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# Pilot Project to Map the Causal Relationships Of The Conduct-Operations-Capability Program Within Defence's Performance Management Framework

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## Abstract

Defence's Planning, Reporting and Accountability Structure (PRAS) identifies capability gaps; however, no precise causal relationships have been established to help Defence's leadership make decisions that will improve one capability shortfall without exacerbating a problem in another capability area. Of particular interest were the capability gaps related to the Conduct Operations Capability Program (COCP). This pilot project closely examined the principal cause-effect relationships related to planning and launching of new military operations, with a view to describing the institution's strategy-to-results linkages in a clear, measurable fashion. The project resulted in a set of four stock-&-flow sector maps governing the COCP of Defence's capability-based program. The project's team members believed that this project has helped Defence move one step closer to achieving its corporate vision of implementing an integrated defence management framework. Moreover, the overall achievement of the pilot project was the team's ability to relate the operational-forces-specific measures and indicators contained in the Performance Management Framework (PMF) to the capability goals & gaps outlined in Defence's capability-based-program.

**Key Words:** performance measurement, performance management, balanced scorecard, capability based planning

## Introduction

The management environments in which both private and public-sector organizations and institutions operate are far too complex in their structures and internal business processes for any one individual, or management team, to have a clear, coherent view of how they work together as a total system—that is, how particular actions or events can trigger a cascading series of ever-more indirect effects. At most, what the management team sees and understands are the workings of a tiny fraction of such complex adaptive systems. Consequently, senior managers regularly make decisions with little or no appreciation of the full range of ensuing consequences, both intended and unintended. Furthermore, individual managers often find themselves making

decisions that, by virtue of their consequences, are not really theirs to make in the first instance.

Lacking a systemic vision of causality (i.e. cause and effect) management teams have no way of knowing why corporate-level policies often produce results directly opposite to those that they intended. Often, policies that have been adopted to resolve a business problem prove to be the root cause of surprising and baffling negative effects. Then, as the unintended consequences worsen, the management team is pressured to more stringently apply the same policies, thereby fuelling a vicious downward spiral. SD provides managers with the methods, tools and techniques to design organizational structures and policies that—both in theory and practice—are consistent with their corporate vision, mission, goals and objectives. Invariably, a SD model highlights how the policies and decisions implemented by the management team create the very problems confronting their organizations.

## Purpose

The purpose of this paper is to summarize the results of a SD-related, proof-of-concept pilot project undertaken by Director General Strategic Planning (DGSP) to map the principal cause-effect relationships of the COCP sub-system, with a view to establishing direct linkages to Defence's PMF.

## Defence Context

The synchronization of the 29 Key Result Expectations (KREs) and Defence Tasks contained in Sustaining Agenda—*running the business*—with the Change Initiatives of the Change Agenda—*changing the business*—coupled with the prioritization and allocation of resources, drives the integration of Defence's framework for modern management and forms the basis for developing its business model, accountability regime, and associated PMF.

The PMF has evolved steadily since its inception in the fall of 1997, with a view to achieving accurate, meaningful performance reporting across the breadth of the Defence institution. The PMF employs a 'Balanced-Scorecard-like' approach consisting of four Key Perspectives—Operational Forces, Resource Management, Defence Team, and Contribution to the Government of Canada (GOC)—that are subdivided into 16 measurement areas and supporting indicators connecting Defence's functional processes and activities with its strategic goals.

Based upon the Planning, Reporting and Accountability Structure (PRAS), Defence Strategy 2020 and Defence Plan 2001 (DP01) a detailed analysis of current capability goals and gaps is outlined in the Personnel, Research & Development, Infrastructure & Organization, Concepts & Doctrine, Information Technology, Equipment & Material (PRICIE) perspective of the Capability Based Planning model. Although the capability gaps have been identified in the 'PRICIE', no precise cause-effect relationships between the various areas has been established to help Defence's senior managers make decisions that will improve one capability shortfall without exacerbating a problem in another capability area.

Of particular interest at this time are the capability gaps as they relate to COCP. Because this is a dynamic problem a methodology that can analyze dynamic complex issues, like SD, is a necessity.

## Objective

A SD model, when key internal players are involved in the group model-building process, can help uncover the unintended consequences of policies and decisions and then identify key performance-related leverage points. The SD-related pilot project's objective is to help Defence's Performance Measurement Core Action Team (PMCAT) develop a better understanding of the causal linkages that interact dynamically across the COCP, 'PRICIE' and PMF.

To accomplish the above-cited objective the model-building process closely examined the principal time delays related to planning and launching new operations, and quantified, where possible, the current qualitatively defined capability goals and gaps. The model-building process involved key stakeholders and people possessing relevant information—the PMCAT—with a view to building a rich model that reflects not only formal organizational policy, but also unofficial policy that managers use to inform their decision-making processes.

## Project Approach

Central to the pilot project's success was the ability of the Lead Facilitator and Project Manager to collect, correlate, analyze, synthesize and integrate the vast quantities of Defence data, information and knowledge necessary to reflect, in quantitative SD terms, the cause-effect linkages that interact dynamically across the COCP, 'PRICIE' and PMF. To ensure a complete and thorough understanding of the requirement, the consultant team reframed the constituent elements of the Defence Management System (DMS) from a SD perspective, creating a '3-D structure' consisting a causal view, an external view and an internal view.

The internal view [i.e. Defence Strategy 2020, Capability Goals & Gaps, DP01—including the PMF—and the so-called 'Horizon Plans'] focuses on the how information is used by the Defence Team to manage the organization's internal business processes. The external view [i.e. Defence Policy, PRAS, Report on Plans & Priorities (RPP) and the Departmental Performance Report (DPR)] deals with how defence-related information is portrayed to the Defence Team's external audience: the Government, Parliament and the People of Canada. The purpose of the causal view is to establish a clear picture of how the sub-system is structured—its stocks, flows and delays—in order to better understand the underlying patterns of behaviour over time. The causal view focuses on the structure of the system/sub-system, not the usage of the data, information and knowledge thereby generated.

## PMCAT Group-Modelling Sessions

While preparing for the 1st group-modeling session with the PMCAT, the consultant team closely scrutinized the COCP [i.e. the Military Strategic; Operational (Domestic), Operational (International) and Tactical levels], the 'PRICIE' and the PMF in terms of stocks, flows and delays. The consultant team quickly came to the realization that the COCP, 'PRICIE' and the PMF, as currently constituted, could not be readily modeled in either qualitative, or dimensionally consistent, quantitative SD terms.

Defence's five capability programs are as follows: Command & Control (encompassing both Command and Information & Intelligence); Conduct Operations (encompassing Conduct Operations, Mobility and Protect Forces); Sustain Forces; Generate Forces; and Corporate Policy & Strategy. Given the stated purpose of the pilot project—*to map the principal causal relationships of the COCP sub-system, with a view to establishing direct linkages to Defence's PMF*— coupled with the overall requirement to develop a quantitative SD model containing dimensionally consistent units, the consultant team decided to focus the project team's modeling efforts on the direct link between the COCP and the PMF, which is the 'PRICIE'.

The 'PRICIE' more readily lends itself to 'quantification' in terms of dimensionally consistent units that can be formulated as a SD model and portrayed in terms of stocks, flows and delays over time. However, the scope of the project was restricted to developing a dynamic, quantitative model for only one of Defence's five capability programs: the COCP. Therefore, the consultant team decided to translate the 'PRICIE' in terms of the four principal 'stocks' that underpin the COCP sub-system: Personnel, Equipment, Materiel, and Contingency/Operations Plans. See Appendix A.

Before group model building a 1 day crash course in SD was written and members of PMCAT learned the basics of the language of stocks and flows. During the 1st session, the project team reviewed and improved the 'alpha' versions of the Personnel and Equipment sector maps. At the 2nd group session, the project team reviewed and improved the 'alpha' versions of the Materiel and Contingency/Operations Plans sector maps. During the 3rd modeling session, the project team validated the 'beta' versions of the Personnel, Equipment, Materiel and Contingency/Operations Plans sector maps. Having done so, the team then ran an experimental sub-model derived from the Personnel sector map to demonstrate how the a SD model could help senior managers animate the planning process to experience the dynamic effects of their decisions.

## Summary of Modeling Results

The net result of the work accomplished by PMCAT members during the modeling sessions, coupled with focussed input from Defence's subject matter experts (SMEs) and the inter-session development work by the consultant team, was a set of four 'beta-version' SD sector maps, or models, governing the COCP sub-system of Defence's capability-based program:

- Personnel Sector Map—see Appendix B.
- Equipment Sector Map—see Appendix C.
- Materiel Sector Map—see Appendix D.
- Contingency/Operations Plans Sector Map—see Appendix E.

An interesting insight from the group-modeling activities was the recognition that the 'context' surrounding the Personnel and Equipment sector maps (i.e. ageing personnel and equipment suites) engenders a significant 'feedback' effect over time that is in turn effected by the tempo of Defence's military operations. The dynamic feedback generated by the inter-play between the length of a given operation, the intensity of the operation, and the structure of the forces deployed on the operation is captured via the interaction between the above-cited four Sector Maps and the two (i.e. Personnel and Equipment) ageing chains.

The team's success in mapping the COCP sub-system augers very well for future quantitative modeling activities related to Defence's four remaining capability-based 'sub-systems': Command & Control; Sustain Forces; Generate Forces; and Corporate Policy & Strategy. The project team recognized that, having mapped portions of the 'PRICIE' in quantitative SD terms the opportunities to effectively link the COCP to the PMF, in a dimensionally consistent manner, are greatly improved.

The team members acknowledged that, by employing shadow variables, model arrays and random pulses to 'shock' the COCP sub-system, Defence's data and information can be used to generate very timely, useful knowledge to better inform decision-making by the senior management team (i.e. scenario-based planning exercises using multiple, arrayed sector maps). Furthermore, several team members expressed their view that the project has helped Defence move one step closer to achieving its corporate vision of implementing an integrated defence management framework.

## Prototype—Ops Status Instrument Panel (OSIP)

The integrated set of four 'beta-version' SD sector maps governing the COCP sub-system served as the foundation for the development of a prototype OSIP. See Appendix F.

The various views of the COCP [i.e. PRAS, DP (including PMF), 'PRICIE', Scenarios, etc) constitute different 'uses' of the same data and information, because the same four sector maps, or models, drive all the views. See Appendix G.

When used to test the dynamic interplay within and amongst the four sector maps, the OSIP pointed to several COCP-related areas that beckon closer examination, in a dynamic sense: weak links, ageing chains, operational tempo, and strategy to results.

With respect to 'weak links', the OSIP indicated that the time delays governing the flows of Defence's personnel, equipment and materiel constitute important leverage points for

senior management, and that particular attention should be paid to identifying and improving the slowest events in chain of causality. Furthermore, the OSIP highlighted the importance of arraying Defence's personnel stocks [i.e. Military Occupation Classifications (MOCs)] in a dynamic fashion, because it is the people requirement that defines Defence's ability to sustain, over time, the structure of the deployed force.

The aging chains that affect Defence's stocks of personnel and equipment are important factors, particularly when viewed through the lens of Future Capability-Based Planning. The dynamic complexity engendered by aging personnel—coupled with a high turnover rate—and aging equipment suites is not yet well understood by the Defence Team. Intuitively, most Defence managers recognize 'aging' as an important issue; however, the leverage points remain obscured by mountains of detail. A management tool like the OSIP may help to shed light on the personnel and equipment trade-offs that need to be made today to ensure tomorrow's operational capabilities.

The notion of 'operational tempo' is an issue that begs further concerted analysis, supported by dynamic modeling. The tempo of Defence's operations appears to affect the organization's personnel-attrition rate, and the personnel-attrition rate appears to affect the tempo of Defence's operations. The OSIP suggests that operational tempo shortens the lifecycles of Defence's infrastructure, equipment and materiel stocks, while concurrently accelerating the integration of new, sophisticated technologies into the force structure. The OSIP also underscored the important role that the Reserve Force plays in both domestic and international operations and the need for Defence to manage this valuable resource in a dynamic manner.

Finally, the OSIP represents the practical application of the above-mentioned '3-D structure' in terms of linking Defence's strategy to its results. The four sector maps (i.e. the causal view) that frame the dynamic COCP model structure provide a mechanism to integrate the internal view (i.e. Defence Strategy 2020, Capability Goals & Gaps, DP01—including the PMF—and the Horizon Plans) with the external view (i.e. Defence Policy, PRAS, RPP, and the DPR). The dynamic model can also be reconfigured and populated with data/variables to test the underlying planning assumptions and examine how the flow of operations (i.e. 'spike', 'surge' and 'sustain') impact the development of a sustainable force structure.

## Conclusion

Until recently, few public or private-sector organizations would have considered developing a quantitative SD model to run simulations designed specifically to test their management team's underlying assumptions and business strategies, over time. Increasingly, senior and middle mangers are seeing their responsibilities expand in scope, and they are becoming more and more aware that doing their jobs properly and effectively means understanding and managing business-dynamics issues.

The overall success of the pilot project stems from the team's ability to relate the operational-forces-specific measures and indicators contained in the PMF to the capability goals & gaps outlined in Defence's capability-based-program.

This proof-of-concept pilot project has demonstrated that a SD-based, quantitative model of the COCP sub-system is a very useful and powerful approach to developing insights into the causal relationships that govern Defence's capability-based program.

## Recommendations

Given the success of this proof-of-concept pilot project to map the principal cause-effect relationships of the COCP sub-system, with a view to expanding the linkages of Defence's CBP to the PMF, the following recommendations are made:

1. Acquire dimensionally consistent data and variable information from the Navy, Army and Air Force to populate the COCP sub-system model, placing particular emphasis on the key MOCs and equipment suites that limit Defence's ability to sustain its operational force structure over time.
2. Develop a SD-based model of the 'Generate' sub-system and link it to the COCP sub-system model.
3. Develop a SD-based model of the 'Sustain' sub-system and link it to COCP and 'Generate' sub-system models.
4. Develop SD-based models of the 'Command & Control' and 'Corporate Policy & Strategy' sub-systems and link them to the other three, above-cited models.

## Appendices

Appendix A: 'PRICIE' in Terms of Four Principal Stocks
Appendix B: Personnel Sector Map
Appendix C: Equipment Sector Map
Appendix D: Materiel Sector Map
Appendix E: Contingency/Operations Plans Sector Map
Appendix F: COCP Sector Map
Appendix G: Prototype—OSIP

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