was assigned to Comd MARLANT and supported by the N5 organization that was stood up in 2012.

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[183] *Project Approval Directive (PAD) 2011-2012*, 44.
[184] *Maritime Equipment Program Plan, FY14 – FY16*, 17.
[185] *Interview with Vice-Admiral Mark Norman*, 11.
[186] Department of National Defence, *Department of National Defence - Departmental Performance Report 2012-13* (Ottawa: GoC, 13 November 2014): 37, 46. http://www.forces.gc.ca/assets/FORCES_Internet/docs/en/DND-DPR-2012-13.pdf
[187] Department of National Defence, *Department of National Defence - Departmental Performance Report 2010-11* (Ottawa: GoC, November 2012): 23, 28.
http://www.tbs-sct.gc.ca/dpr-rmr/2010-2011/inst/dnd/dnd-eng.pdf

The N5 organization has responsibility to track the readiness of naval capabilities and insert FG activities as required. FG activities consist of regular collective training such as work-ups (WUPS) for individual ships and fleet exercises. N5 is also responsible to evaluate capability deficiencies and coordinate mitigation measures necessary to maintain the agreed readiness posture of the RCN. [188] At the strategic level, the creation of Director General Naval Strategic Readiness (DGNSR) position was still awaiting approval at the time of writing but work on new readiness models has already begun.[189] These organizations should improve the RCN's ability to articulate and standardize its readiness posture as part of capability management.

While the precise maritime readiness posture is communicated to GoC annually, the RCN's Readiness and Sustainment (R&S) Policy[190] defines the readiness levels of all RCN warships that deliver this readiness posture. The four levels (tiers) of RCN ship readiness are:

- Extended Readiness (ER) applies to units that are removed from operational status for the purposes of undergoing extended maintenance.
- Restricted Readiness (RR) applies to units transitioning between readiness levels and subject to restrictions placed on their operational employment.
- Standard Readiness (SR) applies to the normal level of readiness for all maritime operational capability across the Navy. Units at SR comprise a broad zone of capability that is employed for the purposes of conducting core naval training and executing assigned CF continental and expeditionary missions that do not entail the possibility of high intensity, full spectrum combat. Upon successfully completing a Work Up, Ships will be at an SR level.
- High Readiness (HR). High Readiness units shall be capable of conducting the full-spectrum of combat operations. HR units will have undergone additional levels of training based on both the mission and the intensity requirements of full combat operations. Mission Work-Ups will determine HR status and suitability for mission employment.

[188] N5 – Operational Readiness, "N5 Assistant Chief of Staff Operational Readiness," Last modified 30 July 2014, http://halifax.mil.ca/n5/index.html;
[189] *Naval Strategic Management Board 02/2014 Minutes*, 6.
[190] *CFCD 129 Maritime Command Readiness and Sustainment Policy*, 19-20.

The four readiness levels are progressive and are cycled within a readiness cycle that is driven by the frequency determined for each warship class. The progression from ER to SR is managed as the Tiered Readiness Programme (TRP) and progression beyond SR to HR is considered an addition to the normal cycle. To certify an RR ship to be safe to sail and execute some low intensity tasks, specific R&S Policy requirements must be met. R&S Policy defines operational readiness pillars as Personnel, Material, and Training (PMT).[191] Again, another group of pillars appears in the capability discussion in addition to those previously identified for the FG functional model (materiel, personnel and training, and combat effectiveness), and the *CFDS* (personnel, equipment, readiness, and infrastructure). The approach taken in the next chapter is to tabulate the relevant portions of all pillars into the capability contributors applicable to RCN capabilities.

Naval units give the GoC flexibility to deliver a variety of effects within a relatively short notice and the RCN's ability to deploy an SR warship within ten days [192] has been a long standing GoC requirement. Currently the RCN requirement is tied to the roles and missions articulated in the *CFDS* but the Greenwich Maritime Institute believes global sea-borne trade and roles for navies are on the increase.[193] Supporting this claim, the RCN has, despite previous years of minimal capability investment, sustained an operational capacity of at least one SR ship in home port and an HR ship forward deployed in foreign waters.

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[191] *CFCD 129 Maritime Command Readiness and Sustainment Policy*, 12.
[192] Rear Admiral N.S. Greenwood, *CFCD 129 Maritime Command Readiness and Sustainment Policy* (NDHQ file: 3371-3250-1 DMPOR / RDIMS #183298, 23 October 2009): 23. http://esquimalt.mil.ca/stp/STP_Documents/Publication_References/Readiness/
[193] Professor Christopher Bellamy, "Naval Power: Strategic Relevance in the 21st Century," *IHS Janes Navy International* 119, no.1 (January/February 2014): 17.

Readiness standards are applied by Sea Training Staffs within the N5 organization that relies on Combat Readiness Requirements (CRRs) as a reference to shape collective training (CT) events. CT is designed to prepare teams, units and other elements to perform military tasks in accordance with defined standards. This includes procedural drill and the practical application of doctrines, plans and procedures to acquire and maintain tactical, operational and strategic capabilities.[194] CRRs are derived from the capability programs and streams listed in Table 4.2 and are applicable to a variety of teams and sub-teams composed from subsets of the entire warship's crew. While CT standards exist for multi-ship activity performed within a naval task group, shore based C4 support to warships has largely been excluded from the standard.

The Capability Streams in Table 4.2 offer an additional option for the framework to be applied to the capability team concept however it was developed to manage readiness and gives little consideration to the other three capability pillars described in the *CFDS*. Generation levels of the capability streams in Table 4.1 vary as either direct, or supporting.[195]

Table 4.2 RCN Readiness Report Categories

Capability Program	Capability Streams	Capability Stream ID
command	command, control, communications, computers	C4
information and intelligence	intelligence, surveillance, reconnaissance	ISR
conduct operations	Anti-surface warfare	ASuW
conduct operations	Anti-air warfare	AAW
conduct operations	Anti-submarine warfare	ASW
conduct operations	Interdiction	INT

[194] *NAVORD 4500-0– Royal Canadian Navy Individual and Collective/Operational Training Policy*, 4.
[195] *Canadian Military Doctrine*, 5-9.

conduct operations	search and rescue	SAR
conduct operations	Air Operations	AIR
mobility	Force Mobility	FMOB
mobility	Special Operations Forces	SOF
mobility	Naval Coordination and Advice to Shipping	NCGAS
mobility	Mine Warfare	MW
mobility	Seamanship	SEA
protect forces	Harbour Defence	HD
protect forces	chemical, biological, radiological, nuclear warfare	CBRN
protect forces	Force Protection	FP
sustain forces	Specialist Support	SPEC
sustain forces	Survivability	SURV

Source: B-GN-002-000/RQ-001, CFCD 102(L) RCN Combat Readiness Requirements (Ottawa: DND Canada, 2011): Table 1-2.

The RCN is experiencing a reduction in the number of sea days and an increase in pressure to maximize the FG or FD value from each sea day. The main tool used to articulate the RCN's complex readiness profile resides in the fleet schedules (FLTSKED) for MARLANT and MARPAC.[196] The resources required to sustain the agreed readiness profile are derived from the FLTSKED in terms of days at sea for collective training, and days in home port for maintenance. It's therefore important for the FLTSKED to reflect an accurate forecast[197] of the number of sea days and dockyard maintenance days in order to conduct business planning that covers all capability pillars and includes provisions to support longer term capability enhancement. Development and production of the FLTSKED is conducted within the Formation and updated

[196] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016,* A-1.
[197] Department of National Defence, "MARLANTORD 45-1 Operations Schedule Management," Last modified 16 October 2013, http://halifax.mil.ca/marlantords/index.html

quarterly in consideration of CRCN business planning guidance. Occasionally, mid-year guidance to these planners is also provided by the CRCN if needed to meet priorities.[198]

Naval Infrastructure

The Chief of Force Development (CFD) includes infrastructure as one of five resource types used by DND for resource management and the PRICIE scheme includes infrastructure as part of defining a full capability. The integrated and enhanced Business Management Model needs to include the infrastructure pillar of capability but infrastructure has lagged others in becoming integrated into DND's asset management information system in DRMIS. The absence of this information impedes the ability to make informed decisions about the life-cycle management of Formation infrastructure assets or to determine if enough funds are allocated each year to maintain the infrastructure for a platform or a capability.[199] It's also recognized that infrastructure construction in support of equipment is often overlooked in the development of equipment projects.[200]

Infrastructure may be the least understood of the four capability pillars and, for the purpose of this paper, requires a definition beyond the catch-all for everything that's not readiness, equipment, or personnel. *CFDS* indicates that 8% of DND's budget is earmarked for infrastructure that includes buildings, land, roads, utilities, ranges, security, and facility structures found on DND properties. Infrastructure also included informatics (IM/IT) according

[198] For example the Single Fleet scheme of manoeuvre CMS letter 3371-1000-1 VOL 7 (RDIMS# 218335) 5 August 2011
[199] *2011 Fall Report of the Auditor General of Canada, Chapter 5 - Maintaining and Repairing Military Equipment - National Defence*, 3.
[200] *Project Approval Directive (PAD) 2011-2012*, 18.

to the PAA.[201] Infrastructure does not, however, include the overhead and corporate services such as policy, finance, public affairs, and review services. These are referred to as Internal Services (Program 6.0) by the 2014 PAA and accounts for approximately an additional 5% allocated to DND.[202]

The ability to attribute RCN infrastructure to maritime capability can only be currently performed as a lump sum and not accountable by its contribution to any particular maritime or joint capability. The IOG scheme in Figure 4.4 contains two elements attributable to infrastructure; realty, and IM/IT. In 2011, these accounted for approximately 25 % of the RCN allocation, well above the *CFDS* intentions to allocate 8%.

Regardless of the GoC's desire to have a single portfolio manager and a single custodian for real property, the RCN remains the custodian of naval infrastructure including the dockyards, bases, ranges, and training areas. The transition from nine custodians of the Defence Real Property portfolio towards a single custodian is currently down to four. The process has begun with the development of a fully integrated business model to deliver a strategically-managed infrastructure portfolio designed to meet the dynamic requirements of the RCN and other CAF tactical and operational level clients of ADM(IE). CRCN has advised the RCN must stand ready to contribute to the discussions ahead to ensure that its strategic, operational and tactical needs are met as the infrastructure business model is developed.[203]

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[201] *Department of National Defence - Departmental Performance Report 2012-13*, 42.
[202] *Department of National Defence - Departmental Performance Report 2012-13*, 111.
[203] Department of National Defence, "ADM(IE) Successfully Launches new Plan," *IE Focus - Special IOC Internal Newsletter* (ADM(IE): Ottawa, April 2014):1. http://www.multibriefs.com/briefs/cmea/focusenglish.pdf

ALIGNING CAPABILITY WITH BUSINESS PLANNING

This paper proposed a structured capability management scheme that would improve coherency and agility within the detailed and complex task of investing, sustaining, and divesting operational capability within the RCN's strategically dynamic capability profile. Recalling the capability and business management issues from Chapter 1 that led were associated with lowered capability readiness and the need to revitalize the CAF, steps towards aligning the various governance schemes practiced by DND and RCN will be covered in this chapter. This will start with a firm adherence to the *CFDS* capability pillars and the CBP and resource management concepts of the Defence Planning and Management (DP&M) framework. Henceforth, adjustments to the RCN governance and processes are proposed that incorporate alignment to capability teams and contributors described with Table 5.1 while respecting the DSP processes and supporting Defence Renewal initiatives. The objective is to align the RCN business model to the granular definition of maritime capability teams.

Capability Contributors

The key piece of governance in existence to help identify naval capabilities is the capability stream listing from CFCD102(L) in Table 4.2. These eighteen capability streams serve as a good starting point for listing naval teams but this listing appears focused only on four capability domains (command, sense, act, and shield) while the other two domains (sustain and generate) were not the focus of CFCD102(L). [204]

[204] *Combat Readiness Requirements*, 1-5/13.

The definition of ‘sustain’ is already expanded upon in Table 3.2 but additional emphasis from a naval perspective follows. Naval units can sustain themselves indefinitely except consumables become an issue in a matter of weeks while equipment and crew often require rest and maintenance after a few months of intense operation. Provision of rest, maintenance, and supplies is a necessary part of naval capability and warrants the addition of another capability stream for ‘sustain’. This is added as ‘SUST’ as one of the twenty capability team headings in Table 5.1. The Sustain Team is relatively enormous and is comprised of the military and civilian logistics and technical trades, their equipment, their readiness activities, and their infrastructure.

Force generation has been defined with the FG functional model consisting of three pillars: materiel; personnel and training; and combat effectiveness. With the cross-pillar nature of FG activity, its management becomes challenging and should be assigned to a team that coordinates at a level slightly higher than all other teams and contributors listed in Table 5.1. This FG is considered analogous to the current N5 Readiness team that can plan, advise, and extract outputs from all pillars as relevant contributors required to deploy ships and teams at the required capacity. Accordingly, ‘FG’ is also added as one of the twenty capability team headings in Table 5.1, but by its nature, is considered as overhead.

Table 5.1 Naval Capability Matrix (NCM)

Capability Contributors	RCN Capability Teams																				Contributor Cost
Personnel	C4	ISR	ASuW	AAW	ASW	INT	SAR	AIR	FMOB	SOF	NCGAS	MW	SEA	HD	CBRN	FP	SPEC	SURV	SUST	FG	
Boatswain						x	x		x	x		x	x		x	x	x	x	x	x	P1
Cook						x										x			x	x	P2
Electrical Technician						x		x	x							x		x	x	x	P3
Hull Technician						x		x	x						x	x		x	x	x	P4
Logistics Officer	x					x									x	x		x		x	P5
Marine Engineer						x		x	x	x			x			x		x	x	x	P6
MSE Officer	x					x		x	x							x		x		x	P7
MARS Officer	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	P8
Medical Technician						x									x	x		x	x	x	P9
Met Technician		x	x	x	x	x	x	x	x				x			x				x	P10
NCI Operator		x	x	x	x	x										x				x	P11
NCS Eng Officer	x					x										x		x		x	P12
Naval Communicator	x					x	x	x	x	x	x	x	x			x				x	P13
NES Operator		x	x	x	x	x	x	x	x							x				x	P14
RMS Clerk						x										x			x	x	P15
Sonar Operator		x	x		x	x	x					x				x				x	P16
Supply Technician						x									x	x		x	x	x	P18
W Eng Technician			x	x	x	x		x	x						x	x		x	x	x	P19
Equipment	C4	ISR	ASuW	AAW	ASW	INT	SAR	AIR	FMOB	SOF	NCGAS	MW	SEA	HD	CBRN	FP	SPEC	SURV	SUST	FG	
information systems	x	x	x	x	x	x	x	x		x	x			x		x	x		x	x	E1
hull systems	x	x	x	x	x	x	x	x	x	x		x	x		x	x		x	x	x	E2
main propulsion			x	x	x	x	x	x	x			x	x			x			x	x	E3
main refrigeration and HVAC	x	x	x	x	x	x	x	x										x	x	x	E4
primary electrical PG&D	x	x	x	x	x	x	x	x	x	x									x	x	E5
secondary electrical PG&D	x	x	x	x	x	x													x	x	E6
machinery control & monitor			x						x			x						x	x	x	E7
EW equipment		x	x	x	x	x	x									x			x	x	E8
C2 equipment	x	x	x	x	x	x	x	x		x	x	x							x	x	E9
UW combat systems		x	x		x	x	x					x							x	x	E10
external comms	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x		x	E11
domestic systems																			x	x	E12
marine auxiliarry systems	x	x		x	x				x				x						x	x	E13
aircraft support systems								x											x	x	E14
interior comms and alarms	x	x	x	x	x	x	x	x	x			x	x		x	x		x	x	x	E15
surface and air weapons			x	x															x	x	E16
deck and hull equipment							x						x		x	x			x	x	E17
damage control and CBRN															x			x	x	x	E18
workshop equipment group													x				x	x	x	x	E19
navigation systems	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	E20
Readiness	C4	ISR	ASuW	AAW	ASW	INT	SAR	AIR	FMOB	SOF	NCGAS	MW	SEA	HD	CBRN	FP	SPEC	SURV	SUST	FG	
Extended	x																x		x		R1
Restricted	x	x					x		x					x			x		x	x	R2
Standard	x	x	x	x	x	x	x	x	x		x			x	x	x	x		x	x	R3
High	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	R4
Infrastructure	C4	ISR	ASuW	AAW	ASW	INT	SAR	AIR	FMOB	SOF	NCGAS	MW	SEA	HD	CBRN	FP	SPEC	SURV	SUST	FG	
garrison facilities	x						x										x			x	x	I1
port facilities								x	x		x				x		x			x	x	I2
range and exercise areas		x	x	x	x	x	x	x	x				x	x			x			x	x	I3
security											x				x		x			x	x	I4
IM/IT	x	x	x	x	x	x	x				x	x	x		x		x	x		x	x	I5

Team Cost	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	Total
Team Valuation	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	

Naval Capability Teams derived from capability streams defined in Table 4.2 were preferred over the option of sifting through the fifty or so teams described in Ship's Standing Orders (SSOs) and scattered throughout CFCD 102(L). These fifty or so teams in existence are considered attributable to the Capability Teams as sub-team or sub-sub-teams and, moving forward, it's considered that Table 5.1 should not invalidate SSOs, Watch and Station Bill organization, or CFCD 102(L). It is, however, considered necessary that Table 5.1 is incorporated into business models, business planning guidance, and force generation models currently being developed.

Bland describes readiness of military capabilities as systems of systems and inseparably defined by capacity.[205] While readiness is now considered part of the capability definition, the scope and quality of naval capability output is precisely defined by the team contributors listed under the personnel, equipment and readiness pillars found in Table 5.1. The twenty Capability Teams presented in the naval capability matrix (NCM) of Table 5.1 are intended to represent the total force capability of the RCN but does not represent or account for the operational capacity. Operational capacity is notionally measured by the rate at which capability can be generated and is generally limited by funds, labour, or materials. Capacity measurement should also consider the ability of WoG and industry to maximize the generation capacity of Capability Teams in the event of a serious crisis.

Capability Teams signal a departure from the ship-centric capability management paradigm that has persisted for decades[206] and supports the transition to a sailor-centric FG

[205] *A National-Level Transformation, Transforming National Defence Administration*, vi.
[206] *CFCD 129 Maritime Command Readiness and Sustainment Policy*, 9.

model suggested in recent RCN business planning guidance.[207] Overall agility benefits for the RCN can be derived from this transition. With capability now defined by Table 5.1 as teams (and sub-teams), the precision and agility of the Tiered Readiness Program to generate capacity should be improved. Agility in this context precisely refers to the ability to tailor the selection and modification of capabilities and generate them quickly for operations. It's argued that the capability teams defined above can more quickly modify and generate compared to a whole warship entity.

Comd MARLANT recently warned of long term technical degradation to the Fleet if additional swaps of whole crews were contemplated with forward deployed ships. [208] Instead of swapping the entire crew at once, the Capability Teams of the NCM would support the development of a concept of employment (CoE) for standing teams in the RCN. The Naval Boarding Party (NBP) team, for instance, has already been considered within this new construct as a mission fit to deployed ships.[209] NBP teams fit within the NCM as a sub-team of the naval interdiction team (INT). Installing and deploying standing teams is still a novel concept for the RCN but mission fits for equipment have long been conducted as part of the FG process where available mission fit enhancements identified by N5 are implemented.

To maximize the agility benefits that capability teams and mission fits provide, it's recommended that the fitted-for-but-not-with (FFBNW) concept be incorporated into the capability management process. The FFBNW concept would provide design features that would enable faster and more efficient insertion of integrated equipment as a capability contributor.

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[207] *Royal Canadian Navy Business Planning Guidance (RCN BPG) 2013/2016,* 2.
[208] *Naval Board 02/13 Minutes,* 3.
[209] *Naval Board 02/13 Minutes,*12.

These design features would be applicable to warships to accommodate modular and integrated equipment installation as part of a standing and deployable Capability Team. To enable the agility potential of deployable Capability Teams, the personnel and readiness contributions also need preparations analogous to FFBNW. Continued exploitation of modelling and simulation should provide a portion of this preparation.

Capability Cost and Valuation

Having established the NCM from Capability Teams and contributors in Table 5.1, the association of capabilities to costs is enabled through the known or estimated costs of capability contributors. Capability contributor costs are found in the NCM on the far right hand side represented by variables Px, Ex, Rx, and Ix. The sum of all contributor costs is shown as *Total* in Table 5.1 and is also equated to the sum of all Capability Team costs (Cx). Mature and effective practices exist to manage several contributor costs include accounting of pay and benefits allocated to an entire naval trade and capital project costs to acquire naval equipment. There may be some initial uncertainty sorting through NP, O&M, and Infrastructure expenditures such that they can be attributed to specific capability contributors according to the methodology proposed but an initial alignment between the Capability Teams and the Business Plan will reduce this to a manageable level. The strategic payoff will be the ability to apportion the capability contributors' costs amongst the Capability Teams they support with some degree of precision and subsequently roll them up for each team. This will reveal the full cost of each maritime capability.

Determining capability contributor costs from amongst each of the four pillars is considered to have its unique challenges. Personnel, for instance, can contribute to multiple capability teams, can take multiple paths to be trained to the OFP, and have variable availability for their primary duties. Also, readiness activities may need to be occasionally repeated, causing a variation in readiness costs. These variations on a capability contributor's cost could become strategically important and spawn scientific or expert studies. For instance, studying the effect of reduced crew size on sustained multi-role warship operations has been studied by DRDC but definitive results are not yet available.

Equipment and infrastructure costs are considered to have similar characteristics due to their large initial demand for acquisition and continuing modest demands for sustainment. Their acquisition costs are not difficult to collect because they are traceable by the capital project used in DRMIS to deliver it. Extracting sustainment costs, however, has been proven more difficult. The sustainment costs of naval systems, for instance, have been covered by legacy sustainment project structures that were based on the type of sustainment activity (sparing, overhaul, modification, etc.) with little regard to aligning with super-system groupings. If the NCM concept in Table 5.1 is adopted by the RCN, it's necessary that DGMEPM revise these legacy sustainment projects with a standardized DRMIS project template [210] designed for easy extraction of equipment sustainment costs.

Valuation for the naval Capability Teams will use the methodology depicted in Table 3.3. Transferring this methodology to Table 5.1 provides twenty valuation results in the bottom row

[210] DRMIS Project Systems access required to view *System Sustainment Project Template X.E.74000*. See DRMIS MA&S user access, http://drmis-sigrd.mil.ca/masua-auasm-eng.asp

(Vx). These valuation results are relative rankings based on their ability to match to criteria presented in Chapter 3 which includes GoC outcomes and DND priorities. The benefit of applying this valuation methodology is additional insight to inform DSP decisions to invest, divest, or sustain individual capabilities. Notwithstanding the fact that procurement is still dominated by platform purchase decisions, the complex task of justifying platform acquisition can now be broken down into more manageable pieces (Capability Team valuations) and collectively applied to relevant platforms.

RCN Business Management Model

Based on the MND stating the intention to develop and implement a Defence Business Management Capability "in order to prioritize, align and integrate policies, processes, resources and systems,"[211] an RCN example for a business model based on the NCM is provided. Using the NCM-based procedure for determining costs of Capability Teams described above, however, requires the matrix populated with contributor costs using *Business Intelligence* queries from an established DRMIS portfolio (projects and cost centers) that covers all contributions to force capability for the RCN.

Fortunately, DRMIS functionality to manage equipment and infrastructure assets and all financial transactions related to acquisition and sustainment projects is already well suited. The ability to allocate and track military and civilian pay and O&M funds for readiness or operations also exists. Therefore any effort to track the resource expenditure on the capability contributors

[211] *Report on Plans and Priorities 2014-2015,* 16.

should be considered within the realm of feasibility. The missing ingredients are policy directives to institute a capability model similar to the NCM, align the existing expenditure tracking schemes to it, and a strategy to exploit DRMIS functionality so that Capability Team and capability contributor cost reporting is intuitive and useful.

Aligning the complete portfolio of projects that support RCN capability to the NCM capability model can performed in a variety of ways but the method recommended is one developed and used by DGMEPM to track projects under the HCM program.[212] It requires a standard template in DRMIS *Project Systems* that's inserted into all affected projects. The standard template consists of a WBS structure that provides an additional portion of standardization to the WBS structure. This standardization ensures all financial transactions using the standardized WBS structure are found by a report query developed from *Business Intelligence*. Running the query regularly gives the necessary information to manage in-year allocations. Further analysis of existing coding systems available to *Project Systems* (i.e. equipment groups and cost centers) has potential to yield additional improvements to the capability cost report.

While the RCN's resource allocation by IOG and association to the PAA are made necessary by the DSP, it's considered helpful to align the various definitions for resources in Table 5.2. Resource definitions include capability contributors defined by this paper, resource types defined by CProg, and IOGs defined by the RCN. To recall, capability contributors have been defined by the naval trade structure managed by CMP, the naval equipment family tree

[212] Director General Maritime Equipment Program Management, "MEMSOP 10/2009 Standard Operating Procedure HCM/FELEX EC Tracking in DRMIS," Last modified 01 May 2009, http://admmat.mil.ca/dgmepm/documents/HCM_FELEX_Target_EC_Tracking_MEMSOP.pdf

defined by the NEI, naval readiness levels and tiers defined by RCN doctrine, and infrastructure features applicable to the RCN. Resource demand to the IRMC would be defendable by the capability teams they support and the valuation of those capabilities.

Using the NCM of Table 5.1 as the RCN Business Model, mechanisms to trace capability contributors to Capability Teams enable strategic guidance on capability to have stronger links to business plans. The definition methodology of the NCM also enables capability planning with more precision and agility. CAF-wide application of Capability Teams to the Force Capability Plan will allow all Defence capability contributors to be linked to operational capability outputs and managed in a holistic manner.

Table 5.2 RCN Business-Capability Alignment

Capability Contributor Cost Variable IDs	Number of Capability Teams Aided by Contributor	Applicable Resource Type(s)	Applicable IOG(s)
P1	12	Personnel	Personnel/Training/Logistics/Ops Cap
P2	4	Personnel	Personnel/Training/Logistics/Ops Cap
P3	7	Personnel	Personnel/Training/Logistics/Ops Cap
P4	8	Personnel	Personnel/Training/Logistics/Ops Cap
P5	6	Personnel	Personnel/Training/Logistics/Ops Cap
P6	9	Personnel	Personnel/Training/Logistics/Ops Cap
P7	7	Personnel	Personnel/Training/Logistics/Ops Cap
P8	18	Personnel	Personnel/Training/Logistics/Ops Cap
P9	6	Personnel	Personnel/Training/Logistics/Ops Cap
P10	11	Personnel	Personnel/Training/Logistics/Ops Cap
P11	7	Personnel	Personnel/Training/Logistics/Ops Cap
P12	5	Personnel	Personnel/Training/Logistics/Ops Cap
P13	11	Personnel	Personnel/Training/Logistics/Ops Cap
P14	10	Personnel	Personnel/Training/Logistics/Ops Cap
P15	4	Personnel	Personnel/Training/Logistics/Ops Cap
P16	8	Personnel	Personnel/Training/Logistics/Ops Cap
P18	6	Personnel	Personnel/Training/Logistics/Ops Cap
P19	11	Personnel	Personnel/Training/Logistics/Ops Cap
E1	15	Cap/ NP	Equipment/ E&M/ Logistics/IM-IT/ Ops Cap
E2	17	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E3	12	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E4	11	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E5	12	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E6	8	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E7	6	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E8	9	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E9	13	Cap/ NP	Equipment/ E&M/ Logistics/IM-IT/ Ops Cap
E10	8	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E11	17	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E12	2	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E13	9	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E14	3	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E15	16	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E16	4	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E17	6	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E18	4	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E19	5	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
E20	17	Cap/ NP	Equipment/ E&M/ Logistics/ Ops Cap
R1	3	O&M	Governance
R2	9	O&M	Governance/ Logistics/ Training
R3	17	O&M	Governance/ Logistics/ Training
R4	18	O&M	Governance/ Logistics/ Training
I1	5	Infr	Realty/Protection
I2	7	Infr	Realty/Protection
I3	13	Infr	Realty/Protection
I4	5	Infr	Realty/Protection/ Equipment
I5	21	Infr	IM-IT

The 'Five F' functional model previously mentioned captures the RCN's pursuit of effectively mapping capability contributions to the three FG pillars (material, personnel and training, combat effectiveness). While the FG portion has matured, the others have not and real difficulty integrating FD and FS into FG and FE is apparent while the value of adding FM to the model is negligible in its current state.[213] The utility of the NCM model, however, offers links in Table 5.2 from all approved resources from the DSP to capability outputs. Furthermore, each capability contributor is already linked to a Sustainment Team in the NCM that looks after FS. FD, however, is cross functional in nature and could be handled in two very different ways: either as its own capability contributor or as its own Capability Team. The former is recommended as the primary option to pursue.

[213] *Naval Strategic Management Board 02/2014 Minutes*, 7.

SUMMARY

Exploring the existing governance structures and organizations of DND and the RCN has determined they are already founded upon capability pillars and capability teams at the L1 level shown in Figure 3.1. For example, CMP manages personnel contributors while the RCN represents a group of Capability Teams. Further exploration of the RCN governance and doctrine revealed that capability streams, readiness levels, and super-systems were able to be combined to form a structured capability-based business model that facilitates transformation initiatives for integration, agility, and effectiveness.

While valuation methodology was shown to be absent from the DP&M framework, its inclusion was argued to be valuable to a decision process that is defendable and less dependent on affordability criteria and political influence. Valuation is also intended to ensure Capability Teams evolve their development and investment to match GoC expectations which could also result in divestment of one sub-team in favour of another. Only in rare or distant future circumstances would an entire Capability Team be considered redundant. The Capability Team valuation concept was also argued to benefit platform acquisition by attributing the contribution of the platform to a number of valued teams.

Revisions to the PAA in 2014 were intended to better positions Defence to address program granularity and interdependencies required for strategic reviews. Similarly, development of the NCM in Chapter 5 was intended to address capturing the full scope of contribution to RCN capability and the interdependencies of teams to contributors. Given the

PAA and the NCM are still fairly new, the exercise of mapping Defence Programs to the RCN Capability Teams has not been included in this paper but initial assessment indicates they are well suited to one another. Also not included in this paper but recommended as part of moving forward is a capability dictionary that would serve as common lexicon across all branches and across all operational, engineering, maintenance, logistics, and human resource communities who may view their sustaining contributions to force capability in a realistic context.

The ability to precisely define capability and attribute costs to teams is considered well within the reach of current management structures and enterprise information systems. This management ability will advance Defence accountability by more precisely and contextually articulating gaps in current capability and plan expenditures according to GoC strategy instead on the current reliance on historical expenditures. This would strengthen investment plan projects in their challenge to provide defendable requirements in their early phases. Filling the gaps may take some time, however, according to media comments in reference to the last federal budget.[214]

Making changes to the policy that controls resource expenditure is not a trivial undertaking and must be well understood before implementing. With transformation efforts already underway, it's recommended that the Naval Business Management Working Group adopt the methodology presented in this paper for presentation to the Naval Strategic Management Board who are also progressing the 'Five F' functional model. Achieving Defence management improvements to satisfy external auditors who consider changes necessary to

[214] James Cudmore, "Budget 2014: Military wings clipped again Funding to be restored in future, government says," 11 February 2014, http://www.cbc.ca/news/politics/budget-2014-military-wings-clipped-again-1.2532827

provide the integration and agility required to keep abreast of a dynamic threat environment would also need to migrate to the DSP governance to be adopted CAF-wide. Consultation with the Defence Renewal Team on this capability definition and valuation methodology is recommended prior to efforts by the DSP governance to socialize and implement any proposed changes put forth by this paper.

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