

**COST ESTIMATION AND PERFORMANCE MEASUREMENT**  
**IN CANADIAN DEFENCE:**  
**A PRINCIPAL-AGENT-MONITOR PERSPECTIVE**

by

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## ABSTRACT

The relationship between the Government and the Department of National Defence between 1945 to 2010 is examined from the perspective of the struggles between a principal, an agent and a monitor using the reports of the Auditor General as a basic source of information. Evidence is presented of an efficient exchange between the principal (Government) and the agent (Department of National Defence) which is complicated by the monitor (Auditor General) who reports 'bad' behaviour by the Department to Parliament rather than to Government. The Government buys votes through industrial and regional benefits in exchange the Department of National Defence gets new military equipment that it would not get otherwise. In terms of performance measurement, the Government receives success stories and budget controls and in exchange the Department of National Defence receives autonomy in the conduct of its business. The Auditors General, on the other hand, criticize this efficient exchange because they have a narrower vision of 'value for money'. The monitor's reports are helpful to the principal in controlling the agent but also troublesome because the monitor has objectives that do not align perfectly with the principal. Historical episodes in monitoring the Department of National Defence are described and analyzed using major capital projects as examples for cost estimation and performance measurement purposes.

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To my family, Edmond, Edwina, Daphne, Truman, Barb, Julia, Laura and Sarah

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## Chapter 1

### Introduction

#### 1.1 Analytic Narrative with a Principal–Agent–Monitor Framework

This dissertation investigates the relationship between the Government, the Department of National Defence and the Auditor General over the past 65 years from the perspective of a principal-agent-monitor framework. Evidence is presented of an efficient exchange between the principal (Government) and the agent (Department of National Defence) which is complicated by the monitor (Auditor General) who reports ‘bad’ behaviour by the agent to Parliament rather than to Government. The Government buys votes through industrial and regional benefits, in exchange, the Department of National Defence gets new military equipment that it would not get otherwise. In terms of performance measurement, the Government receives success stories and budget controls, and in exchange, the Department of National Defence receives autonomy in the conduct of its business. The Auditors General, on the other hand, criticize this efficient exchange because they have a narrower vision of ‘value for money’. The monitor’s reports are helpful to the principal in controlling the agent but also troublesome because the monitor has objectives that do not align perfectly with the principal.

A case in point is the new fighter aircraft<sup>1</sup> acquisition program from 1977 to 1980 which by most accounts was a great success (Atkinson and Nossal, 1981). The Canadian Forces obtained a highly capable aircraft that could conduct both the air-to-air role in North America and the air-to-ground role in Europe and

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<sup>1</sup>Hereafter referred to as the CF-18

thereby, with one modern aircraft, replaced two aging and obsolete aircraft. Regional politics played out over the share of industrial benefits to various provinces (Boyd, 1989) but, when the decision was finally made, many people felt that the process worked well and the best aircraft was chosen both from a military and an economic perspective (Atkinson and Nossal, 1981). The program manager of the CF-18 acquisition went on to become Commander of Air Command, and in 1983 was promoted to Chief of Defence Staff, the top general in the Canadian Forces.

The Auditor General (1984) began to find anomalies in the CF-18 program's accounting practices. His report referred to the financial ceiling on the program and noted the changes in aircraft costs. He stated, "The Department faced a difficult choice between reducing the number of [aircraft] or deferring important support elements in the hope that they could be accommodated in future budgets . . . The Department elected to defer certain components and subsystems" (Auditor General, 1984, para. 12.54).

The Auditor General's findings lead the House of Commons Standing Committee on Public Accounts to conduct a series of inquiries in 1985 into the CF-18 acquisition. They found that, even though the program was capped at \$5.2B, there were some \$3.6B worth of follow-on projects related to the CF-18. The committee admonished the Department of National Defence for not identifying these costs to the Government as part of the acquisition program (Byers, 1986).

This case study of the Auditor General as monitor finding 'bad' behaviour in the Department of National Defence as agent with regards to cost estimation in major capital projects is discussed in Chapter 4 in more detail using a methodology described by Bates *et al.* (1998, 2000a,b) as analytic narratives. Analytic narratives

use rational choice theory to enlighten case studies of a historical nature. Bates *et al.* (1998), in their book, begin with “a desire to account for particular events and outcomes” as opposed to scientific methods that are employed when situations occur repeatedly (p. 3). Bates *et al.* (1998) suggest that principal-agent theory, which will be used in this research, could be utilized in analytic narratives but do not demonstrate how it can be done. Therefore, to a great extent, this research will be an experiment in the potential value of analytic narratives within the principal-agent framework to explain the behaviour of the Auditor General, the Department of National Defence and the Government.

This dissertation is novel because it describes a practical application of principal-agent-monitor theory to the Canadian defence situation. The tension between the Government as principal and the Department of National Defence as agent with regards to cost overruns and performance shortfalls in defence equipment acquisition programs has been seen over many years (Dow, 1979; Arseneault, 1989; Knight, 2007; Plamondon, 2010). There has also been significant literature on the general tension between Departments as ‘spenders’, the Government as ‘guardian’ and the Auditor General as ‘watchdog’ (Hartle, 1988; Sutherland, 2002; Good, 2007). The questions that should be asked are: if cost overruns and performance shortfalls in defence have been so common over so many years, why do they continue to persist? Why does the Government as principal allow the Department of National Defence as the agent to continue to get away with this ‘bad’ behaviour?

This dissertation brings together the defence, Auditor General and the principal-agent literature to show that there may be a series of efficient exchanges between the principal and the agent that allows this apparent ‘bad’ behaviour

identified by the monitor to continue. It is suggested that no amount of monitoring by the Auditor General will completely correct this situation, although the Auditor General's reports can aid the Government in controlling exceptionally egregious behaviour by the Department of National Defence.

## 1.2 Outline

Chapter 2 lays out the framework of the principal-agent-monitor model of the Department of National Defence. It attempts to explain why the situation in defence is interesting and unique. There are three aspects of this dynamic that make this study unique and interesting. First, the complexity of the military mission makes it difficult for laypeople in the Government and in the Auditor General's Office to understand and measure the performance of the Department of National Defence. There is associated with this a general impression that within the military the 'ends' often justify the 'means' which appears to lead to a lack of consideration for efficiency in the conduct of their mission. Second, the military mission is relatively capital intensive. This fact makes it difficult for the Department of National Defence and the Government to hide from the scrutiny of the Auditor General. These capital projects are lucrative and complex. Their lucrative nature makes them important to many interest groups and their complexity makes them highly susceptible to failure. Finally, military expenditures on capital are intended to provide industrial and regional benefits. To make military expenditures palatable to the Canadian public, the Government introduced guidelines for industrial and regional benefits that needed to be addressed by the Department of National Defence and their contractors. This became the source of efficient exchange between the Government and the Department of National Defence but confused the issue of

‘value for money’ that the Auditor General’s Office was trying to address in their audits. These issues affect the principal, monitor and agent relationship in various ways, giving advantages to the principal and monitor in some cases and the agent in other cases.

In the following chapters, a principal, agent and monitor approach is taken but also the discussion proceeds historically. First, the post-World War II period from 1945 to 1975 is examined in Chapter 3. Secondary sources are utilized from the readily available military procurement literature of the time. The primary sources of information used in Chapters 4 and 5 for the period 1975 to 2010 are the Reports to Parliament by the Office of the Auditor General and the Inquiries of the Public Accounts Committee<sup>2</sup>. During this second period, the Department of National Defence went through a rearmament, a downsizing and a revitalization. This second period begins with the Government policy of industrial and regional benefits, on the one hand, and the Auditor General’s Act on the other.

The industrial and regional benefits policy, originally introduced in 1976, is seen as a way to develop an efficient exchange between the principal and the agent. The Government principal is able to pursue national socio-economic development initiatives that buy votes and the departmental agent is able to acquire military equipment that it would not be able to otherwise.

The Auditor General’s Act of 1978 institutionalized the Auditor General’s position. The Auditor General was now named for a ten-year non-renewable term. This relatively long term and its non-renewability was intended to make the position as independent of the Government as possible. The Auditor General can only

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<sup>2</sup>It was decided to use these official records because of the author’s full-time employment in the Department of National Defence during the researching and writing of this dissertation.

been dismissed on bad behaviour via an order-in-council, therefore, is relatively immune to Government pressure. The Government does, however, provide funding for the Auditor General's Office. The Auditor General's Office had seen substantial growth during this period (Sutherland, 1981) and the relationship between the Government and the Auditor General changed considerably to focus on the concept of 'value for money' rather than small scale financial indiscretions.

Chapter 3 is about how the principal brought the agent under control in the post-World War II period. It describes the historical background of military procurement in Canada from 1945 to 1975. This was a period in which military capital equipment development programs were attempted in Canada; many of which failed to produce an effective capability even though millions of dollars were spent. The first section of this chapter discusses the well-known case of the Avro Arrow. However, it is shown that this was not an isolated incident. There were similar debacles in the army and the navy in this period. The second section of Chapter 3 discusses the introduction of benefit-cost analysis and performance measurement to the Department of National Defence. In many ways, this was an adoption of processes originally developed in the United States Department of Defense in the 1960's. The introduction of this rational management approach in both United States Department of Defense and the Canadian Department of National Defence is outlined.

During the period 1945 to 1975, the Auditor General played a fairly minor role. Prior the Diefenbaker administration, the Auditor General was chosen from the civil service and maintained a small section in the Ministry of Finance that concentrated on the discovery and quiet handling of financial indiscretions (Ward,

1962). John Diefenbaker appointed Maxwell Henderson in 1960 from outside the civil service and the tradition of the Auditor General being a chartered accountant with much higher public visibility was established.

Chapter 4 concentrates on major capital programs in the Department of National Defence, as seen through the eyes of the Auditor General from 1975 to 2010. The first section of the chapter describes the processes involved in the Defence Program Management System which includes requirements definition, options analysis, acquisition, and in-service stages. The second part of the chapter provides a number of case studies from the rearmament period of the late Cold War, the downsizing period of the Post-Cold War and the revitalization period Post 9/11. During the period 1975 to 2010, most of the capital programs involved foreign design and development of off-the-shelf equipment. There were also policies in place to maintain a fixed-cost ceiling on military capital programs. However, it will be shown that a number of games were played by the Department of National Defence to get around this fixed-cost ceiling and although these games were discovered by the Auditor General as monitor and investigated by the Public Accounts Committee, the Government protected the Department of National Defence.

Chapter 5 is in two parts. The first part of the chapter discusses the 20 year history, from 1975 to 1995, of failed attempts by the Department of National Defence to create a performance measurement system as seen from the perspective of the Auditor General as the monitor. The position of the Auditor General in this effort is, on the one hand, to encourage the Department of National Defence to develop a quantitative performance measurement system but, on the other hand, to continually raise issues with performance shortfalls that are recognized

by departmental employees that are documented in the files. In 1995, the Government introduced the Departmental Performance Reports as part of the Estimates process in which the Department of National Defence and the other Government Departments document various 'good news' anecdotes for public consumption.

The second part of Chapter 5 is a study of the alternative service delivery program in the Department of National Defence that occurred primarily in the late 1990's and early 2000's. It is shown that most of the initiatives in this privatization program were failures in the sense that they did not produce the expected amount of savings. This is explained primarily by the fact that public servants in the Department of National Defence will not voluntarily privatize their own functions without significant incentives. There are two cases that are discussed where the incentives were significant enough to result in relative success stories: the Canadian Aviation Training Centre and the NATO Flying Training in Canada program. In both cases, military bases were turned over to civilian companies and continued to run the pilot training programs that they had been used for when they were military bases. The novelty of these programs was that new aircraft were provided to the military pilots without having to go through the hassle of a major capital project and the scrutiny of the Treasury Board and the Cabinet.

As the theory of principal-agent interactions would suggest, there are two ways that the principal can obtain and maintain control of an agent. The first is through positive incentives that align the goals of the agent with the goals of the principal. The second is monitoring the behaviour of the agent and negative incentives if the agent is caught shirking. The concluding chapter will review the relative effectiveness of the positive incentives (the investment in the defence cap-

ital program) compared to the monitoring (as done by the Auditor General) and negative incentives. The conclusion is that the Government has effectively obtained and maintained co-operation from the Department of National Defence through a positive incentives program which results in a series of efficient exchanges. The relative effectiveness of the monitoring by the Auditor General and negative incentives is complicated because the Government most often has tried to protect the Department of National Defence and itself from embarrassment when the Auditor General's reports criticize the Department.

In the concluding chapter, there is also a short discussion of the potential effectiveness of monitoring by the Auditor General in the counterfactual situation if the Auditor General reported to the Government rather than Parliament. The dissertation ends with an evaluation of the adequacy of the principal-agent-monitor framework in the examination of Canadian defence cost estimation and performance measurement.

## Chapter 2

### Theoretical Considerations

#### 2.1 A Principal-Agent-Monitor Framework

The goal of this dissertation is to examine cost estimation and performance measurement in the Department of National Defence using a principal-agent-monitor framework. Here the principal is the Government of Canada, the agent is the Department of National Defence and the monitor is the Auditor General of Canada. This chapter will provide: a description of the principal, agent and monitor in defence; and, a discussion of why this principal-agent-monitor framework in defence is interesting and unique.

In principal-agent theory, as applied to bureaucracies and the public sector, the principal hires an agent or a number of agents to implement policies in exchange for remuneration (Breton and Wintrobe, 1982). The way this is implemented in public management is as a ‘nexus of contracts’ between principals and agents (Lane, 2005). Lane goes on to say that “in the public sector the interaction between the key players tends to be a *game* between two parties that lasts longer than the quick buying and selling behaviour in the market” (9, emphasis added).

This principal-agent framework was originally formulated as an ‘ultimatum game’ in which the principal could make a ‘take-it-or-leave-it’ offer to the agent (Miller, 2005). However, the principal-agent framework was later reformulated as a ‘repeated prisoner’s dilemma game’ in which the ‘folk theorem’ applies, so that cooperation may develop from repeated interaction.

The central focus of the principal-agent framework is the ‘principal’s problem’ that was first noted by Weber (1958). This problem is created by information asymmetry in that the agents are usually experts in their field whereas the principal is usually a layperson. If nothing else, the agents know their own qualifications and the amount of effort they will put into the task whereas the principal is only able to see the results of the completed task.

There are two related problems stemming from this information asymmetry: ‘adverse selection’ in which the agents know their true qualifications for the job but may misrepresent themselves to get the position, and ‘moral hazard’ in which the agents once they get the job may not put the expected effort into the task and may ‘shirk’<sup>1</sup>

There are two commonly suggested ways to align the objectives of the agents with the principal and thus resolve these problems. The first is the use of incentives (Laffont and Martimont, 2002). Generally, this involves pay for performance. However, this may be difficult to implement in the public sector directly and therefore other incentives might be employed. Parkinson (1957) suggests that bureaucrats seek power by building the size of their organization. Niskanen (1971) suggests that bureaucrats are motivated by budget increases. Breton and Wintrobe (1982) suggest that public servants seek all kinds of ‘pay’ for services such as “large offices, air conditioning, thick carpets, beautiful secretaries, expense accounts, research budgets, amiable work companions, use of the company airplane, and not least, the pursuit of personal goals deemed in the public interest” (p. 19). All of these provide a menu of incentives that can be utilized by the principal.

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<sup>1</sup>As Miller (2005) suggests the principal also could be susceptible to moral hazard because he or she does not always have to follow through on an agreement previously made with the agents.

The second type of action that the principal can conduct to ensure the agents comply with their direction is monitoring. Tullock (1965) describes the internal and external monitors that a principal may utilize to check on its agents. The internal monitors are primarily the ‘cost accountants’<sup>2</sup> and the ‘pseudo-accounting performance measurers’<sup>3</sup>. Both of these internal approaches are being constantly criticized as insufficient by the Auditor General.

It has been noted by Lindsay (1976) that pseudo-accounting performance measurement is highly imperfect. It can be costly to implement and of uncertain value (Halachmi, 2005). Therefore, it is not unusual for the Government to instead rely on the press<sup>4</sup> and lobbyists<sup>5</sup>, as external monitors, to identify problems in the bureaucracy. This was noted by McCubbins and Schwartz (1984) who label these sources of external monitoring as ‘fire alarms’ that are cheap in contrast to the expensive ‘police patrols’ of formal monitoring agencies. Tullock (1965) concludes that “the [principal] will find it useful to compare internal and external sources of information” (p. 213).

External monitors also include the Office of the Auditor General. Good (2007) discusses the rising influence of the Auditor General as a ‘financial watchdog’

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<sup>2</sup>Although not considered in this dissertation, the Ministry of Finance monitors the Departments in a similar manner to cost accountants. See Good (2007) for an excellent discussion of the influence of the Ministry of Finance on departmental ‘spenders’.

<sup>3</sup>There will be a detailed discussion in Chapter 5 of the problems with performance measurement inside the Department of National Defence as well as the Departmental Performance Reports enforced by the Treasury Board. Good (2007) provides a discussion of the importance of the Treasury Board as an internal monitor, although he is not specifically interested in their role in performance measurement.

<sup>4</sup>The press will not generally be used as a source of evidence for this dissertation because their reporting on defence is seldom reliable, although it was evident in the Somalia Affair, in which the Canadian military was severely punished for misbehaviour primarily reported in the press, that they can be highly influential (Desbarats, 1997).

<sup>5</sup>The influence of lobbyists will be tangentially discussed in the importance of industrial and regional benefits from defence expenditures.

for the Government. Monitoring by the Auditor General's Office, a focus of this dissertation, is definitely an expensive type of monitoring (Sutherland, 1981), more like a 'police patrol' than a 'fire alarm'. The Auditors General pride themselves on their independent viewpoint (Good, 2007). Concerning auditors, Tullock (1965) argues that they usually have "only one function; to catch regular bureaucrats in some form of misconduct ... [e.g.] dishonest, disobedient, or incompetent" (p. 215). Thus, they often uncover embarrassing findings that reflect poorly on the Government. Although retired Members of Parliament and others (Hartle, 1979; Sutherland, 1981, 2002; Good, 2007) often complain that the Auditor General has too much power<sup>6</sup>, the Auditor General's mandate is legislated in Canada in the Auditor General's Act.

The Auditors General have a great deal of discretion on what subjects they consider for examination (Auditor General, 2010b). As the Policy Division of the United Kingdom Department for International Development (2004) recommends, the Auditor General "should actively seek to report on 'sexy', high value issues – corruption, gross mismanagement, failure to deliver the services which voters are particularly concerned about" (p. 5). The Auditor General's reports are examined by Parliament and the most controversial findings are further investigated by the Public Accounts Committee. This committee is representative of Parliament and is chaired by a member of the Opposition. Although, the Public Accounts Committee has limited resources and very limited time to conduct their inquiries, as the Department for International Development (2004) suggests, they are well briefed by the Auditor General and provided with "lines of questioning they might

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<sup>6</sup>The uncovering of the Sponsorship scandal is considered by many to have directly influenced the subsequent federal election in which the ruling Liberals were defeated by the Conservatives in 2006.

wish to pursue with the audited bodies” (p. 4). Furthermore, the Auditor General can choose subjects “which will be attractive to members of the Public Accounts Committee and [which] encourage them to act on the [Auditor General’s] reports” (p. 5). In another Department for International Development (2005) paper, it is suggested that the Auditor General should “cultivate positive publicity” by having a media policy, releasing summaries of their reports to the press, holding press conferences when reports are released and generally promoting “good news stories about their work” (p. 17).

In most formal models of the principal-agent-monitor relationship, the agent bribes the monitor to lie to the principal about the level of cooperation of the agent (Antle, 1982; Baiman *et al.*, 1987; Strausz, 1997; Baiman *et al.*, 1991; Ng and Stoeckenius, 1979; Dittman, 1999). However, in this dissertation, a different pattern of behaviour between the principal and the agent is identified which was first generally recognized in bureaucracies by Breton (1991) as an ‘efficient exchange’. The monitor appears as a disruptive agent in this relationship on many occasions, as well as serving the interest of the principal on others.

It is shown that the Auditor General repeatedly reports shortcomings in the implementation of Government policies by the Department of National Defence, only to get the reply that implementation to correct the problem is in the works and will be completed shortly (e.g. Auditor General (1984)). Then when the Auditor General’s Office looks again a few years later, they find that the problem remains or may have gotten worse (e.g. Auditor General (1987)). This situation arises because the principal and the agent have a mutually beneficial arrangement.

Party politics clouds the role of the monitor from the principal's perspective and often interferes in the principal-agent relationship. The criticism of arrangements between the Government and the Department of National Defence by the Auditor General can be in part related back to different reporting relationships. The Auditor General reports to Parliament. Parliament directs the Public Accounts Committee that is chaired by a member of the Opposition to conduct inquiries into significant findings from the Auditor General's Annual Report. The Department of National Defence, on the other hand, reports to the Cabinet in the Government through the Minister of National Defence. The Auditor General by finding misconduct in the Department of National Defence is finding fault in the Government and aiding the Opposition in Parliament. Therefore, there is a natural alliance between the Auditor General and the Opposition against the Government and the Department of National Defence.

A principal-agent-monitor framework is helpful in understanding the relationship between the Government, the Auditor General and the Department of National Defence in which the Government and the Department being monitored, act in the shadow of the Auditor General (Breton, 1991).

### **2.1.1 The Government Politicians as the Principal**

The principals, in this framework, are governing party politicians; in particular, the Prime Minister and the Minister of National Defence and to a lesser extent the other members of Cabinet. These players could have greater or lesser power based on whether the governing party has a majority or whether the Minister of National Defence has relative independence and/or support from the Prime Minister and Cabinet. From a public choice perspective, the governing party wishes

to implement policies that will result in their re-election as a majority Government at best or at least as a minority Government.

The Government provides policy direction and funding to the Department of National Defence and the Canadian Forces. The relationship between the Government and the Department of National Defence changed a number of times during the period under study. There was a period of rearmament during the Cold War, in the later years of the Trudeau administration and implemented more fully during the early Mulroney years, in which there were major acquisition programs for the CF-18 and the Canadian Patrol Frigate. When the Cold War ended, the later years of the Mulroney administration followed by the Chretien administration, the Government was facing a debt crisis and tried to reap a 'peace dividend' through budget cuts and reduced readiness. Then after the terrorist attacks in 2001, the War in Afghanistan became a high priority for the Martin and Harper minority Governments<sup>7</sup>.

The Prime Minister chooses the Minister of National Defence from his caucus and may choose this person to provide either a relatively high or a relatively low profile. For the period under study, the Prime Minister has chosen, for the most part, to keep the Department of National Defence under control by naming a relatively low profile Minister. There have been exceptions, for example, Marcel Masse, Erik Nielsen and Perrin Beatty were 'household names' on the political scene in their time and Peter MacKay has been a high-profile Minister during the current Harper administration. However, the point is that the Prime Minister

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<sup>7</sup>However, with the Canadian participation in Afghanistan winding down, there appears to be a return to concern about the deficit.

chooses the Minister of National Defence for his own purposes and is the ultimate principal in this framework.

On behalf of the Prime Minister, the Privy Council Office chooses the Deputy Minister of the Department of National Defence who heads the civil service component and in particular controls finances and procurement through the Assistant Deputy Minister (Finance and Corporate Services) and the Assistant Deputy Minister (Materiel). The Prime Minister and Minister of National Defence choose the Chief of Defence Staff, who leads the Canadian Forces. The military component of the Department of National Defence is more than twice as large as the civilian component, although the Deputy Minister is positioned slightly but not directly above the Chief of Defence Staff in the hierarchy. The principals can choose these people for various reasons. However, during the period of this study, the primary criteria has been to maintain control<sup>8</sup>. These leaders represent the highest level of the bureaucratic agent in the principal-agent-monitor framework.

The Prime Minister chooses the Auditor General of Canada, who in the framework is considered a monitor between the principal and the agent. The Auditor General, however, reports to Parliament as a semi-autonomous body which makes for a more complex relationship than would be usual if they were true monitors of the agent on behalf of the principal.

### **2.1.2 The Department of National Defence/Canadian Forces as the Agent**

The Department of National Defence consists of some 30,000 civil servants responsible for supporting the Canadian Forces that are made up of some 70,000

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<sup>8</sup>General Hillier (2009) might be the exception.

military members. The Department's budget is divided into three categories: capital, personnel, and operations and maintenance. This dissertation will concentrate on capital procurements. Many analysts believe that the investment in capital is the remainder after the personnel and operations and maintenance budgets are allocated (Bland, 2004). Capital allocations have suffered considerably with personnel and operations and maintenance costs rising with inflation and equipment wear and tear. It is commonly believed that the capital budget should be around 25% of the total in order to efficiently replace aging equipment (Bland, 2004).

The period under study begins in 1945 and runs to 2010. This is divided into two sub-periods: 1945 to 1975 when most of the defence equipment design and development was done in Canada but was fraught with difficulties; and 1975 to 2010 when the Government brought in policies to reduce risk and control costs in defence equipment acquisition. The unique contribution of this dissertation involves the examination of this latter period using a principal-agent-monitor framework.

The period 1975 to 2010 includes a significant portion of the end of the Cold War when Canada was coming out of an underinvestment in defence through the 1970's and started a rearmament program to replace aging and obsolete weapon systems. This was followed in the Post-Cold War with the Government looking for a 'peace dividend' while at the same time the Canadian Forces were trying to redefine their role by expanding their already high level of participation in peacekeeping and creating a new role in 'peacemaking'. The period under study concludes with the 'new' warfighting posture for the Canadian Forces after 2001 in which they were actively engaged in Afghanistan.

In 1975, the Government issued a Defence Structure Review that laid out the rearmament program for the Canadian Forces over the next 15 years. This rearmament, from 1975 to 1990, involved new aircraft like the Aurora, long range patrol aircraft, and the CF-18, new fighter aircraft, as well as, new armoured vehicles, such as the Bison, Cougar and Husky, and new weapons systems, such as Low Level Air Defence. The Tribal Class Upgrade and the Canadian Patrol Frigate programs came on at the end of this period. One of the significant aspects of this rearmament effort was that from the beginning it was closely linked to industrial benefits and regional job creation programs.

The Post-Cold War of the 1990's was a period in which the traditional role of peacekeeping for the Canadian Forces expanded into a new role of peacemaking in the former Yugoslavia, Somalia, Haiti, Rwanda and Zaire. Readiness levels in some of the traditional roles of the Canadian Forces were reduced and this may have led to certain disciplinary problems discovered in the Somalia Inquiry (Desbarats, 1997). In terms of investment in the military, the primary interest was in augmenting the current platforms with precision-guided weapons and investing in 'force multiplying' computer technology based on the theory behind the Revolution in Military Affairs (Sloan, 2002).

The combination of the end of the Cold War and the realization that Canada was in a debt crisis led to significant cuts in the defence budget in the 1990's. The Canadian Forces were cut from 78,000 to 60,000 and the civilian component of the Department of National Defence was cut from 30,000 to 20,000 over a few short years. Overall the defence budget was reduced by approximately 30%. There were a few notable smaller capital programs during the early 1990's

with the Griffon helicopter being purchased for air force, the Maritime Coastal Defence Vessel for the naval reserves, and the ERYX missile for the army. There was a major effort during this period to protect the fighting force as much as possible and reap savings in the support functions and the logistics tail, in the 'tooth-to-tail ratio'. The Gulf War at the beginning and the Kosovo Crisis at the end of this period highlighted the need to invest in precision-guided weapons for the air force and the idea of zero-attrition warfare was being hypothesized.

The 9/11 attack in the United States and the subsequent War in Afghanistan led to a revitalization of the Canadian Forces in the eyes of the Government and the Canadian public and gave a particular spin to the United States term 'Transformation' in the Canadian Forces with significant new investment in defence. The concept of Transformation in the United States followed closely after the Revolution in Military Affairs which emphasized a new way of organizing warfare as the United States attempted to do in Iraq. However, in Canada, Transformation took on a different meaning. After 9/11 with the War on Terrorism and the active employment of the Canadian Forces in a warfighting posture in Afghanistan, the idea of zero-attrition warfare was put aside in favour of the need to invest in self-protection of all kinds as the Canadian Forces could no longer avoid high-risk missions.

The bottom-line of the position of the Department with regards to the Government is that warfighting is relatively good for the Department of National Defence (National Defence, 2008). The investment in equipment and personnel is enhanced.

However, similar to the previous periods of rearmament and downsizing, the position of the Auditor General during this revitalization remained much the same with highly critical audits of departmental programs (Auditor General, 2005a, 2006, 2010c) while the Government continued to protect the Department of National Defence from this criticism. It will be seen that when the principal and the agent “share the same view as to how much time to invest toward production of some output, whether much or little”, the principal does not need and will not use a monitor (Brehm and Gates, 1997, p. 209). In the context of this dissertation, the Government and the Department of National Defence agree on a combination of military capability and job creation through industrial benefits, and this agreement is embedded in the Department of National Defence’s budget for capital expenditure. This will be demonstrated in Chapters 4 and 5 when the rearmament, downsizing and revitalization periods are discussed in detail.

### **2.1.3 The Office of the Auditor General as the Monitor**

The unique contribution of this dissertation primarily uses the reports of the Auditor General on the Department of National Defence from the Cold War in 1975 to the War in Afghanistan in 2010. The period 1945 to 1975 is reviewed in Chapter 3 but, aside from the cases of the Bonaventure refit debacle and the fire on-board the Bras D’Or, which will be discussed in the case studies section, the Auditor General was only a minor player in these defence controversies.

However by the 1960’s, the Auditor General was growing in importance in Government affairs. When John Diefenbaker was elected in 1957, he established that the chair of the Public Accounts Committee would be a member of the Opposition. In 1960, Diefenbaker appointed an ‘outsider’ as Auditor General,

the accountant Maxwell Henderson. Previously, the Auditor General had been a member of the public service.

Henderson (1972) claims to have started the process of ‘value for money’ audits in the Government of Canada. However, his interpretation of ‘value for money’ auditing was “to report on non-productive payments” (Auditor General, 2010a). This meant for example in the case of the Bras D’Or Naval Vessel that was cancelled after years of development, about which more will be said later, Henderson (1972) would say that it had been a waste of tax payers money even though keeping the project alive and spending more money on development might have made the problem worse (Sinclair, 1979). During Henderson’s term, his annual reports became ‘front page’ news and led to significant conflict between the Government and the Auditor General as a result of the media coverage.

Henderson often complained that his office was understaffed and poorly qualified. However, because of his constant conflict with the Government requests for increased staff were not actioned until Henderson was replaced by James J. McDonnell in 1973. Hartle (1988) suggests that the Government acquiesced because they did not want it to seem as if they were the reason for the conflict with the Auditor General. So, the 1970’s saw a rapid expansion of the office by paying for contractor support from management consultants and hiring full-time accountants as auditors (Hartle, 1979). In the 1980’s, the expansion continued and today the Auditor General has a staff of 650 personnel (Auditor General, 2010d).

Of particular interest in this dissertation is that although most of the Assistant Auditors General have the mandate to examine many Departments, there is one particular Assistant Auditor General who’s sole mandate is to examine the

Department of National Defence. The Department of National Defence is an easy target on which the Auditor General can find scandals to publish (Ward, 1962). The Auditor General's Office must continually find scandals in order to justify their existence. Scandals in the Department of National Defence attract approval from the Opposition, and makes it difficult for the Government to say 'no' to expansion of the Auditor General's Office, if he or she claims the office is understaffed to conduct the necessary auditing work (Frey, 1994).

The period under study in Chapters 4 and 5 coincides with the introduction of defining legislation concerning the role of the Auditor General in the Auditor General Act of 1978. This expanded the definition that was being informally developed by the Auditor General in the concept of 'value for money' audits. This approach to auditing placed the Auditor General into even more of a confrontational position with the Government. This legislation authorized the Auditor General to examine Government activities for economy, efficiency and effectiveness. Economy is defined as the acquisition of resources at a fair price. Efficiency is defined as the evaluation of the costs associated with turning inputs into outputs<sup>9</sup>. Effectiveness, on the other hand, is based on the measurement of the results from these outputs. This legislation stopped just short of giving the Auditor General the mandate to criticize Government policy. The Auditor General has gone out of his or her way to emphasize that this approach will not be critical of Government policy but will instead evaluate whether Departments have put in place methods of measuring effectiveness. Although Hartle (1988) and Sutherland (1981, 2002) worry that criticism of Government policy is now a real possibility,

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<sup>9</sup>This is similar to the concept of social efficiency and should not be confused with the concept used in this dissertation of 'efficient exchange' which is a mutually beneficial agreement between two players similar in concept to Pareto efficiency.

Good (2007) suggests that an Auditor General who is not accused of criticizing policy once in a while is not doing his or her job.

In the early 1980's, the Auditor General's Office began a program of comprehensive audits in which it looked at whole Departments and their most significant programs for 'value for money'. The Auditor General conducted his first comprehensive audit of the Department of National Defence in 1982. This was an uncontroversial and highly complimentary evaluation. He was impressed with the Defence Program Management System which documented the capital procurement process and felt that excellent progress had been made in the development of performance levels based on the Defence Structure Review of 1975. This was followed two years later with a highly unflattering comprehensive audit of the Department of National Defence that went into great detail on irregularities in the financial accounting in the CF-18 acquisition program.

After 1984, this comprehensive audit approach became unworkable. So, the Auditor General took its direction from Parliament to look into specific issues in Departments on a priority basis. The Auditor General moved to a pattern of smaller focused audits that investigated portions of the Department of National Defence. The office conducted over 30 audits of the Department of National Defence in the period from 1984 to 2010. These audits will be examined to determine what can be revealed about the behaviour of the Department of National Defence with regards to cost estimation and performance measurement in capital programs and how this may have changed over the period.

The discussion above is not intended to suggest that the job of the Auditors General is an easy one, or without social value. As Tullock (1965) suggests,

being outsiders they do not have the deep knowledge of how the organization works that the bureaucrats do. They must rely on information obtained from interviews in which the bureaucrats may not be forthcoming. They must also conduct random sampling of the files hoping to find documented 'evidence' of wrongdoing which would obviously be hidden. Their reputation for independence and credibility is most important to their effectiveness. Therefore, they must be very careful that they have 'the facts' (Good, 2007). It is shown later that despite the conflict between the Government and the Auditor General, some 'bad' behaviour by the Department of National Defence was identified by the Auditor General and corrected by the Government.

## **2.2 What Makes the Department of National Defence Unique?**

“What makes the Department of National Defence’s relationship with the Government and the Auditor General unique compared to other Government Departments and why is it worthy of a separate study?” An easy answer to these questions involves the size of the expenditures in defence and the large number of individuals employed by the Department of National Defence. In addition, however, it is noted that there are three key issues. First, the complexity of the military mission is very difficult for civilians who have not gone through military training to understand. Many attempts have been made over the years to include civilians in the departmental decision making process with limited success. Second, the departmental mission is relatively capital intensive. The Department of National Defence is both enamored by and constrained to seek technological solutions to its operational problems, resulting in major capital programs which are both complex and expensive. Also, the esprit de corps of the military is often associated with

major pieces of military hardware. Finally, since most equipment purchases for the modern Canadian Forces are off-the-shelf foreign designs, industrial and regional benefits packages are expected from the competing prime contractors to make these purchases palatable to the Canadian public. However, this makes military capital acquisitions subject to scrutiny and even more complex for the Auditor General's Office since the political nature of such benefits is not part of its mandate.

### **2.2.1 Complexity of the Departmental Mission**

The complexity of the departmental mission is obviously an advantage for the agent compared to the principal and the monitor. The military understand their missions better than outsiders. They can create a military mystique. This allows them a certain amount of autonomy from outside scrutiny. There is also the national security issue that provides some secrecy associated with the military mission making it easier to avoid accountability.

On the other hand, the capital programs have tried to balance affordability and requirements. This often led to sliding goals as affordability became a priority and the military requirements were hard to define and protect (Auditor General, 1998b). For example, many times the number of equipment needed to conduct military operations is specified by departmental analysts early in a procurement program but then when unit costs increase or budgets are cut, the number of equipment to be acquired is adjusted downward without any analysis of the implications of this change on the operational missions (Auditor General, 1987, 2010c). Tactical assessments are usually missing or ignored by departmental decision makers. These assessments are readily available from various wargames, concept of operations, and doctrine. However, when these studies contradict the

wishes of departmental decision makers, they are frequently questioned and countered with alternative assumptions (Auditor General, 1998b).

The political principals are at a particular disadvantage because of the information asymmetry caused by the complexity of the departmental mission. However, they are ultimately accountable for the actions of the Department of National Defence. They must face questions from the Opposition parties every day that Parliament is in session. One advantage from the point-of-view of civilian control over the military is that the political principals have ‘the right to be wrong’ (Feaver, 2005). They accept expert advice from the departmental analysts but they make the ultimate decision whether they understand the implications or not and the military is bound legally to follow orders.

The Auditor General as the monitor is also at an informational disadvantage to the departmental agent because of the complexity of the military mission. There are a small number of auditors assigned to the Department of National Defence compared to the size and number of issues that need to be surveyed. They can however compensate somewhat for this limited amount of background by being in the same job for their full 10-year mandate. They can also compensate somewhat by reviewing the large amount of public information on auditing the United States Department of Defense for places to look at in auditing Canada’s Department of National Defence.

The complexity of the military mission makes auditing the Department of National Defence difficult especially if one wishes to determine the efficiency of the military’s internal processes. It has also created and continues to create problems for civilian analysts who attempt to understand the military processes. It is very

difficult to determine whether alternative processes which would be more efficient could be used to provide the defence services.

### **2.2.2 Capital Intensity of Defence Spending**

The political principals have the advantage when one considers the capital nature of the defence expenditure. They can specify controls over the processes, for example, requiring Treasury Board and Cabinet approval. They have specified that programs must live within a fixed-cost ceiling and must be off-the-shelf designs. The political principals know that the departmental agents want new high-technology equipment badly enough that they will cooperate with these Government policies.

When the capital nature of the departmental expenditure is considered, it is the Department of National Defence that is at a disadvantage. Their capital programs are highly visible and extremely expensive which makes for a serious problem when 'selling' them to political principals and the Canadian public in peacetime. The departmental analysts try to play 'games' to hide some of the costs.

Various 'games' are played by the Department of National Defence when gaining approval for capital programs. One of them was identified first in the United States and called 'buy in' (Stubbing, 1986). In this 'game', a small investment at the beginning can lead to a large expenditure in the future based on the 'sunk cost' fallacy. In Canada with the fixed-cost ceiling, the weapon systems are purchased within the specified budget but they may not have all the 'essential' and 'indispensable' components that were originally specified in the requirement (Auditor General, 1984, 1998b). So the capabilities are reduced to meet the budget constraint.

Another 'game' identified first in the United States, 'low-balling' (Stubbing, 1986), was also transferred to Canada. In this 'game', there is fierce competition between the prime contractors in the bidding process where a company might agree to sell its equipment at a low cost and even lose money. However, when the decision is made to acquire the equipment from a specific company, they now have a monopoly situation and are able to charge exorbitant amounts for spare parts and modifications to make up for their initial losses (Auditor General, 1984, 1987).

In Canada, there is a 'hard' separation between Vote 1 money that is operating and personnel funds and Vote 5 money for capital. Another 'game' is the transfer of money between these two categories (Public Accounts Committee, 1985). It has been policy that the capital program must contain all of the expenses in the first two years of operation of the new equipment (Auditor General, 1987). However, it has been found that when facing a potential capital cost overrun, ammunition, spare parts, repair and overhaul facilities, and software maintenance facilities have been paid for out of the operating and maintenance budget (Public Accounts Committee, 1985; Auditor General, 1987). Similarly, money from one capital program might be hidden in other capital programs to remain within the budget ceiling (Arseneault, 1989). In another case, the Department of National Defence took advantage of the opportunity of the Government program of privatization to obtain access to new training aircraft that would have been difficult to acquire via the normal capital funding route through Treasury Board and Cabinet as a major capital project (Auditor General, 1999). This use of the privatization program was a blatant excuse to use operating and maintenance money for a capital purchase.

The Auditor General as the monitor has an advantage created by the capital nature of the military mission. The Department of National Defence must produce a large number of documents to justify their requirements and recommendations. These can be easily obtained and scrutinized. If these documents are not available, the Auditor General can criticize the Department of National Defence for not providing sufficient evidence for their recommendations. The Department of National Defence often tries to justify the 'means' by emphasizing the 'ends' that result but both the 'means' and 'ends' are examined by the Auditor General. If the Department follows the processes required but does not get the capabilities they require, the Auditor General will criticize them. If the Department, in an effort to get their requirements met, do not follow the appropriate procedures, the Auditor General will be able to criticize them for that. The large costs involved with capital programs means that any problems found with them are highly newsworthy. Thus, the Auditor General will get credit for saving the tax payer unnecessary expense.

### **2.2.3 Industrial and Regional Benefits**

Industrial and regional benefits are a mixed blessing for the Department of National Defence. They get equipment that they might want but it may cost more than they would like. The desire of the political principal to include Canadian-designed systems in a foreign-designed platform can mean that specific Canadian requirements might be addressed. On the other hand, because these Canadian-made systems are unique, the Department of National Defence may not have the interoperability with the United States that they might wish. However, in the end, the Department of National Defence must live with the decisions of the Government

because industrial and regional benefits are the only way to make the purchase of military equipment palatable to the Canadian public in peacetime.

There is also the question of who should pay for these industrial and regional benefits when the cost of the equipment was higher than expected because their inclusion creates inefficiencies. Most military analysts feel that this added expense should be paid for out of Industry Canada's budget or by the regions that were benefiting from these inefficiencies (Boyd, 1989). However, Industry Canada and the regions know that the Department of National Defence wants the equipment badly enough to accept the inefficiencies as part of their budget and do not readily offer to pay for these expenses.

The Department of National Defence knows that they must 'play along' with this 'game' of industrial and regional benefits, otherwise they will not get the equipment. However, during various downturns in the economy, the Department of National Defence benefited from Government bailouts of failing industries. For example, to keep jobs in Canada, the military arranged to buy armoured vehicles from General Motors Canada (Auditor General, 1987).

One exception to the rule of buying off-the-shelf is shipbuilding. The Eastern Canada shipbuilding lobby is quite strong (Arseneault, 1989). Whenever there is a lull in the shipyards, there is pressure on the Government to come up with plans to fill the gap with military vessel design and production, or upgrades and modernizations. The capabilities of these shipyards are very difficult and expensive to re-establish once they are allowed to lapse. Thus, the navy, as part of the Department of National Defence, obtains a large benefit from this policy of industrial and regional benefits.

This industrial and regional benefits policy is a leverage tool for the prime contractors and a 'political minefield' for the Department of National Defence and the Government. For example, often the Department of National Defence would wish to buy the best equipment from a military point-of-view and one prime contractor would emphasize their equipment's ability to satisfy the military requirement. Another prime contractor would focus on industrial and regional benefits to make their equipment, that might be inferior from the military point-of-view, look favourable to the Canadian public, the Government and the Opposition (Atkinson and Nossal, 1981).

Industrial and regional benefits overall are a formidable advantage for the political principal. By creating jobs from investing in military hardware, the politicians can buy votes and reward patronage. However, the Canadian public is aware of political patronage that sometimes leads to scandals and voter dissatisfaction. For example, when some regions are rewarded with industrial benefits, other regions can feel excluded. This leads to winners and losers in the political decision making process.

The Auditor General's Office is extremely disadvantaged by industrial and regional benefits because they cannot criticize government policy decisions. They try to discuss 'value for money' when they examine industrial and regional benefits but they have had difficulty rationalizing the benefit-cost equation when it comes to military capital expenditure.

Industrial and regional benefits add to the complexity of the military management problem. Consideration of what to include in and what to exclude from the departmental benefit-cost equation becomes significant. This can put the

interests of the Department of National Defence at odds with the interests of the Government as a whole. It can also lead to various ‘games’ being played by the Department of National Defence to get what they want by exploiting this policy.

### **2.3 Summary**

In this chapter, the principal-agent-monitor framework was discussed in general and its application to the defence situation was discussed in particular. A historical review of the period under study (1945 to 2010) was given for the Government as the principal, the Department of National Defence as the agent and the Auditor General of Canada as the monitor. It was emphasized that the defence situation is unique among Government Departments for three reasons: the complexity of the departmental mission, the capital intensive nature of defence expenditure, and the industrial and regional benefits pursued by the Government in defence expenditure. These unique features of the defence situation have a significant impact on the relative power relationships between the Government as the principal, the Department of National Defence as the agent and the Auditor General as the monitor. How these unique features advantage or disadvantage the players in this three-way dynamic will be discussed in more detail in the following chapters with specific examples.

## **Chapter 3**

### **Getting the Department of National Defence Under Control: 1945-1975**

#### **3.1 Introduction and Purpose**

This chapter will examine the evolution of cost estimation and performance measurement policies in the Department of National Defence. The period that will be examined will begin at the start of the Cold War with the advent of the policy of ‘mutually assured destruction’ that led to a downplaying of conventional forces in favour of strategic nuclear forces (Sandler and Hartley, 1995). The period covered in this chapter will end with the introduction of the ‘flexible response’ policy which led to a re-emphasis of conventional forces and a new period of rearmament in Canada (Sandler and Hartley, 1995). Thus, this chapter will concentrate on the period from Post-World War II until the early-1970’s in Canada which were the years where the need was first identified for the Government as the principal to get the Department of National Defence as agent under control.

This chapter is organized into two sections. Section 3.2 concentrates on six case studies of major capital programs that experienced significant cost overruns and performance problems: the CF-100 Canuck, the CF-105 Arrow, the Bobcat armoured personnel carrier, the Bonaventure aircraft carrier, the Bras D’Or hydrofoil and the DDH-280 destroyers. It will be shown that these failures led the Government to direct the Department of National Defence to buy ‘off-the-shelf’ and to introduce a ‘fixed-cost ceiling’ policy in major capital programs. Section 3.3 discusses the introduction of quantitative performance measurement of capital acquisitions through the Planning, Programming and Budgeting System in

the United States Department of Defence and the Defence Program Management System in the Canadian Department of National Defence.

### **3.1.1 Period Under Study in this Chapter**

After World War II, there was a rapid de-mobilization of many of the World's armed forces. The rise of the challenge of the Soviet Union led to the development of the North Atlantic Treaty Organization in 1949. This, in turn, led to the need to maintain a large standing force in North America and Western Europe at a high level of readiness. The success of communists in China and the subsequent Korean War demonstrated among other things two important aspects of the Cold War. First, Canada wanted to, and did, make a significant contribution to the war effort in support of the United Nations. There was a significant push in Canada to produce an effective equipment development response that led directly to the development of the air force's CF-100 Canuck. Second, even though the United States had nuclear weapons available to them and there was significant pressure on the President by the military leadership to employ these weapons, President Truman refused. This introduced questions about the level of war that would require nuclear intervention and eventually was translated into the policy of 'flexible response' promoted by General Maxwell Taylor and adopted by John F. Kennedy and Robert McNamara in the 1960's (Taylor, 1960).

The surprisingly rapid development of nuclear weapons in the Soviet Union led to an arms race based on the policy of mutually assured destruction. In the mid-1950's, the primary threat of deployment of nuclear weapons was via manned bombers from the Soviet Union flying directly over Canada. This led to the development of the CF-105 Arrow long-range interceptor and subsequent de-

cisions about 'make or buy' policies for the Royal Canadian Air Force when the CF-105 Arrow was cancelled because it was unaffordable.

When the Canadian and United States populations were again surprised by the rapid development of intercontinental ballistic missiles in the Soviet Union in the late 1950's, the missile threat became the highest priority. The policy of mutually assured destruction took emphasis off conventional tactical forces and placed it on strategic nuclear forces. Thus, investment in conventional aircraft, ships and armoured vehicles was reduced while investment in intercontinental ballistic missiles and platforms that deployed nuclear missiles was substantially increased. Since the Canadian government was uncertain about whether it would participate in this development, it responded to mutually assured destruction by taking a 'free rider position' (Sandler and Hartley, 1995).

The Cuban Missile Crisis saw the United States and the Soviet Union face-to-face at the brink of all-out nuclear war only to eventually step back from the brink. One of the surprising results of this crisis from a Canadian Forces point-of-view was that the Minister of National Defence put the Canadian Forces 'on alert' and the Chief of Air Staff and Chief of Navy Staff put their forces 'on high-readiness' in support of the United States before the crisis became public and without the permission of the Prime Minister and Cabinet. This was because with their links to the United States through the North American Aerospace Defense agreement, it was within their mandate (Ghent, 1979). This situation led to a questioning of proper civilian control of the military in Canada (Bland, 1997).

The 1960's saw the development of the flexible response position with the conventional interventions into a number of small wars around the World by the

United States, the Soviet Union and China. This policy eventually filtered into the North Atlantic Treaty Organization's policies in the mid-1970's which led to an increased emphasis and investment in conventional forces (Sandler and Hartley, 1995). Up to this point, the Canadian government had been neglecting their commitments to the North Atlantic Treaty Organization and the North American Aerospace Defence organization<sup>1</sup>. They had allowed the capital equipment in the Department to 'rust out' (Auditor General, 1998b). With the 1975 Force Structure Review, the Department outlined an ambitious effort to rearm the Canadian Forces through a series of capital investments for aircraft, armoured vehicles and ships. This is the point at which this chapter ends and the next chapter begins.

### **3.1.2 The Rise of Rational Management**

Cost estimation and performance measurement, or in other words 'value for money', are the cornerstones of the rational management movement that began in earnest in governments around the World in the 1960's. Its antecedent, scientific management, can be traced back to the early 1910's in the United States with Frederick Taylor and the efficiency studies in industrial settings (Taylor, 1911). The modern rise of the application of science in military management can be found in the operational research that was done in England (Waddington, 1973), the United States (Hoerber, 1981) and Canada (Lindsey, 1998) during the Second World War. This led confident operational researchers to propose that their skills could be applied to more general management decisions in industry and commerce in the 1950's (Churchman *et al.*, 1957). Then these skills were expanded into the military

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<sup>1</sup>Loomis claims the government was focusing effort on support to the civil power preparing for an event like the FLQ Crisis (Loomis, 1985)

systems analysis (Hitch and McKean, 1960) and public policy analysis (Quade, 1975) in the 1960's.

Around the same time as military systems analysis was developing in Harvard Business School and the RAND Corporation, the Hoover Commissions of 1947-49 (Hoover, 1949) and 1953-55 (MacNeil, 1956) were examining the organization of the executive branch of the United States government and proposing various ways to introduce business-like processes. In particular, they found inefficiencies in the Department of Defense because of the separate service branches of the Navy, Army and Air Force (Gervasi, 1949). They suggested better cost accounting and that performance budgeting be introduced to link inputs to outputs in the Department (Hoover, 1949). They were also critical of the lack of accountability in the Department because the Secretary of Defense could not control the service chiefs (Moe, 1982).

President Dwight Eisenhower left office in 1961 with dire warnings about the growing power of the Military-Industrial Complex (Enthoven and Smith, 1971). The Secretary of Defense in the United States had administered the defense budget through the issuing of an arbitrary ceiling within which the three services had to fight amongst themselves for funds for their desired programs. There was very little top-down direction and the process was primarily one of inter-service rivalry and heated partisan negotiation (Enthoven and Smith, 1971). President Kennedy had come into office with a desire to change this and found just the person to handle it in the President of Ford, Robert McNamara, who wanted to introduce business processes to defense management (Shapley, 1993). McNamara was a Harvard Business School professor of rational management and he brought with him a number of

RAND economists who were advocates of rational management (Hitch and McKean, 1960). Together they quickly implemented the Planning, Programming and Budgeting System to bring top-down direction to the military establishment via a systems analysis capability in the Office of the Secretary of Defense (Enthoven and Smith, 1971). McNamara felt that the introduction of the Planning, Programming and Budgeting System had brought the military under the control of the Secretary of Defense through rationalization of the budgeting process without the need to consider unification of the forces which had been advocated by a number of external analysts (Kaufmann, 1964).

The Canadian situation was driven by the Royal Commission on Government Organization, called the Glassco Commission, similar in many ways to the Hoover Commission but adapted for a parliamentary system. They found the same inefficiencies and rivalry created by the multiple services in the Canadian Forces when they published their many recommendations in the early 1960's (Saint-Martin, 1998). Increased top-down direction was given as the primary reason for the unification of the Canadian Forces in 1968. Although, the service chiefs were eliminated in favour of functional commanders (Paquette, 2001), unification primarily affected the administration and logistics trades in the Canadian Forces by attempting to combine their independent overlapping service related processes into a common single process (Shaw, 2001). McNamara, in the United States, had also placed great emphasis on removing inefficiencies through unification of supply with the development of a Defense Supply Agency (Trehwitt, 1971). The study of the Management Review Group led to the introduction of business management methods and the integration of the civil service and the military leadership in the structure of National Defence Headquarters (Pennefather, 1972). Whereas, the

McNamara approach to civilian control of the military was through the strengthening of the Office of the Secretary of Defense that were political appointments, the Canadian approach to this problem was a strengthening of the Deputy Minister's purview of the civil service. Where McNamara exercised the role of principal over the service branches as agents with his civilian system analysts as monitors, the Canadian situation was more cautious with the Minister as the principal, the military services as agents under the Chief of Defence Staff, and the civil service to counter-balance, but not really monitor, the agents under the Deputy Minister. This difference leads to the Canadian dynamic between the differing goals of the military, the civil service and the politicians.

### **3.2 The Transition from Cost-Plus, Design and Development to Fixed-Cost, Buy-off-the-Shelf Policies**

During the Second World War, Canada mobilized its industrial sector in an effort to supply its allies. In particular, the aircraft industry was greatly expanded but all of the production went out of the country. When Canada eventually wanted aircraft for its own protection on the West Coast against Japan, it was unable to get them because all of the production was allocated to other allied nations. Therefore, the Royal Canadian Air Force decided that in the future they would build an indigenous aircraft industry to supply their own needs first (Stewart, 1998).

The F-86 Sabre was built by Canadair under license and was employed successfully by the Royal Canadian Air Force in Canada, Korea and Europe (Milberry, 1981). When Canada felt that they needed to counter the Soviet manned bomber threat in the North, the Royal Canadian Air Force examined the aircraft

developed around the world and found none that would meet the particular requirements of the Canadian situation (Stewart, 1998). It was decided to develop and build a unique aircraft to meet these requirements, the CF-100 Canuck. This effort was relatively conservative in terms of development risks but not without its own difficulties that will be discussed in the next section. The production of this aircraft was sped by the needs of the Korean War.

Buoyed by the relative success of the development and production of the CF-100 Canuck, its replacement by the CF-105 Arrow was undertaken by A.V. Roe on the encouragement of the Royal Canadian Air Force and the Minister of National Defence (Campagna, 2010). The development risks for the CF-105 Arrow were greatly expanded as the Royal Canadian Air Force challenged the state-of-the-art with four new major untested development programs for airframes, engines, fire control systems and weapons (Dow, 1979). This understandably caused costs to soar until eventually the program was cancelled (Campagna, 2003).

Around the same time as the CF-105 Arrow debacle, the army was demonstrating that they were no better at controlling costs or designing equipment on schedule with the Bobcat armoured personnel carrier program. Like the CF-105 Arrow program managers, the army was pushing the state-of-the-art, constantly changing the requirements and increasing the scope of the program (Knight, 2007).

This was followed by major scandals in the navy with the Bonaventure aircraft carrier, the Bras D'Or hydrofoil and the DDH 280 destroyers. The Bonaventure was bought outright from the United Kingdom in 1957 (Snowie, 1987). However, the large and difficult refit in 1966 was not able to hold down the costs. It was highly embarrassing to the navy and the Government (Public Accounts Committee,

1971). The Bras D'Or was an experimental hydrofoil ship that suffered enormous cost overruns and continual reliability problems before the program was cancelled (Lynch, 1983). Government intervention in the DDH 280 destroyer program was necessary to bring it under control when costs started escalating after a major design change that the navy 'snuck' through the Treasury Board (Arseneault, 1989). This type of egregious behaviour caused the Treasury Board to tighten controls over the defence major capital programs in the period that followed which will be discussed in the next chapter.

### **3.2.1 Case Studies**

In this section, six case studies will be examined. These case studies demonstrate why the Canadian government decided to move from a 'cost-plus' approach to contracting in which weapons systems were designed, developed and produced in Canada to a 'fixed-cost' approach to contracting in which weapons systems were bought 'off-the-shelf' from other countries. In only two of these case studies was an effective weapon system produced; the CF-100 Canuck in the air force and the DDH 280 destroyers in the navy. The other four case studies reveal that the Canadian Forces and Canadian industry could not produce an effective weapon system and control costs. This led the Treasury Board to implement policies to control costs using a fixed-cost ceiling on major capital programs and aside from shipbuilding move towards buying off-the-shelf from other countries.

Of the following six case studies, two are from the air force and were based on a 'cost-plus' contracting strategy in which all of the research and development was done in Canada. The CF-100 Canuck was relatively successful. The CF-105 Arrow was a complete failure. The army's Bobcat followed closely after

the cancellation of the CF-105 Arrow. It was not a 'cost-plus' contract but all of the research and development was attempted in Canada. The army found that they could not control costs or produce an effective vehicle. The navy case studies learned from the earlier air force and army programs, these projects were based on a 'competitive bidding' process. The Bonaventure aircraft carrier and the Bras D'Or hydrofoil were eventually decommissioned after great expense without producing a cost-effective capability while the DDH 280 destroyers were eventually commissioned and served the country well but only after the Government stepped in to get the program back on track.

### **The Canuck**

To counter the Soviet manned bomber threat, Canada needed a unique aircraft that could climb quickly to considerable height, had significant range to travel across the large expanse of the Canadian North, yet would still be able to take-off and land on the short runways that were available on austere bases. After doing an extensive survey of the current production and development programs going on throughout the Western World, no aircraft could be found that met these requirements. So it was decided to design, develop and produce a unique aircraft, the CF-100 Canuck, in Canada (Stewart, 1998).

A.V. Roe was given the contract on a 'cost plus 5% guaranteed profit' basis. This was a deal which put all the risk on the shoulders of the Government and no real risk, except cancellation of the project, on the shoulders of A.V. Roe. The control of the risks by the Government came via the Department of Defence Production led by the eminently successful wartime production leader C.D. Howe.

At the same time as A.V. Roe was designing the CF-100 Canuck for the Royal Canadian Air Force, it was trying to sell the first Jetliner to Trans-Canada Airlines. They had great difficulty meeting the demands of Trans-Canada because they could not control the costs of development. Since Trans-Canada was run in a business-like manner, they were not willing to concede any unnecessary risks contractually to A.V. Roe. Eventually, C.D. Howe stepped in and told A.V. Roe to concentrate their efforts on the development of the CF-100 Canuck because of the pressing needs of the Korean War. Although, disappointed by the lack of sales for the Jetliner, A.V. Roe realized that their development programs were safer with the Royal Canadian Air Force who was willing to fund their contracts on a 'cost-plus' basis rather than being locked into a 'firm-fixed price' arrangement in the private sector (Campagna, 2010).

As a risk avoidance strategy, A.V. Roe was encouraged to opt for a very basic airframe design. However, with the acquisition of the highly ambitious engine company, Orenda, they could not resist the introduction into the design of the latest engine technology. This was a risk that led to considerable delay and cost when it was found that the airframe was over-stressed by the introduction of such powerful engines.

After great fanfare during the release of the first CF-100 Canuck aircraft to the Royal Canadian Air Force, there was an even greater embarrassment for the Government when it was returned to A.V. Roe shortly after with its rivets falling out. A.V. Roe subsequently fired various engineers and designers while going on a mission to make as many as 34,000 design changes to fix the problems (Stewart, 1998).

Once the problems were fixed, the Department of National Defence bought well over 600 of these aircraft and used them in Canada and Europe until finally retiring the last one in 1981. Even as the first CF-100 Canuck was coming off the assembly line in 1953, the Royal Canadian Air Force had decided that it was already obsolete and a new design and development program should be undertaken by A.V. Roe to build the CF-105 Arrow (Dow, 1979).

### **The Arrow**

The CF-105 Arrow was conceived by the Liberal Government's Minister of National Defence Brooke Claxton and the Air Marshall Wilf Curtis in the early 1950's around the same time as the Soviet Union was developing the 'Bear' manned bomber capable of flying deep into Canadian airspace and launching its nuclear weapons at strategic sites in the United States. During the design and development program of the CF-105 Arrow, Canada and the United States signed the North American Aerospace Defense agreement and the Canadian government wished not only to demonstrate that it could defend its own country but that it could contribute in a significant way to the defence of North America.

Again, a 'cost plus fixed 5% profit' contract was set up with A.V. Roe that protected the company from almost all risk except cancellation of the project. The Royal Canadian Air Force thought that a situation of early obsolescence like that of the CF-100 Canuck could be avoided in the case of the CF-105 Arrow by pushing far beyond the state-of-the-art in all four areas of aircraft design: airframe, engines, fire control systems and weapons (Dow, 1979). A.V. Roe had enough on its plate working with the significant design and development problems of the airframe and the engines. They were having continual disagreements with the National Research

Council over the aerodynamics of the basic airframe. The National Research Council controlled the wind-tunnel tests and was convinced that the CF-105 Arrow was unstable (Campagna, 2010). The A.V. Roe engineers had to bring in experts from the National Aeronautics and Space Administration to overrule the National Research Council (Campagna, 2010). The Orenda subsidiary to A.V. Roe were busy designing and testing a series of new 'Iroquois' engines. However, they were not ready for incorporation in the first versions of the CF-105 Arrow. The Royal Canadian Air Force drove requirements for an experimental fire control system, called ASTRA, over the wishes of A.V. Roe engineers who had designed the CF-105 Arrow to accommodate the smaller Hughes system. The Royal Canadian Air Force chose in conjunction with the ASTRA fire control system, the Sparrow II missile. Unfortunately, the development of the Sparrow II by the United States Navy was cancelled in 1956. It was decided to patriate the design efforts and continue development of the Sparrow II in Canada. This unsuccessful effort cost a great deal of money and was an enormous setback for A.V. Roe. It led to numerous airframe design changes and rapidly escalating costs (Dow, 1979). By the time a project manager was assigned to bring these very different development sub-programs under one umbrella, the cost had increased to approximately \$1B and was eating up a huge proportion of the defence budget to the chagrin of the navy and the army (Dow, 1979).

On the same day as the roll-out of the first CF-105 Arrow, the Soviets launched the Sputnik satellite that harkened in the space age and the intercontinental ballistic missile (Dow, 1979). There were questions about whether the manned bomber threat that the CF-105 Arrow had been designed to defend against would be made obsolete by the new intercontinental ballistic missiles (Campagna, 2010).

Soon after Diefenbaker was elected, he signed the North American Aerospace Defense agreement without careful consideration of the consequences both militarily and politically of linking Canadian defence so closely to the United States (Campagna, 2010). Because of this close association with the United States, there was eventually pressure placed on Canada to accept the expensive SAGE air defence radar surveillance and control system in Canada. Canada was also expected to deploy the high-priced BOMARC nuclear missiles in Canada along with the SAGE computer. Campagna (2010) provides evidence that the Minister of National Defence thought that Canada could not afford the SAGE computers, the BOMARC Missiles and the CF-105 Arrow at the same time. Therefore, the Minister of National Defence recommended that the CF-105 Arrow program be cancelled against the wishes of the Chief of the Air Force but with the implicit agreement of the Chief of the Army and the Chief of the Navy (Campagna, 2010). Both the Prime Minister and the Minister of Finance stated that they were worried about the effect of the cancellation on the economy and would not want to cancel the CF-105 Arrow if it was detrimental to the defence of the country but they conceded that if the Minister of Defence felt that they should cancel the program, they must agree (Campagna, 2010).

Originally, it was thought that 500 to 600 aircraft would be purchased at a cost of \$1.5M to \$2.0M each. It was later decided that the Royal Canadian Air Force would not deploy these aircraft to the Reserve squadrons that reduced the number of aircraft considerably. Eventually, it was decided that only 100 aircraft would be purchased. Thus the development costs would not be spread over as many aircraft making their unit cost much higher, \$7.8M each, and making it even more important to obtain foreign buyers. Stewart (1998) speculated that the United

States Secretary of Defense undermined support for this expensive new aircraft when asked if the United States might buy the CF-105 Arrow for their own air defence, he offered to sell used CF-101 Voodoo aircraft to Canada to do the job when the costs and risks of the CF-105 Arrow program became too great to handle.

When the Prime Minister cancelled the program, it had immediate consequences on the Canadian aircraft industry and the defence industry in general as will be shown with the army's Bobcat program and the navy's Bras D'Or program. Later, the CF-104 Starfighter and the CF-5 Freedom Fighter were built in Canada under license and no great risks were taken in this regard. Sixty-six used CF-101 Voodoo aircraft were eventually purchased by the Department of National Defence in 1961 and the 'make or buy' decision had been settled for the air force.

### **The Bobcat**

In 1952, the army sold the Government on the concept of developing an infantry carrier because they said that in an emergency they would not be able to get armoured personnel carriers from the United States or the United Kingdom. Even if the Department could acquire infantry carriers during times of emergency, the Deputy Quartermaster General said that the United Kingdom's and United States' carriers did not meet the Canadian requirements. This same argument had been made by the air force in the CF-105 Arrow debacle, and it will be shown that it was eventually found to be false when the army bought the M113 vehicles from the United States after the Bobcat program was cancelled (Knight, 2007).

The first proposal to build an infantry carrier in Canada was rejected by the Minister in 1953 but by 1954 the Chief of the General Staff had convinced the Minister and had obtained approval from the Treasury Board to build six

prototypes at a cost of \$750K to \$1M each. The request for proposal was sent out and seven responses were received. Eventually, Leyland Motors of Longueuil, Quebec was selected in November 1954.

During 1955, the Army changed the scope of the project in a major way. It now wanted a common chassis for a self-propelled Howitzer, a general load carrier, a command and control vehicle and an ambulance, as well as, an armoured personnel carrier. This was approved by the Cabinet Defence Committee in August 1956.

In the meantime, Canadian Car and Foundry Company took over Leyland with an associated cost increase to the program in order to keep the development team together. By January 1957, the requirements were set for the 'Carrier Tracked Light' to be able to travel cross-country, to be air portable, to be able to traverse inland water and to provide armour protection. A mock up of the crew compartment was completed in June 1957.

When Canadian Car and Foundry Company became a subsidiary of A.V. Roe of CF-105 Arrow fame in November 1957, problems began to show up. The steering gear design was behind schedule, the engines were not ordered and the vehicle was too heavy. In September 1958, Canadian Car and Foundry Company delivered three prototypes for engineering test and user trials. However, in October 1958, the user trials were stopped for major repairs and there were no spare parts.

In 1958, the final production numbers were being discussed. Originally the Vice Chief of the General Staff had requested 800 to 1000 Bobcats. In September 1958, this was increased to 1931 which was soon after reduced to 1567 at \$35K a copy. In January 1959, the Minister told the Army to plan for 700 and by 1960 this was reduced to 500.

Testing restarted in January 1959 but stopped soon after because of lack of funding. It was restarted in May 1959. When the results were analyzed one year later, it was suggested by the army engineering test agency that the prototypes would have to be completely reworked because the track design was inadequate (Knight, 2007). Nevertheless, in February 1961, Cabinet approved the production of 500 Bobcats with 20 to start at a fixed-price of \$3.7M. An oversight committee was set up to ensure that the army did not make any more design changes. In November 1961, the contract was signed. By January 1962, A.V. Roe had dissolved Canadian Car and Foundry Company and in February it closed the plant in Montreal and was moving the operation to Toronto. Many of the Canadian Car and Foundry Company engineers quit and A.V. Roe had major difficulties establishing operations in the old CF-105 Arrow plant in Malton (Knight, 2007).

A 2000 mile test began in February 1963 and by June, they had completed 1485 miles. A review of the test results suggested that the company would need to make many modifications and then retest the vehicle. The holding company Hawker-Siddeley of the United Kingdom subsequently dissolved A.V. Roe and advised the Chief of General Staff that they would not spend any more money despite not fulfilling the terms of their contract. They claimed that they had used up all of the contract money and had invested \$1.6M of their own funds. They said that they would require a funding increase of \$6.7M. It was apparent that the contractor had lost interest in the program (Knight, 2007). There were just too many technical problems and they were aircraft designers with little army experience.

In November 1963, the Chief of General Staff asked Cabinet for permission to stop work on the Bobcat and procure 500 M113 vehicles from the United

States with proven reliability and interoperable with other North Atlantic Treaty Organization countries for less cost than the Bobcat. The Bobcat development program had cost \$9.3M and ten years of work with very little to show for it (Knight, 2007). The relatively simple replacement of the personnel carrier had turned into a complex armoured personnel carrier family. Knight concluded that “the endless changing of the required military characteristics was not healthy [and] the trauma of four different contractors in ten years with the last two being aircraft companies with no experience in designing armoured vehicles” was too much for the program to withstand (Knight, 2007, p. 24).

### **The Bonaventure**

The shipbuilding industry was an exception to the ‘make or buy’ pattern in the Canadian Forces because of the length of time to design and build a ship and the major refits every four years that give the shipyards steady and substantial levels of work. However, it was not completely clear-cut that the navy would always build its own ships. Although the St. Laurent Class steam powered destroyers had been built in the 1950’s and served the navy well until the 1980’s, the Bonaventure, a small aircraft carrier, was purchased from the United Kingdom in 1957. This precedent would be followed in the late 1990’s when the Department would purchase the Victoria Class submarines from the United Kingdom with somewhat similar problems of conversion and refitting to the Canadian requirements.

The ‘cost-plus’ style of contracting had basically ended with the CF-105 Arrow and when the major mid-life refit and modernization of the aircraft carrier was contracted, it was under a competitive bidding situation. However, this did not reduce the cost overrun because there was an open-ended outlet for the contractor

referred to as 'work arisings' (Public Accounts Committee, 1971). Although the cost of any individual work arising was small, the problem was the large number of work arisings and their cumulative cost. The refit cost increased from the original \$8M estimate to between \$12M and \$17M depending on the source (Snowie, 1987). It could be argued that a 'work arisings' approach was the only way that the refit of the Bonaventure could have been undertaken because such a enormous job had not been attempted before by the Canadian navy. However, there were also a number of findings with regard to high prices being charged for normal items such as medicine chests and chairs. This type of 'gold plating' of the requirements for everyday items had been noted in the United States at the same time by the Secretary of Defense (Enthoven and Smith, 1971). Thus it was normal that this problem was found in 1968 by Maxwell Henderson, the outspoken Auditor General of Canada<sup>2</sup> and was taken up by the Public Accounts Committee who formed a sub-committee to look into the problem in detail (Snowie, 1987). Eventually, the whole Public Accounts Committee made a special trip to the shipyard to look at the work in person. The combined effect of the subsequent negative publicity and the 'cash crunch' that the Canadian Forces found itself in after unification led to the eventual decommissioning of the Bonaventure in 1970 soon after the completion of the refit (Snowie, 1987).

The Minister of Defence, in testimony before the Public Accounts Committee, stated that the introduction of the Planning, Programming and Budgeting System and the initiation of the Management Review Group study with the subsequent recommendation to strengthen civilian input into the military decision

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<sup>2</sup>This was the first time in the period studied when the Auditor General's monitoring came into play.

making by setting up National Defence Headquarters was directly related to the negative outcome of the Bonaventure refit (Public Accounts Committee, 1971).

### **The DDH-280 Destroyers**

In 1962, the Conservative government approved the building of eight 'general purpose frigates' based on a number of 'slick presentations' by the naval staff (Arseneault, 1989). The goal of the general purpose frigates was two-fold: to diversify the navy from its primary role of anti-submarine warfare to include anti-aircraft and surface-to-surface capabilities; and to provide work to Canadian shipbuilders who were beginning to experience a lull in their Government contracts. The estimated cost of the eight general purpose frigates was estimated in 1962 at \$264 million. By 1963, the estimated cost of the general purpose frigates had risen to \$452 million. With the change of Government in 1963, the new Minister of National Defence put the whole capital program under review. He decided to re-emphasize the need for the navy to specialize in anti-submarine warfare. So he cancelled the general purpose frigate program.

The power of the shipbuilding lobby was soon evident and the Cabinet responded in the summer of 1964 that the navy should "propose a shipbuilding program that could be undertaken quickly and relatively cheaply" (Arseneault, 1989, p. 123). The navy came back with a four-ship proposal to update an existing design for \$142M. Since the drawings and basic design work for this option were already done, the Cabinet was led to believe that there was little risk in this choice. Treasury Board approved this program in 1965 to bring an earlier shipbuilding program up-to-date. It was forecast that there would be no more than 300 design

changes required. Therefore, the program would be “simple, cheap and quick to implement” (Arseneault, 1989, p. 125).

One week after Treasury Board authorization, the navy requested a one word alteration in their submission. They changed ‘one’ helicopter to ‘two’ helicopters. They argued that this would provide greater anti-submarine capability and the price would remain the same (Arseneault, 1989). Arseneault describes the situation “when one Admiral was confronted by the Minister at a Defence Council Meeting in 1966 about whether the second helicopter made the [earlier design] concept invalid, he replied ‘Definitely not!’ ... [The Minister] was manipulated to a certain degree because the navy staff controlled the technical information” (Arseneault, 1989, p. 127). This would appear to be an extreme case of the inability of the political principal to control the military agent because by that time it was well-understood by the navy designers that the earlier design was of no use. The original design would be too small to handle two helicopters and a whole new design effort would have to be undertaken. Arseneault (1989) goes on to suggest that navy planners assumed that since Cabinet had approved an up-to-date anti-submarine warfare vessel, “there was no need to inform their political masters of the change” (p. 127). The costs began to increase from \$142M in 1965 to \$252M in 1970 resulting in five separate submissions to Treasury Board for approval before the Government stepped in and took control.

A Treasury Board Task Force was established and Cabinet took over the program decision-making. The Government even considered cancelling the project. The Treasury Board Task Force found that 75% of the budget had already been spent and therefore Cabinet decided to complete the program with cost-ceiling of

\$252M. However, Arseneault states “it has been learned that unknown millions were hidden on other ship-repair programs” (Arseneault, 1989, p. 132). In 1972 and 1973, the program was completed and “four of the world’s most modern destroyer escorts” were commissioned (Arseneault, 1989, p. 127). In the review of defence programs, weapon systems that are considered ‘too good’ are called ‘gold plated’.

As Arseneault (1989) states:

[The navy] appears to have allowed the Government to believe that the original cost and schedule estimates were valid, for it no doubt feared that if Cabinet knew the truth, the new ship design program would have been cancelled. The evidence certainly indicates that some of the military bureaucracy were less than frank (p. 127).

Although this was quite egregious behaviour on the part of the navy, when the DDH 280 destroyers were eventually commissioned, they went on to serve the Country effectively for more than thirty years. Although this does not mean that the program was successful, it does demonstrate that it was not a complete failure.

### **The Bras D’Or**

The Bras D’Or was a hydrofoil vessel with a long history of development in Canada (Boileau, 2004). The modern hydrofoil project can be traced to a Defence Research Board study in 1947 but most of the early development work was futile until the basic design was established in 1958 (Boileau, 2004). This new design coincided with a United States Navy nuclear submarine’s first traversal of the North Pole under ice. One year later, the first Soviet nuclear submarine was

launched that led to renewed interest in anti-submarine technologies in Canada. The basic problem with anti-submarine warfare was that sonar detection ranges were small compared to the vast area of the ocean. Most efforts to-date had been to improve sonar performance. However, another approach being proposed by the Canadian navy was to provide more ships cheaper; the “small and many” philosophy<sup>3</sup>. With low production cost and as few as twenty sailors on board, the navy could obtain three hydrofoils for the cost of a normal helicopter supported destroyer. To complement this strategy, the hydrofoil had a unique speed profile. The scenario that suited the hydrofoil was called ‘drift, search and dash’ because for anti-submarine warfare 90% of the time the ship would be hull-borne and searching for submarines with its passive variable depth sonar. Thus, the vessel would require great endurance. When a submarine was detected, the ship would be able to ‘dash’ foil-borne at 60 knots to intercept the submarine, then return to hull-borne posture to attack it with torpedoes and depth charges.

A feasibility study was completed in January 1960. It was decided that because of the need to use lightweight materials, to have the highest possible power/weight ratios and to use the latest in analogue and digital computer simulation, a contract should be let to the aerospace industry. Boileau (2004) suggests that this might have also been the result of pressure to keep defence manufacturing alive in Canada and admits that the cancellation of the CF-105 Arrow had released a number of key specialists for this project. DeHavilland Aircraft of Canada was awarded the contract for \$8M. A \$10M ceiling was placed on the development project and control was transferred from the Defence Research Board to the Royal

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<sup>3</sup>This “small and many” philosophy was originally suggested by the famous Lanchester Equations model during World War I (Lanchester, 1956). It has seldom been adopted by modern armed forces but it is often noted in the study of asymmetric warfare (Fowler, 2006).

Canadian Navy. From there the costs began escalating, first to \$14.5M and then to \$22.4M not including weapons that also had escalated from \$4M to \$7M (Lynch, 1983).

In November 1966 during testing of the electrical generator, a fire broke out on-board that did \$3.25M damage to the vessel and cost a total of \$6.5M in re-engineering to the program with an associated 18 month delay. Very little information about the fire was released to the public even though the fire was noted in the 1967 Auditor General's Report<sup>4</sup>. Lynch (1983) states:

In one of the best stone-walling efforts to be mounted in recent years, the Government quashed any controversy over the incident in both the House and publicly. It was not until the March 11, 1969 [Inquiry of the] Standing Committee for Public Accounts that the public gained access to the truth surrounding the fire (p. 64).

The first foil-borne trip by the Bras D'Or was in mid-1969 and the pre-acceptance trials were completed in early 1971. There were many problems with the trials but the Bras D'Or demonstrated that it could sail at up to 60 knots in July 1969. It also proved quite stable in rough seas (Lynch, 1983).

In August 1971, the Minister of National Defence announced in a White Paper that the Canadian Forces priorities had switched from anti-submarine warfare to sovereignty and later in the same year, the hydrofoil project was cancelled. The high cost of \$52.7M already spent was noted as was the fact that up to \$20M might be needed to complete further testing. It was also noted that there were

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<sup>4</sup>This was the other major contribution of the Auditor General in the case studies of this period.

no foreign sales imminent. However, the designer of the Bras D'Or stated that "the Department of National Defence was still in the public eye for cost overruns on the Tribal Class [DDH 280] procurement and for decommissioning the carrier Bonaventure soon after an expensive refit" (Boileau, 2004, p. 83).

### **3.2.2 The History of Acquisition Reform: What Has Been Learned?**

As we have seen, the 1950's was a time of design and development of new equipment by the Department of National Defence and Canadian industry under a 'cost-plus' contracting arrangement. Huge unaffordable cost escalations, such as in the case of the CF-105 Arrow, caused the government to introduce the concept of competitive contracts to control costs and manage risks in the 1960's. This did not necessarily remove the problem of requirements changes, contract amendments and equipment modifications. The army's Bobcat was a disastrous example of changes to the requirements that increased the scope of the program beyond the state-of-the-art and led eventually to cancellation of the program. In these two cases, the capability requirements were set high and the costs were allowed to vary. This was the same process that is used in the United States Department of Defense. After these Canadian army and air force debacles, the Government realized that without the possibility of foreign sales, the Canadian Forces could not afford to cover the costs of development of new weapon systems. So, they moved to buy 'off-the-shelf', primarily from the United States, in the future.

This left only shipbuilding as the remaining area in which weapon systems were designed and built in Canada. The Bras D'Or was a navy program that challenged the state-of-the-art and eventually failed. This was a case of 'buy-in' in which the original costs of development were small but the follow-on costs

were much higher, once the program was approved. Again the development costs were too high for the Canadian Forces to afford by themselves and there were no apparent foreign sales (Lynch, 1983). The Bonaventure was an example of 'low-balling'. The refit costs were estimated low but the navy was not able to control the costs of the refit because of the 'work arising' situation with the contractor. The DDH 280 was an example of 'buy-in'. The original cost estimate was small to win Government approval but once the program was approved a major design change caused the costs to increase substantially. These are all examples of the inability of the principal, namely the politicians, to control the agent in the Department in their acquisition programs.

### **3.3 The Introduction of Performance Measurement in Defence**

The previous section discussed cases of underestimation of costs, overestimation of requirements and their consequences in the Canadian Forces and Canadian industry. It also described the evolution of the responses by the Government to control costs by using a 'fixed-cost ceiling' and control requirements determination by buying 'off-the-shelf'.

This section will discuss the other side of the equation of rational management or 'value for money', namely, measurement of the outputs from defence investment. This history of performance measurement in the Canadian Forces is another part of the struggle for control by the politicians as the principals over the Department as the agent. It was a continuing problem during the Cold War when there was the need for large standing forces. A systematic approach to performance measurement was first introduced in the United States Department of

Defense which will be described in Section 3.3.1. The Canadian Department of National Defence later following suit as will be described in Section 3.3.2.

### **3.3.1 Performance Measurement in the United States Department of Defense: A Brief History**

The goal of performance measurement is to determine the relationship between inputs and outputs in public programs. As is often true, the United States Department of Defense was at the forefront of the development this new management technology. Some of the major milestones in the introduction of performance measurement in defence occurred with the Hoover Commissions of 1949 and 1955. Then in the 1960's, the McNamara era brought in a systematic approach to rational management. Two of the lasting innovations of McNamara's strategy were the Planning, Programming and Budgeting System and the Systems Analysis Organization in the Office of the Secretary of Defense. The following section will provide a brief history of the development of performance measurement in the Department of Defense in the United States.

#### **The Hoover Commissions**

There were two Commissions on the Organization of the Executive Branch of Government in the United States in 1947-1949 and 1953-1955. Both were chaired by former President Herbert Hoover. The first was commissioned under the Truman administration and the second under the Eisenhower administration. The first approached the functions of Government from a 'scientific management' point-of-view recommending greater accountability and control by the President through his departmental secretaries. The second approached the functions of Govern-

ment from a 'business enterprise' point-of-view looking at ways and means to find economies and efficiencies to thereby reduce the size of Government.

In 1947, the National Military Establishment bill had given the Secretary of Defense greater authority over his Department and the three military service Chiefs of the Navy, Army and Air Force. Therefore, the Hoover commission of 1947-49 became the first evaluation of the effectiveness, or lack thereof, of this new power vested in the Secretary of Defense. They found that there was still too much discord among the service chiefs leading to duplication of effort and a lack of accountability. They suggested that the Secretary of Defense overhaul the budgetary process making it performance-oriented while exercising strong civilian control over the military. They also recommended, that in order to accomplish these aims, the Secretary of Defense would need a much larger and more capable staff. Although, these recommendations were not acted on by Secretaries of Defense in the 1950's, they were acted on by Secretary McNamara in 1960.

The 1953-55 Hoover Commission was an attack on 'Big Government' and focused clearly on the 'Big Spender' in the Department of Defense. This time, they were looking for economies and efficiencies in the business enterprises such as supply, transportation, research and development. Again, these recommendations were not acted on by the Department of Defense immediately but found a sympathetic ear from Secretary McNamara in 1960.

### **The McNamara Strategy**

During his election campaign in 1960, John F. Kennedy was highly critical of the Eisenhower administration's running of the Department of Defense. It was well-known (Kaufmann, 1964) that tri-service rivalry for missions in the new Cold

War was creating a great deal of overlap where two or three services were doing essentially the same job<sup>5</sup>. One of the most famous examples of this situation was the choice of continental air defence missiles in 1958. The services were told to come up with a plan for one missile type. They went away to study the situation and came back with three different answers. The army said the Nike-Hercules missiles were necessary and the BOMARC missiles were not. The air force said the BOMARCs were necessary and the Nike-Hercules were not. The navy said that neither were needed (Enthoven and Smith, 1971). Kennedy wanted to avoid this kind of problem in the future and brought in Robert McNamara to rationalize the force structure process in the Department of Defense. McNamara rejected the option of unification of the armed forces that was being proposed by some at that time and decided instead to strengthen the Office of the Secretary of Defense by bringing in a large number of economists from the RAND Corporation. In this way, he hoped to counter the strength of the Joint Chiefs of Staff and the service chiefs' organizations and introduce greater civilian control of the military in the United States.

The story of the 'tactical fighter experimental', which was later known as the F-111, was a case of major controversy as Secretary McNamara, as the principal, tried to get the air force and the navy, as the agents, to cooperate with him and each other (Art, 1968). At the end of the Eisenhower administration, the air force had come up with a requirement for a new tactical fighter/bomber aircraft that overcame the limitations of previous fighter/bombers and had caused

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<sup>5</sup>This would seem to be an example of competition between the services which should result in economic efficiency. However, the duplication noted was that instead of choosing the most 'cost-effective' solution from one of the three services, often the solutions for the same problem are bought from all three services simultaneously. Therefore, the output was provided at a level three times more than the requirement.

Tactical Air Command to be 'cash starved' by the Strategic Air Command with its large long-range bombers and missiles that had eaten up the air force budget. This new fighter/bomber would be able to fly trans-ocean, take-off and land on short austere runways, dash at supersonic speed at low altitude behind Soviet lines and conduct interdiction missions with tactical nuclear weapons, then ascend to high altitude to fly back to base. At the same time, the navy was defining a requirement for a new carrier based fighter to conduct close air support for the Marines on land and to defend the carrier fleet from attack from long-range air-to-surface missiles. The navy did not require supersonic capability but instead required long endurance at subsonic speed, extensive radar detection range and air-to-air missiles. Eisenhower's Secretary of Defense asked the Director of Defence Research and Engineering to examine whether both of these requirements could be met with one aircraft. The new technology called 'swept wings' would allow these diverse requirements to be met with one aircraft. However, Eisenhower did not wish to encumber the new administration with this major development effort and deferred the decision.

When Secretary McNamara was told by the Director of Defense Research and Engineering that these two different requirements for a tactical fighter could be accommodated by one aircraft, he felt this was an opportunity to demonstrate his new doctrine of commonality (Art, 1968). The air force was told to proceed with the development of the tactical fighter/bomber and the navy was coerced to cooperate against its wishes. The first problem was finding a contractor that could accommodate this requirement. It came down to two designs after three unacceptable efforts by Boeing and General Dynamics. Boeing had been working on the requirements for some time and took a strategy that was favourable to both

the air force and the navy to design basically two unique versions of the aircraft that would provide high performance in both missions. General Dynamics had air force experience and combined with Grumman, who had navy experience, to produce a design that had more commonality between the two versions of the aircraft but might not have as much performance in the individual missions. Against the wishes of the military Chiefs of the Air Force and the Navy, McNamara and his civilian deputies chose the General Dynamics design. This led to a heated inquiry by the House of Representatives and the eventual resignation of two senior civilians in the Department (Coulam, 1977).

During the subsequent development program, General Dynamics had major problems meeting the requirements of both the air force and the navy. Eventually, there were delays in the program and costs escalated. The range for the air force mission was too small for the supersonic dash requirement and the aircraft was too heavy for the navy's carrier landing requirement. The air force bought fewer aircraft than originally planned and the navy version was eventually cancelled. Coulam (1977) suggests that none of these problems were unusual in the development programs of similar aircraft but instead the problem was one of 'not invented here'. Later, the navy was much more conciliatory with the development of its own F-14 that was also heavier than desired for carrier landings (Coulam, 1977). Although this attempt at enforcing commonality in a particular program between the air force and navy was considered a failure, the larger program to develop a performance budgeting system that compared the capabilities of the individual services against each other was much more successful.

## **The Planning, Programming and Budgeting System**

McNamara and his new Comptroller, Charles Hitch, a former RAND economist, set up a new force structure development process soon after taking office called the Planning, Programming and Budgeting System based on their criticism of the previous administration (Hitch and McKean, 1960). Planning had been the sole responsibility of the military, while budgeting was the sole responsibility of the civilian organization (Novick, 1968). The novelty in the new process was programming which linked planning and budgeting via what were known as 'force packages' that had similar capabilities but were in different services (Feltus, 1976).

There was also a new process called the 'five-year defense plan' to project farther into the future than was done in the past. Earlier systems had been based completely on the annual budgetary processes and therefore gave very limited visibility into the long-term costs of capital acquisition programs. One of the goals of the five-year defense plan was to estimate the costs of research and development and capital programs so that more of the entire life costs of a procurement would be visible for trade-off analysis. The five-year window was considered a compromise between the desirability of a long-term view and the lack of ability to predict long-term costs and benefits.

This five-year defense plan was augmented with a concept called 'program change proposals'. These were intended to represent significant changes to the five-year defense plan. They required approval from the Secretary of Defense and evaluation by the Systems Analysis Organization (Enthoven and Smith, 1971). In this way, the Secretary of Defense took positive control over the capital budget

and by bringing in civilian advisors from the Systems Analysis Organization to counter the knowledge imbalance between himself and the service chiefs concerning priorities and capabilities.

One of the ways that the Secretary of Defense was able to establish civilian control over the weapon systems procurement process was through the 'force package' concept. By introducing force packages that combined weapon systems from all three services, the Secretary of Defense was able to compare proposals from the services against each other. These force packages included such capabilities as: strategic nuclear forces, general purpose forces, tactical air forces, anti-submarine warfare forces and strategic mobility forces.

Thus via the Planning, Programming and Budgeting System, Secretary McNamara felt that he had institutionalized civilian control over the military services. Through the five-year defense plan and the program change proposals, he was able to rationalize the weapon systems procurement process and with force packages, he was able to quantify the outputs from the current and future force structure.

### **Systems Analysis**

The changes to the National Military Establishment bill had given Secretary McNamara the authority to take control of the Department of Defense and the Armed Services. The Hoover Commission recommended all of the departmental secretaries establish larger staffs to take control of their agencies on behalf of the President. Secretary McNamara demonstrated the willpower to enforce his principal status on the military agents. He needed the independent civilian 'horse-

power' to counter-balance the military agents' power of experience and knowledge of military operations.

To do this, he brought in a team of RAND economists and a number of 'Rhodes Scholar' military officers to set up the systems analysis capability in the Office of the Secretary. This Systems Analysis Organization introduced quantification of performance and costs of military weapon systems that would challenge existing processes of intuitive judgment and informational power of the military leadership.

The systems analysts asked 'hard' questions about the assumptions being made by the military leadership when making their proposals for new weapon systems. They were assigned the job of critically evaluating every program change proposal brought forward by the three services. Through the challenge function they were assigned by the Secretary of Defense, they delayed many programs that did not provide sufficient quantitative evidence of cost-effectiveness (Enthoven and Smith, 1971). Obviously, they did not make many friends with the military establishment and were derisively called 'The Whiz Kids' because they were young, confident and highly educated (Cohen, 1982).

### **3.3.2 Performance Measurement in the Canadian Department of National Defence and Unification of the Canadian Forces**

As with many Canadian policies, with regards to performance measurement and civilian control of the military, the Canadian Government followed the lead of the United States. Prime Minister Diefenbaker was particularly interested in the work of the Hoover Commissions and in 1960 established a similar Royal Commission on Government Organization, called the Glassco Commission. The

Minister of National Defence, Paul Hellyer, followed up on the commission's recommendations by integrating and unifying the Canadian Forces. He also introduced a Canadian version of the Planning, Programming and Budgeting System called the Defence Program Management System. The need for systems analysis support for this management system was filled by the civilians and military officers in the operational research organization under the Vice Chief of Defence Staff. In the 1970's, the Minister of National Defence, Donald McDonald, directed a management review be conducted which confirmed the need for civilian control of the military and established an integrated National Defence Headquarters.

Many of these developments were prompted by the equipment acquisition disasters discussed in the case studies above and these links will be noted throughout this section. However, one of the other consequences of the equipment acquisition disasters was a natural reluctance of the government to start new equipment acquisition programs in the late 1960's and early 1970's. The Canadian government seemed satisfied, as did many other North Atlantic Treaty Organization nations, to follow a 'free rider' policy 'piggy backing' on the high level of investment in nuclear missiles by the United States (Sandler and Hartley, 1995). This led to a 'rust out' of the military's capital equipment which would be rectified after the 1975 Force Structure Review when the United States went to a policy of flexible response and the North Atlantic Treaty Organization nations realized that the United States may not always come to their collective defence (Taylor, 1960).

### **The Glassco Commission**

The Royal Commission on Government Organization, chaired by J. Grant Glassco, was given the mandate "to inquire into and report upon the organization

and methods of Departments and Agencies of the Government of Canada [with the goal of improving] efficiency, economy and services in the dispatch of public business” (Bland, 1998, p. 21). One of the primary changes that was made based on the recommendations of this Royal Commission was the separation of the Treasury Board from the Finance Department and the mandate given to the Treasury Board Secretariat to survey and introduce where appropriate the best business practices into the Government of Canada (Saint-Martin, 1998).

The Glassco Commission singled out the Department of National Defence because of its size and cost (Glassco, 1962). Similar to the Hoover Commission in the United States Department of Defence, the Glassco Commission found much room for improvement in the Canadian Department of National Defence with its duplication and triplication of functions among the navy, army and air force. It did not go as far as to recommend unification but it did suggest that many of the functions of administration and logistics in the Department should be rationalized.

One of the recommendations of the Glassco Commission was to amalgamate the Department of Defence Procurement with the Department of National Defence. Similarly it was recommended that Defence Construction Limited, which handled the building and maintenance of infrastructure, should also be combined with the Department of National Defence. It was felt that this would reduce paperwork and improve managerial control. As was the motto of the Glassco Commission: “Let the managers, manage”.

One of the contributors to the Glassco Commission noted in a section on civil versus military judgment that the greatest resentment in the military was when Treasury Board staff asked for the justification of military proposals (McGill,

1962). Thus, it was the Treasury Board analysts in Canada who were asking the hard questions to the military. They were fulfilling the role similar to the systems analysts in McNamara's Department of Defense on behalf of the Canadian politicians who did not have system analysts of their own.

In another part of the Glassco Commission Report, they mention the need for armed forces to be subject to the civil power; meaning the Minister who is accountable to Parliament. However, because of the size and complexity of the Department, they state that the Minister often had to rely on the military for advice which "raised doubts as to the reality of civilian control" (Glassco, 1962, p. 76). Therefore, to change this situation the Glassco Commission recommended enlarging the Deputy Minister's Office and relying on civilian organizations in the Department that were free of the common military problem of service rivalry.

Civilian control of the military in Canada had been an issue with the Diefenbaker Government when he was convinced by the military to prematurely sign the North American Aerospace Defense agreement without considering the full consequences of the United States' direct control over the Canadian Forces. This would come back to haunt him during the subsequent Cuban Missile Crisis (Ghent, 1979) because of the Canadian Government's lack of coordination. It became known to the public that the Chief of Air Staff and the Chief of Navy Staff put their forces 'on high-readiness' in support of the United States without the permission of the Prime Minister and Cabinet. It was within the mandate of the senior defence staff because of their links to the United States through the North American Aerospace Defense agreement (Ghent, 1979). This was followed by the controversial cancellation of the Arrow aircraft program and the dismantling of

the Canadian high performance aircraft industry. The cancellation of the Arrow also implied that Canada would be required by the North American Aerospace Defense agreement to employ the BOMARC nuclear tipped missiles which was a controversy that Diefenbaker seemed unprepared to handle. In 1962, the Glassco Commission re-emphasized the need to bring the military under civilian control because of these incidents and in the name of efficiency in command, which led later to the unification of the Canadian Forces.

### **Hellyer's Integration and Unification of the Canadian Forces**

The Pearson government took office in 1963 and the Minister of National Defence, Paul Hellyer, with the support of the Prime Minister took it upon himself to bring the military in Canada under civilian control much as the Glassco Commission had suggested. Because of a history of cost-escalation, he put all of the defence acquisitions on hold including the general purpose frigate that was mentioned in the previous section<sup>6</sup>. In 1964, soon after publishing a White Paper, Hellyer integrated the three services under a single Chief of Defence Staff. The intent was to stream-line command and thereby improve the operational structure of the Canadian Forces. Also integration removed the need for many of the over 300 committees that were in use at the time to manage the Department and required unanimous agreement from the three services to move proposals forward.

Hellyer also reorganized the military from three services into six commands. These commands were focused around the various missions of the Canadian Forces: Mobile Command included not only the Army but also air-to-ground fighter aircraft and transport helicopters; Air Defence Command involved air-

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<sup>6</sup>The general purpose frigate was the precursor to the DDH 280 destroyer Program.

interceptor fighters, surface-to-air missiles, ground radars and space surveillance in co-operation with the United States; Maritime Command was constructed of ships, helicopters and fixed-wing aircraft; Training Command rationalized basic training and common trades training across the Canadian Forces; Material Command set up a common supply system for the Canadian Forces; and, Air Transport Command consisted of cargo carrying aircraft that supported the strategic movement of the army.

Hellyer is probably most notable for unifying the Canadian Forces into a single service in 1968. One of the rationalizations behind this drastic change was summarized by Hellyer in a speech before Parliament in which he stated that he was not getting objective judgment from his military advisors both in setting the criteria for important decisions or interpreting the results of the analysis because of their service allegiances (Hellyer, 1966). He claimed that one area of service bias historically was in the field of cost estimation (Hellyer, 1966). He believed that more objectivity would increase the chances of getting a good solution to this modern operational problem and concluded that with a unified single service the military advisors' loyalty would be "to the force as a whole, rather than the traditional services, [and therefore] the probability of reaching logical conclusions would be greatly increased" (Hellyer, 1966, p. 136). These words seem to reflect the type of cost-effectiveness thinking that was pervasive in the rational management philosophy originally developed in the United States Department of Defense by Robert McNamara and the RAND economists.

## The Defence Program Management System

A United States style, Planning, Programming and Budgeting System was adopted by the Department of National Defence in the 1960's. In describing his strategy of unification and integration of the Canadian Forces, the Minister of National Defence, Paul Hellyer, referred to this 'defence programming' system in a speech to Parliament in 1966. He described the process as:

A logical sequence of steps from the establishment of defence policies and objectives to the final output of defence forces to meet these objectives. The process is designed to produce data and options which assist in taking decisions that are calculated to achieve the objectives in the most economical way. It also establishes, once decisions are taken, the basis for systematic follow-through until the program is completed (Hellyer, 1966, p. 110).

Hellyer noted in 1966, that although the system was functioning, it would not be perfected for a number of years because it required a costing database be developed, the analytical methods be devised, and training conducted for the civilian and military officers involved in the process (Hellyer, 1966).

The process was called the Defence Program Management System (Public Accounts Committee, 1971). It was a highly structured bureaucratic system to develop and amend the force structure of the Canadian Forces through new capital programs. It was also intended to respond to the history of cost-overruns and performance shortfalls from the earlier lack of program management structure that was described in the case studies above. The process of amending the 'long-

term capital plan' in this new Defence Program Management System began with a 'statement of capability deficiency' that was staffed from the bottom-up by the military environments (i.e. the Maritime Staff, Land Staff and Air Staff). If the need was considered a high enough priority by the environmental leadership, the statement of capability deficiency was followed by a 'program planning proposal' that broadly outlined the solution space with a 'rough-order-of-magnitude' cost estimate. This program planning proposal then needed to be approved by a cross-environmental committee to move to the next stage. The project then went into an extended definition stage that culminated in a 'program development proposal' that examined the options and was reviewed by the Defence Management Committee. Then after the development stage, a 'program change proposal' was written which costed out the recommended solution. The program change proposal was finally passed to the Minister, if it was a change within his or her mandate, or the Treasury Board and Cabinet, if it was a larger solution. When it was finally approved by Treasury Board, a fixed-cost ceiling was put on the project and a 'request for proposal' was distributed to industry (Auditor General, 1992a).

An audit of the Defence Program Management System found that the time required to approve a statement of capability deficiency was on-average 3 years. It then took 3 years to approve a program planning proposal and another 4.5 years to get departmental and Treasury Board approval-in-principle of the program development proposal. The program change proposal with the cost estimate then took 3.5 years. Finally, the Treasury Board submission and Cabinet approval, where necessary, took 1 year. This was supposed to be a fully sequential process that could take approximately 15 years from the time the deficiency was determined

until the request for proposal was sent to industry for a solution (Auditor General, 1992a). As the Auditor General noted:

It is unrealistic to believe that today's assessment of what constitutes appropriate missions and tasks will be the same up to ten to fifteen years later when the equipment actually arrives in field units. Even then, the in-service life cycle of military equipment can be as long as another twenty or thirty years before replacement (Auditor General, 1992a, para. 17.31)

Therefore, it was not unexpected that the Auditor General found that, since it was introduced in the mid-1960's, the Defence Program Management System was virtually never followed as specified (Auditor General, 1992a). The Auditor General found that only 3.3% of all the projects went through the complete process. Most of the projects, that received approval of their program change proposal, drafted and approved the earlier documentation after the fact. The Auditor General found some cases where the Defence Program Management System was by-passed altogether and contracts were awarded on a sole-source basis before the Department could properly determine what its needs were or when it needed the equipment (Auditor General, 1992a).

### **Systems Analysis in the Department of National Defence**

The need for systems analysis similar to that used in Robert McNamara's Department of Defense implementation of the Planning, Programming and Budgeting System was recognized by the Minister of National Defence, Paul Hellyer in 1966, when he referred to the need to develop analytic methods (Hellyer, 1966).

The Minister of National Defence, however, did not set up a special Systems Analysis Organization in the Minister's Office similar to what Robert McNamara did in the Office of the Secretary of Defense. Instead, the existing military operational research organization was separated from the Defence Research Board and expanded into the Operational Research and Analysis Establishment. It was then placed under the direct control of the Vice Chief of Defence Staff along with the Chief of Programs who was charge of the Defence Program Management System (Hellyer, 1966).

The Chief of the Operational Research and Analysis Establishment had two subordinate director generals. The Director General of Operational Research handled the needs of the military environments (the Maritime Staff, the Land Staff and the Air Staff) in justifying their requirements for new equipment. The operational research organization was primarily interested in military effectiveness issues. The Director General of General Analysis handled the pan-departmental organizations of logistics, manpower, socio-economic and strategic analysis (Mayne and Kaye, 1985). The general analysis organization was primarily interested in efficiency studies. The organization as a whole was oriented toward cost-effectiveness analysis (Mayne and Kaye, 1985). In fact, the organization produced a controversial chapter to the Defence Program Management System manual on the subject of system analysis that was never published espousing the benefits of cost-effectiveness studies in the equipment procurement process (Baglow, 1975).

The Auditor General, when looking at how the Department buys major capital equipment, found that the operational research organization produced "studies that were well-conceived, professionally and independently executed, and

well-documented” (Auditor General, 1998a, para. 4.79) much like what the Systems Analysis Organization claimed to produce for the Department of Defense in the United States (Enthoven and Smith, 1971). Thus, the operational research staff in the Department of National Defence were the Canadian version of ‘The Whiz Kids’. However, in this period of time, operational research in Canada suffered a fate similar in many ways to systems analysis in the United States. The Auditor General noted that the operational research studies were often “commissioned and completed after important decisions had been made, and either pointed to unsuspected problems or attempted to address problems that might have been avoided” (Auditor General, 1998a, para. 4.79). The conclusion was that “the Department’s operational research staff constitutes a valuable and underused resource that could be better employed to improve capital acquisition decision making” (Auditor General, 1998a, para. 4.80).

### **The Management Review Group**

In 1971, in response to the Bonaventure embarrassment discussed in the case studies, the Minister of National Defence, Donald McDonald, directed a Management Review. The Management Review Group submitted their final report in July 1972. Among their findings was the statement that the Department was unable to turn Government policy into “clear, meaningful operational goals and management objectives” (Pennefather, 1972, p. 161). The Management Review Group noted the lack of performance targets and the fact that there was not sufficient quantification which precluded effective performance measurement and management accountability (Pennefather, 1972). The Management Review Group found that the little performance measurement which was attempted had the wrong em-

phasis; measuring processes instead of results (Pennefather, 1972). They concluded that the end result of the departmental efforts should be to improve the operational readiness and effectiveness of the Canadian Forces (Pennefather, 1972).

This was during a period of ‘rust out’ of the Canadian Forces (Auditor General, 1998b). The Management Review Group put the blame on the shoulders of the Department that had not been able to manage its frozen budget. With escalating personnel, operating and maintenance costs, the Department’s only accommodation for the escalating cost was by postponing capital expenditures causing obsolescence and resulting in high maintenance costs, low readiness and less than expected effectiveness. The Management Review Group noted inefficient and inappropriate use of resources, in the “spectacular excess . . . [in] the resources allocated to-date for the DDH 280 program” which was discussed previously in this chapter (Pennefather, 1972, p. 187). The Management Review Group also noted the well-publicized optimism among the Department’s major equipment procurement program managers causing projects to fall behind schedule and cost more than anticipated.

With regard to service norms and values, the Management Review Group suggested that old navy, army and air force allegiances were still leading to “a dominating interest in . . . continual replacement and modernization of existing types of equipment” without regard for the cost or the continuing requirement (Pennefather, 1972, p. 200). The Management Review Group concluded that the Canadian Forces had not adapted to unification in the 1960’s, or the changes in Government policy and public opinion in the 1970’s. They recommended stronger civilian control of the Canadian Forces with the integration of the civil service and mil-

itary components of the Department in the new National Defence Headquarters to provide a more diverse perspective in the decision making processes and better support to the Minister of National Defence.

### **The Defence Structure Review of 1975**

After the many equipment acquisition scandals throughout the 1950's and 1960's, there was a natural reluctance of the Government to approve new equipment programs. Furthermore, the Canadian Government like many North Atlantic Treaty Organization nations were seen to be taking a 'free rider' approach to their collective defence allowing the United States, with their large supply of nuclear missiles, to take most of the burden for their defence (Sandler and Hartley, 1995). This led to a situation in which very little of the defence budget was allocated to capital programs and the equipment base of the Canadian Forces began to deteriorate. This period in the late 1960's and early 1970's is often referred to as the 'rust out' of the Canadian Forces (Minister of National Defence, 1975a).

The Defence Structure Review of 1975 was a carefully crafted response to the 'rust out' that had occurred in the early 1970's (Minister of National Defence, 1975a). It was published in two phases. Phase One was a Memorandum to Cabinet on the Defence Program in January 1975 which outlined the tasks that the Government had assigned to the Department of National Defence. This began with national aims, such as security and independence, enlarging prosperity and the preservation of human values. Then moved into policy themes, such as sovereignty and independence, peace and security, economic growth, social justice, quality of life and harmonious environment. Next it moved towards specific Department of National Defence roles, such as sovereignty, internal security, national devel-

opment, Defence of North America, the North Atlantic Treaty Organization and Peacekeeping. These roles were then broken down to 15 Department of National Defence objectives. Finally, the Phase One report documented 55 operational tasks and 11 infrastructure tasks that crossed over these 15 departmental objectives. The Department then sought:

Cabinet guidance on the various tasks that the Canadian Forces should be capable of performing [and] acceptance of a task at this stage . . . [would] constitute a determination that at least some degree of capability to perform the task is necessary (Minister of National Defence, 1975a, p. 1).

Thus the Department was backing Cabinet into a corner by outlining a large number of unarguable tasks the Government expected from the Department and saying that if the Cabinet agrees that these tasks must be performed then Phase Two of the review would tell Cabinet what this will cost.

Phase Two of the Defence Structure Review, which was a second Memorandum to Cabinet published in June 1975, laid out a number of costed 'force structure options' that were predicted to have various levels of effectiveness in performing the 55 operational tasks and 11 infrastructure tasks. The operational tasks were described under eight families of activities: maritime surveillance, maritime presence and control, territorial presence and control, aerospace surveillance, airspace control, internal security, military air transport, and search and rescue (Minister of National Defence, 1975b). One might notice that these eight operational activities have some similarity to the United States Department of Defence force packages.

Phase Two went on to develop “minimum practical force levels which justify retention of the [various] tasks” (Minister of National Defence, 1975b, p. 4). This list of force characteristics also laid out the quantitative performance goals to be achieved by the individual force structure elements. The Phase Two Review closed with a discussion of the political, military and budgetary implications of the force structure that was recommended to accomplish the 55 operational tasks and 11 infrastructure tasks to the minimum level of effectiveness. Outlined were: a new fighter aircraft program from 1979 to 1987 costing \$1.3B; a new long range patrol aircraft program from 1975 to 1980 costing \$854M; a new armoured vehicle program from 1976 to 1980 costing \$315M; a ship replacement program from 1976 to 1990 costing \$900M; and a surveillance radar replacement program from 1980 to 1985 costing \$194M. There would be associated reductions in military and civilian personnel, infrastructure, and maintenance and operations costs to help off-set the increases in the capital budget.

Thus, in response to the earlier ‘rust out’ of the Canadian Forces, the Defence Structure Review of 1975 laid out the rearmament program that followed and will be discussed in detail in the next chapter. It also went further making an attempt at quantitatively measuring the effectiveness of the Department currently and setting performance goals for the future force structure. This work greatly impressed the Auditor General (1982) when he did his first comprehensive audit of the Department. Subsequent audits of the Department reviewed the execution of the rearmament program and this will be the basis of the discussion in Chapter 4.

### 3.4 Summary and Conclusions

This chapter set out to provide the historical evolution of the Canadian Department of National Defence's policies concerning equipment acquisition (the inputs) and performance measurement (the outputs); what we have referred to as the introduction of rational management into the Department. Rational management, of which unification of the Canadian Forces was the ultimate example, involves the expectation of obtaining 'value for money' and was an attempt by the politicians as the principal to control the Department, the civil servants and the military, as the agents, since these agents were unable to accurately estimate the cost of their equipment acquisition programs or avoid 'gold plating' their requirements if left to their own devices.

Program failures in the 1950's and 1960's led to the Government to question the 'cost-plus' approach and introduce the 'fixed-price ceiling' and 'off-the-shelf' buying policy into the procurement processes of the Department of National Defence. By applying a fixed-price ceiling and an off-the-shelf policy, the Government intended to maximize the performance that can be achieved from a fixed project budget as opposed to finding the minimum cost to meet a fixed requirement. This was because the military and civilian agents were not able to keep their requirements from changing as new technologies appeared on the horizon. Development programs were downplayed and the options to the Department were limited to a feasible set of available technologies.

Performance measurement received its original impetus in the United States Department of Defense with Hoover Commissions in the 1940's and 1950's that recommended that the Secretary of Defense be given greater powers for civil-

ian control of the military and that he set up a performance budgeting system that focused on outputs and objectives not on inputs. Civilian control was established in 1960 by Secretary McNamara through the Planning, Programming and Budgeting System. He was supported in this effort to control the military by a large group of independent civilian economists in the Systems Analysis Organization. However, as was seen in the tactical fighter experimental program failure, it was not completely possible to make the military agents cooperate with the Secretary of Defense as the principal.

In Canada in 1962, the Glassco Royal Commission on Government Organization mirrored the work of the Hoover Commission. In 1964, Prime Minister Lester Pearson, assigned his Minister of National Defence, Paul Hellyer, the job of taking civilian control of the military which he did by unifying the Canadian Forces, getting rid of the separate services and setting up a new functional command structure. This coincided with the Canadianization of the Planning, Programming and Budgeting System, in the Defence Program Management System, introduced in the mid-1960's. The operational research organization was broken off from the Defence Research Board and provided the necessary systems analysis support. Civilian control of the military was further enhanced in 1972 by the Trudeau administration when the Management Review Group recommended, in an effort to introduce better business practices into the Department, that the civilian components of the Department be fully integrated with the military components in a newly established National Defence Headquarters. The Management Review Group found little in the way of standards or quantification of goals and objectives and therefore suggested that it was difficult to hold managers accountable for performance in the Department. They found that what little performance measure-

ment was available to be misguidedly focusing on processes and not results. This may have led in 1975 to the Defence Structure Review laying out a series of tasks for the Canadian Forces with associated performance levels to be achieved. This Defence Structure Review of 1975 greatly impressed the Auditor General (1982) when he did his first comprehensive review of the Department of National Defence.

Throughout the late 1960's and the early 1970's, Canada, like many North Atlantic Treaty Organization nations, was 'free riding' on the United States defence effort (Sandler and Hartley, 1995). The Government's freezing of the defence budget led to a period of extremely low capital spending in the Department as personnel, operations and maintenance costs escalated. This in turn led to a 'rust out' of the existing inventory of defence capital which would be addressed in the mid-1970's by the Defence Structure Review.

This ended a period in which the Minister of National Defence as the principal was actively trying to gain and maintain civilian control of the military agents in the Canadian Forces. It will be shown in the next two chapters that the period from 1975 to 2010 involves a state of co-operation between the political principal and the departmental agent in which the Auditor General and the Public Accounts Committee will act as monitors to reveal that the Department is not living up to its commitments in terms of cost estimation and performance measurement as outlined in the Defence Structure Review of 1975.

## Chapter 4

### Major Capital Programs As Seen Through the Eyes of the Auditor General

#### 4.1 Introduction

In the previous chapter, it was demonstrated that the politicians have had some difficulty controlling the actions of the Department and a great deal of money has been wasted on bad investments in research and development projects that failed to produce effective weapon systems. These disasters were a great embarrassment to the Government and led the politicians to enforce strict rules on military procurement. In particular, purchases in the future would be primarily off-the-shelf which meant, in most cases, they would be foreign-designed. To make this more palatable to the Canadian public, the government brought in a program of industrial offsets whereby foreign companies bidding on contracts to produce equipment for the Canadian military would have to demonstrate a significant investment in Canadian industry to create jobs and keep a considerable amount of the money in Canada. Also there would be concrete financial ceilings put in place to avoid the risk of cost overruns that are the usual situation in defence procurement (Alic, 2007).

The Government politicians brought in these policies of buy off-the-shelf and fixed-price ceiling to control costs and manage risks. In this chapter, it will be shown that most of the great embarrassments of the past were avoided. It would appear that the politicians as principals had brought the Department of National Defence as the agent under control in the period under study 1975-2010.

There was one dissenting voice during this period, namely the Auditor General of Canada, in our framework the monitor between the principal and the agent. The Auditor General, in earlier years, had been a small agency that produced an annual report on the financial indiscretions of Government bureaucrats (Ward, 1962). They were truly taking on the job of monitor when in 1978 the Auditor Generals Act was passed and the office grew in size and expertise (Sutherland, 1981). With a new mandate to examine economy, efficiency and effectiveness, the Auditor General found much to criticize in this new 'cooperative' relationship between the political principal and the departmental agent in the defence procurement programs of the period. There were still cost overruns and performance shortfalls, as shall be described in the case studies section of this chapter, however, these problems did not appear to reduce the spirit of cooperation between the Government and Department.

#### **4.1.1 Period Under Study**

The period under study in this chapter involves three distinct stages that would seem to be quite different. However, it will be demonstrated that they reveal a spirit of cooperation between the principal and the agent even though they were very different periods in World Affairs.

First, the latter stages of the Cold War from 1975 to 1990 will be discussed which saw a rearmament in the Canadian Forces. This long-term rearmament process was laid out in the 1975 Defence Structure Review and was intended to redress the period of 'rust out' in the late 1960's and early 1970's (Minister of National Defence, 1975a,b). It began with investments in main battle tanks and armoured vehicles in the late 1970's, then long range patrol aircraft in the early

1980's. This was closely followed by the acquisition of the CF-18 new fighter aircraft in the early to mid-1980's and then finally the Canadian Patrol Frigate in the early 1990's.

Second, the Post-Cold War period will be discussed which led all Western Nations to look for a 'peace dividend' and in Canada this effort coincided with the problem of the deficit and the debt that needed to be addressed both rapidly and drastically in the mid-1990's. The Government instituted a policy called 'program review' which led to across-the-board budget cuts. The Department of National Defence was one of the hardest hit and did not put up a fight<sup>1</sup>. They focused on operations in the former Yugoslavia, Somalia, Zaire, Haiti and Kosovo. They utilized the equipment that was purchased for them during the rearmament period and purchased some low capability equipment.

Finally, the Post-9/11 period will be discussed in which the attacks on the World Trade Center and Pentagon represented a turning point for the Department of National Defence. Almost immediately Afghanistan became the focus of the militaries of the United States and Canada. United States eventually turned its attention towards Iraq but Canada maintained its focus on Afghanistan and increased its involvement there by moving into an active warfighting role in Kandahar. Although there were some questions in the minds of the Canadian public about this change of role by the military from peacekeepers to warfighters. When the Canadian Forces suffered casualties, there was a outpouring of grief amongst the Canadian public and a new support for the men and women in the military. This was translated into a 'revitalization program' that saw investment by the

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<sup>1</sup>The notable exception was the boisterous resignation of Vice Admiral Chuck Thomas in 1991 primarily because of the lack of funding to the Maritime Forces (Harper, 1991).

Government in new military equipment. The Canada First Defence Strategy (National Defence, 2008) outlined a significant increase in the Defence Budget and an 'investment plan' that would see a large number of major military equipment acquisitions.

During this period from 1975 to 2010, the Auditor General of Canada was a growing force on the political scene. He had been given the mandate in the 1978 Audit General's Act to consider the economy, efficiency and effectiveness of Government expenditure and took this opportunity to look at Government programs from the point-of-view of 'value for money'. This was basically the cost-benefit approach that was advocated by the rational management movement of the 1960's. The Auditor General found much fault in the 'rationality' of the procurement of capital in the Department of National Defence. In particular, the Auditor General found that with regards to the 'fixed-cost ceiling', the Department was living by the letter of the law and not the spirit of the law. During the rearmament period, the Auditor General focused on cost overruns, hidden in procedural manoeuvres. During the downsizing period, they focused on the low capabilities that were obtained by the equipment that were acquired. During the revitalization period, they focused on the changes in the operational requirements after projects had been approved.

#### **4.1.2 Scandals in the United States Department of Defense Throughout the Period**

The Auditor General of Canada followed the lead of the General Accounting Office and the Bureau of Budget Management in the United States who found the Department of Defense an easy target for their audits. As one author noted,

the “[defense department] auditor that cannot find fraud, waste, abuse and faulty cost estimation is an auditor without upward mobility” (Schrady, 1984, p. I-2). The 1980’s were a period of almost constant scandal in the procurement programs in the United States Department of Defense.

One of the more controversial books on the subject of defense department scandals was entitled “The Defense Game” (Stubbing, 1986) where the problem of ‘buy in’ was noted. The Department of Defense would start with a small initial commitment from the Government that would get their ‘foot in the door’. Then continue to expand the commitment when the Government felt that they had sunk in a significant amount of money and did not want to lose their investment by cancelling the program. Another game played by the Department was called ‘low balling’ in which the Department would encourage the contractors to bid low on contracts and possibly lose money on the original contract to gain approval from Government. Then once they have won the contract would use their monopoly power to ‘get well’ via unreasonably high prices charged for spare parts and equipment modifications. Stubbing (1986) describes this situation as follows:

Prior to source selection, there is a ferocious competition among a few major defense firms. The companies usually provide extremely optimistic cost estimates and performance goals in order to win the contract award. The second stage totally antithetical to the first moves the winning contractor to monopolist. . . . The contractor can expect lucrative sole source follow-up awards . . . for production, spare parts and system modifications over a period of ten to twenty years (p. 165).

A similar message was written by McNaugher (1989) in “New Weapons, Old Politics”. He states:

As advocates of new programs, government operating agencies have encouraged contractors to estimate costs optimistically recognizing that higher headquarters might be shocked out of supporting the program whose true costs were revealed at the outset (p. 43). . . . Having underbid to win development contracts, aerospace firms were hardly anxious to forgo monopoly profits that would compensate for whatever losses were incurred during development (p. 36).

In his book, “Trillions for Military Technology”, Alic (2007) noted that program managers in the Department of Defense often appear to mislead their leaders and Congress about the costs and performance of their programs. However, they are no different from the project managers in other Government Departments and in industry. This is similar to the findings by Flyvbjerg *et al.* (2003).

If this behaviour by agents is so well-known and has carried on for so long, the question should be asked: “Why have the principals not learned lessons?” The hypothesis that this dissertation hopes to prove is that there is an alignment of goals that leads to efficient exchange or vertical trust (see Breton and Wintrobe (1982)) between principals and agents to mislead outsiders about the cost and performance of their plans and policies.

#### **4.1.3 Data Sources**

This chapter will use the reports of the Auditor General and the inquiries of the Public Accounts Committee as a primary source of data on which to provide

evidence of efficient exchange between the Department and the Government politicians. The independence of the Auditor General, who is outside the hierarchical relationship of Government, is valuable.

In 1982, the Auditor General was conducting a series of comprehensive audits of Government Departments. The first comprehensive audit of the Department of National Defence was highly superficial (Auditor General, 1982). It examined the 1975 Defence Structure Review and the newly introduced Defence Program Management System. They were pleased to see performance measures and performance levels identified for the Defence Program. They thought the Defence Program Management System which was modeled after the United States Planning, Programming and Budgeting System was the most comprehensive in the Canadian Government at that time. Their conclusion was “the Department’s management systems are basically sound” (Auditor General, 1982, para. 11.2). The Auditor General was much less complimentary in its next audit.

The Auditor General (1984) returned to the Department for another comprehensive audit. They examined major capital programs, capital construction, human resources management and automatic data processing. This dissertation is primarily interested in their findings on major capital programs in which they looked at needs definition, requirements definition, acquisition, in-service, maintenance and supply operations, and industrial benefits. They looked at seven specific equipment programs: the Leopard Main Battle Tank, the Medium Logistic Vehicle Wheeled, the General Purpose Armoured Vehicle, the Destroyer Life Extension Program, the Canadian Patrol Frigate, the CF-18 New Fighter Aircraft, and the Long Range Patrol Aircraft.

In 1987, the Auditor General examined major capital programs in particular. They found that not much had changed since 1984, even though they had made many recommendations that were accepted by the Department.

In 1992, the Auditor General examined the program of industrial offsets that had been implemented in the mid-1970's to make defence procurement more appealing to the public. They found serious deficiencies in this program with an inability to account for the amount of benefit that these offsets were providing Canadian industry (Auditor General, 1992b).

In 1994, the Auditor General examined the Defence Program Management System and found that it was not being used as intended in the procurement process. When it was used the process was long and tedious and, as would be expected, it was often by-passed to save time and effort (Auditor General, 1994b).

After 'program review', the Auditor General re-examined the major capital programs in the Department of National Defence (Auditor General, 1998a,b). This time they examined the processes the Department used to set priorities. They did six case studies: the Griffon Helicopter, the Leopard Tank Thermal Sight, the Coyote Reconnaissance Vehicle, the Eryx Anti-Tank Missile, the Challenger Electronic Warfare Trainer, the Maritime Coastal Defence Vehicle.

After a period of revitalization in the Department, the Auditor General (2010c) examined the helicopter acquisitions, the Maritime helicopter to replace the Sea King and the medium to heavy transport helicopter to support the Land Forces.

The Public Accounts Committee selectively reviews the reports from the Auditor General on behalf of Parliament. The Chairman of the Public Accounts

Committee is a member of the official Opposition. Therefore, they often take a highly critical look at Government programs. They are not as circumspect in their commentary as the Auditor General and often try to make political points by attacking Government policies.

The testimony on the CF-18 program was quite extensive (Public Accounts Committee, 1985). They appeared to be well-briefed by the Auditor General on the possibility of 'buy in' and 'low balling'. The testimony in 1988 focused on the Howitzer program and the games being played by the Department in their shuffling of money from capital to operations and maintenance. The testimony in 1998 tried to convince the Department to face up to its low capability investments, such as the Griffon Helicopter, and tried to convince the departmental leaders that they should put forward their true requirements for Parliament to support them in their acquisition programs instead of trying to guess what the Government would approve and stating that as their requirement.

#### **4.1.4 Outline of the Rest of the Chapter**

This chapter will review some of the Department's major capital acquisitions during the period 1975 to 2010 when the program of industrial benefits allowed the Department to acquire a number of different weapon systems. It will be shown that the Government was able to get what it wanted out of the Department, which were industrial and regional benefits, and the Department was able to get what it wanted out the Government which was military equipment.

The chapter will be divided into two parts. Section 4.2 will provide an overview of the entire equipment life cycle in the Department of National Defence as it has been examined over the years by the Auditor General. Section 4.3 will provide

a number of case studies that will provide examples of buy in, low balling, low performance, and transfer of funding. These case studies will be divided between the rearmament period, the downsizing period and the revitalization period.

Throughout this discussion it will be shown that despite evidence of the Department's misbehaviour, there was a strong spirit of cooperation between the Department and the Government to suppress any scandals and avoid any real reform. This would appear to be evidence of 'goal alignment' in which the Department of National Defence obtains military capabilities in an efficient exchange for assisting the Government obtain industrial and regional benefits.

## **4.2 Equipment Life Cycle**

The purpose of this section is to provide an overview of the generic acquisition processes of the Department of National Defence. This will make it easier to understand the case studies provided in the Section 4.3. It will explain how the Department of National Defence: determines requirements, analyzes options, procures equipment, and uses equipment in-service.

### **4.2.1 Requirements Definition**

The requirements definition stage is the most abstract of the processes used by the Department of National Defence to budget for new equipment. The process of identifying a new requirement begins with a 'statement of capability deficiency'. This statement could be the result of some technological obsolescence in an existing equipment. It might be based on a new threat that has arisen in the environment. It may be an opportunity created by a new technology to improve a capability. It is even likely to be a combination of all three of these situations.

The result might be a modernization of existing equipment with parts replacement to do the same job better or it might result in the acquisition of a new equipment to do something that has never been done before.

As one could imagine, there may be many of these capability deficiencies arising at the same time and the Department would need to set priorities to determine in which to invest. The Auditor General examined the documentation trail from policy statements, such as the White Paper, through threat assessments, through to tactical studies and needs analysis. He found that the 1994 White Paper “allows officials a wide latitude to determine how much is enough” (Auditor General, 1998b, para. 4.40). It provides only general guidance by calling for multi-purpose, combat-capable forces that can fight “alongside the best, against the best” (Minister of National Defence, 1994, p. 14). Therefore acquisition projects can be easily linked to these very loose national policy requirements.

In terms of threat assessment, the Auditor General found that most of the acquisitions had not updated their threat assessments for many years and some acquisitions had no threat assessment (Auditor General, 1998a).

In terms of tactical studies, the Auditor General found considerable ‘in fighting’ in the Department of National Defence. He stated that “according to the Vice Chief of the Defence Staff, the process is adversarial and concludes with senior direction that balances requirements and affordability” (Auditor General, 1998b, para. 3.76). For example, when a lift and speed ‘pacing’ task was identified for the transport helicopter, that eventually led to the purchase of the Griffon helicopter, there were some people in the Department questioning the realism of it. There were those who stood by the original minimum lift requirement for the transport

helicopter, and those who approved the final, substantially lower, lift capability that was specified in the contracted 'statement of requirement' (Auditor General, 1998a).

The studies within the Department of National Defence with regards to the main battle tank did not support the purchase of an upgraded night vision capability. One study conducted by the manufacturer suggested that a fully upgraded main battle tank would be required "to successfully engage the most likely type of enemy tank" (Auditor General, 1998a, para. 4.50). An internal war game by the Department found that an improved main battle tank would fail to withstand an attack and be unable to mount a successful assault.

The tactical studies for the armoured reconnaissance vehicle suggested that the vehicle had insufficient armour and would only be considered for 'light units' suitable for peacekeeping "but not necessarily for peace restoring operations". Some departmental officials "disputed the validity of some aspects of this study" and said that the reconnaissance vehicle was "highly regarded by Canada's allies" (Auditor General, 1998a, para. 4.52).

A departmental study in support of the short-range anti-tank missile made "no conclusion about guided or unguided missiles" even though the Department claimed "unequivocally that only a guided system had the accuracy it required". The study also called "into question the cost effectiveness of man-portable anti-tank weapons" (Auditor General, 1998a, para. 4.55). Furthermore, the Department had not been able to determine how the basic load of six missiles would be carried into the field when a section can currently only transport three missiles.

These are some examples of the deficiencies in the tactical requirements estimation processes. They demonstrate the problems of 'in fighting' that often leads to expedient conclusions rather than tactically sound conclusions.

One of the most important areas where requirements come into play in the capital program is at the time that the number of equipment to be purchased is determined. This decision on the number of equipment should be based on a military requirement. For example, for the reconnaissance vehicle, the Department used existing doctrine to initially determine the number of vehicles to acquire. However, the Auditor General (1998a) stated that the number of vehicles purchased "was not determined on the basis of any tactical study" (para. 4.54). Similarly for the short-range anti-tank missile, the decision was originally to purchase 1,050 units based on the needs of the close combat field forces. When this was considered unaffordable, the Department cut the requirement to 425 units.

Thus, tactical studies have been found to lack the necessary precision and accountability to support acquisition decisions. This has caused the Department to rely in most cases on military judgment. The Auditor General (1998a) concluded that "complex acquisitions are based so heavily on judgment, that studies performed are poorly matched to plans for employing equipment and that studies often do not support the selection of the equipment that is acquired" (para. 4.57).

The requirements determination is the first place where 'sliding goals' are seen. That is, the Department may initially specify their goals for new equipment capabilities, but when faced with opposition such as budget limitations, they will revise their goals downward. Their new downgraded goals may be met within the budget constraints, but result in much less capability to conduct their missions.

### 4.2.2 Options Analysis

Once the military requirements have been specified, the Department begins an options analysis to determine the most cost-effective way to fulfill the requirements. Needless to say, if the requirements are not correctly specified, conducting an options analysis will be difficult or impossible. For example, the requirements can be specified such that only one type of equipment can satisfy them. This does not allow for any cost-effective alternatives to be considered. Even when there are alternative ways of meeting the requirement, the options analysis may not consider these alternatives fully. Furthermore, the cost or effectiveness of the various alternatives might not be analyzed carefully.

In the case of the reconnaissance vehicle, there was no study of alternative methods of conducting reconnaissance, even though Canadian Forces doctrine specifies that part of this mission be conducted by aircraft (Auditor General, 1998a). This project led to a directed buy of the Coyote vehicle. The short-range anti-tank missile requirements led to a single option, namely the Eryx missile, even though the Department stated that it had done a survey of 'potential contenders' (Auditor General, 1998a). The decision to acquire the Challenger, as an electronic support training system, neglected to consider the option of leasing this capability, even though this was being done by the United States Air Force, the United States Navy, the Royal Navy and the Royal Air Force in Britain (Auditor General, 1998a). With regards to the Griffon helicopter, this utility and transport helicopter was to replace three existing fleets in the Canadian Forces. The Auditor General conducted a cost-benefit study showing that the new fleet of helicopters would cost 20% to 40% more to operate than the existing fleets. This contradicted the De-

partment study which suggested that acquiring a new single fleet would cost less than upgrading and maintaining the existing fleets. In the main battle tank study, the options considered were the status quo, purchase a new tank, purchase a used tank, purchase a used armoured vehicle, or upgrade the existing tank. The decision was made to purchase a night vision capability. The Department claimed that this was the best way to spend the limited funds available. However, this decision was based on the only affordable option and not on what was, according to the Auditor General (1998a), “the best use of the army’s money” (para. 4.63).

Options analysis is the heart of rational management that was discussed in the previous chapter. It would appear from the discussion above that the consideration of alternative ways to fulfill a requirement and determination of the best alternative based on its cost-effectiveness is not being carried out by the Department. The Auditor General concluded that nearly all of the requirements and options studies that they examined were inadequate. What was “particularly troubling were the number of directed purchases, the tendency to override results of tactical studies that challenge the accepted option and conducting of tactical studies after decisions have been made” (Auditor General, 1998a, para. 4.65).

### **4.2.3 Acquisition**

The acquisition stage moves from abstract requirements and options analysis to determining the actual equipment to be acquired. There is generally a design competition among various contractors to determine the best design of an equipment to meet the requirements of the Department. The Department sets up a project office to manage the acquisition. They will determine the concept of operations for the equipment and plan the concept of logistical support. The con-

cept of operations is generally completed before the design competition while the logistical support plan cannot generally be completed until after the design competition. When the purchase is off-the-shelf, tests and evaluations can be conducted to ensure that the equipment meets its performance specifications. As found by the Auditor General (1984), “through a complicated process of reconciling budget ceilings, time constraints, performance and support requirements, industrial and regional considerations, the results of field trials and demonstration of prototypes, options are selected and recommended to Cabinet” (para. 12.59).

The antithesis of this ideal situation in which competition ensures the best performance for the price, is the sole-source contract. The Auditor General felt strongly that if a decision to sole-source was made for a major crown project, then the Department should have a strong cost-benefit analysis and risk assessment to ensure that the Government is getting ‘value for money’.

Another problem that was identified by the Auditor General was the Department’s ability to distinguish between a capital expense and an operations and maintenance expense. In general, a capital expense would involve any requirement that brings the equipment into service such as the platform itself, the initial spare parts, the initial ammunition requirements, the facilities for training and set up costs for test equipment and repair and overhaul. However, the Auditor General has found a great deal ‘creative accounting’ in this area. For the CF18, there were two identical software support facilities built for the CF-18, one in Cold Lake, Alberta and one in Bagottville, Quebec. One of these facilities was to be paid for out of the capital budget and one was to be paid for out of the operations and maintenance budget. Both of these should have been paid for from the capital

budget. When this was identified by the Auditor General, the Department decided to pay for both out of the capital budget.

As described in the book “The Defense Game” (Stubbing, 1986), the most common acquisition game is ‘buy in’. The Auditor General has found cases of this in their studies of defence acquisitions. For the Griffon transport helicopter, the Auditor General (1998a) found that “the Department elected to purchase a customized product based on a commercial pattern helicopter rather than a military aircraft, with the rationale that acquiring the more expensive military aircraft would mean it could not afford the number of aircraft it needed” (para. 4.70). However, when the Department had the helicopter, it had to purchase more equipment to enhance its reconnaissance capability and buy a new suite of defensive electronics, and a radio rebroadcast capability.

The Auditor General (1998a) concluded that:

The requirement so greatly exceeds the funds available that officials do not carry out rigorous analyses of requirements and options. Instead, they attempt to spread funds across as many requirements as possible, perhaps in the hope that at some point in the future the platforms it purchases can be outfitted. Buying vehicles that cannot do the job in combat does not represent good value for money (para. 4.67).

The actual performance of the equipment is determined by tests and evaluations. In the United States, where equipment development projects are common, test and evaluation is a major part of the capital acquisition program because it ensures that the equipment meets its operational needs. In Canada, where most

equipment is bought off-the-shelf, test and evaluation plays a minor role in the acquisition process. However, the Auditor General (1998a) suggested that it should be given a higher profile to ensure that the equipment that is often built to commercial specifications will be able to meet the requirements that were intended by the Canadian military. The Auditor General (1998a) noted that the Land Test and Evaluation Establishment was closed.

The Auditor General (1998a) suggested that testing and evaluation should be done before the equipment is accepted from the manufacturer. All of the technical problems with the equipment should be resolved before the equipment enters service. This was not the case with the Griffon helicopter that was accepted even though search and rescue personnel were found to suffer from severe static-electric shocks when they touch the ground while being suspended from the aircraft or even when stepping out of the helicopter (Auditor General, 1998a). This problem put into question the aircraft's ability to conduct its missions of transporting troops or conducting search and rescue operations. This problem should have been discovered early in the program so that it could be resolved in the design stage. The Maritime Coastal Defence Vessel similarly neglected to conduct sufficient test and evaluation. The main engines were found to routinely shutdown during operation limiting the speed at which the vessel can operate, and a problem with the water purification units was found during operations that limits the time between replenishments. The Auditor General (1998a) concluded that the Department should re-evaluate their processes of accepting commercial pattern equipment before proper military trials are conducted to determine whether they can satisfy the operational demands.

#### 4.2.4 In-Service Stage

During the in-service stage of the equipment life cycle, the equipment is being used to fulfill the missions for which it was intended. The Department has operational goals that they wish to achieve. However, as the equipment ages it becomes more difficult to keep the equipment operating up to its potential. There has been a natural tendency to lower the goals, since they cannot be achieved in any case. The Auditor General (2001b) noted that “National Defence can change the readiness of military units in order to stay within its budget” (para. 10.9). The Land Forces have set an ‘informal standard’ of 75% as the lowest serviceability goal for equipment in garrison. The Auditor General (2001b) found that this is met most of the time. However, the Heavy Lift Vehicle Wheeled had fallen in its serviceability between 6% and 15% while the Armoured Vehicle General Purpose serviceability had fallen 27%. The Department has specified an informal goal of 90% for the serviceability of equipment in-theatre and has fallen below this goal because a lack of spare parts. The Heavy Lift Vehicle Wheeled and the Medium Lift Vehicle Wheeled had availabilities higher than 80% but lower than the 90% target. The Armoured Vehicle General Purpose had fluctuating availabilities just under 80% while the Coyote reconnaissance vehicle had an availability of 85%. In terms of preventive maintenance, the brigades were not meeting their goal of 20% inspections outstanding. One brigade met this goal 61% of the time and the other brigade met this goal only 38% of the time. The air force seemed to have the most difficulty meeting its operational goals. Except for the Griffon helicopter, all of the fleets were available for operation only 30% to 60% of the time. The Aurora’s availability dropped from 55% to 42%. The Sea King helicopter’s

availability dropped from 42% to 29%. In terms of maintenance hours per operating hour, the Auditor General (2001b) found that there was a 62% increase for the Hercules tactical transport aircraft. Even though the Hercules has flown 37% less than in previous years, the total hours of maintenance increased by 26%.

The Department has allowed its goals to decline which means that they can be achieved with aging equipment. It is generally understood that as equipment ages it is more difficult and more costly to maintain in operation. By lowering its operational expectations, the Department can stay within budget. However, because of these 'sliding goals', they are also producing less output.

### **4.3 Case Studies**

In this section, a number of case studies are provided. They are presented in chronological order to show the evolution of the procurement processes as the Auditor General discovers problems and the Government and Department react to these discoveries. Therefore a back and forth dialogue between the Auditor General and the Government and the Department concerning the processes of military procurement will be seen. The nature of the efficient exchange that is created by the vertical trust between the Department and the Government based on various questionable practices are identified by the Auditor General and supported in testimony to the Public Accounts Committee. The benefits that the Government and the Department get from this exchange and how they dealt with the accusations of the Auditor General about their misbehaviour will be shown.

The case studies will be divided into three groups. The first group will demonstrate the kinds of problems discovered during the rearmament period from 1975 to 1990. The second group of case studies will show the kinds of problems

that were discovered during the downsizing period from 1991 to 2001. The third group of case studies from 2002 to 2010 demonstrates the fact that, even during a time when Canadian public opinion concerning the Canadian Forces was highly supportive, the Auditor General remained critical of Department of National Defence programs. Although the problems found in each group were different, there was the same dynamic of cooperation between the Government as the principal and the Department as the agent.

The case studies from the rearmament period will include the Aurora, long range patrol aircraft, that was the first purchase that instituted an industrial offsets policy. This will be followed by the case of the Armoured Vehicle General Purpose. Then an extensive review of the new fighter aircraft, the CF-18, which was both a major investment in the Department and was surrounded by the most controversy will be presented. Then the Tribal Class Destroyer Upgrade and Modernization will be discussed. This will be followed by a discussion of the close support Towed Howitzer artillery weapon. These case studies are situations in which the Department and the Government had previously agreed to a rearmament program in the 1975 Defence Structure Review. Thus they were working together to implement an agreed policy.

The second set of case studies reflect a different type of equipment purchase. These acquisitions were primarily intended as industrial bailouts that did not coincide with the Department's priorities. The Department had to accept low performance equipment purchases. The first of these will be the Challenger electronic warfare trainer. The next will be the Griffon utility and transport helicopter. This will be followed by a discussion of the Maritime Coastal Defence Vessel and

finally the Airbus A310 Strategic Lift Aircraft. These case studies are situations in which the Government took the lead and initiated the purchases to obtain the industrial bailouts and the Department went along with the Government with its usual 'can do' attitude to make a good thing out of a bad situation.

The third set of case studies involve the Maritime Helicopter Project and the Chinook Helicopter Project. The Maritime Helicopter Project is unique because it has been going on throughout all three periods of time (rearmament, downsizing and revitalization). The Chinook Helicopter Project is more indicative of the types of programs that were conducted during the warfighting period in Afghanistan. Both of these case studies seem to have similarities with the case studies in the rearmament period. However, this situation may be short-lived with a potential return to downsizing after the warfighting stage of the war in Afghanistan ends (Treasury Board, 2009).

#### **4.3.1 Rearmament**

##### **Long Range Patrol Aircraft**

Soon after the publication of the Defence Structure Review in 1975, the Government signed a \$1B deal with Lockheed for the purchase of 18 long range patrol aircraft. This aircraft was a combination of two existing aircraft. The basic airframe was the Lockheed P-3 Orion and the electronics used for anti-submarine warfare were based on the Lockheed S-3 Viking. They were delivered in 1980 and 1981. This was the first purchase of military equipment that employed the industrial offsets program that would require Lockheed to invest significantly in Canadian industry.

One of the common problems that has occurred in modern acquisition programs is the lack of consideration of the logistics support requirements when the original equipment is purchased. In the case of the Aurora, long range patrol aircraft, insufficient funds were allocated for the purchase of spare parts to support the aircraft when it entered service. This has historically been one way to transfer capital expenses into operations and maintenance expenses. Often when money in the capital budget is lacking, the Department chooses to invest in the platforms and neglects to buy sufficient spare parts hoping to find money for spare parts from the operations and maintenance budget, once the weapon system is in-service. This is a problem created by the budget ceiling on the original acquisition program when the Department does not want to admit that they have underestimated the cost to bring the equipment into service. Therefore instead of cutting back on the number of weapon systems, the Department tends to neglect the logistics support requirements to stay within budget.

In the case of the Aurora, long range patrol aircraft, the requirement was originally specified to buy kits of spare parts for deployments. However, because of shortages in capital funds, the purchase of these spare parts was not identified in the Treasury Board submission or the contracts with Lockheed. So the parts needed for deployments had to be taken out of the normal supplies that were already insufficient to maintain the fleet. To keep the aircraft flying in deployments, a practice called 'robbing' was employed. This practice means that aircraft that are down for maintenance are robbed of parts to keep the other aircraft flying. The fleet has had at least two Aurora, long range patrol aircraft, in 'rob status' continuously (Auditor General, 1987).

Thus the exchange involved the fact that the Department did not ask for more money to buy spare parts, instead it suffered the resulting reduced readiness caused by not having enough support. In turn, it got its eighteen aircraft even if they could not accomplish as much as a fewer number of well-supported aircraft. The Government, on the other hand, received an industrial offsets package for the first time and set a precedent for future purchases of capital equipment for the Department. The Government and the Department got around the accusations of the Auditor General (1984) by stating that “the average serviceability rates achieved for the first two and half years of operation was the minimum necessary for carrying out the flying program” (para. 12.119).

### **Armoured Vehicle General Purpose**

The armoured vehicle general purpose was an off-the-shelf purchase of a Swiss six-wheeled vehicle, but to satisfy the need for Canadian industrial offsets, it was manufactured under license by General Motors of Canada. Originally, the Department wanted 715 of these vehicles. However, with a funding limit of \$150M, the Department found it could only afford 491. Later the Department found that costs had escalated 30%. After a request for additional funding was turned down, the Treasury Board stated that only 350 would be purchased. Using some ‘creative accounting’, the Department was able to raise the quantity back to 491 by using a portion of its contingency fund and buying spare parts using a federal sales tax rebate (Auditor General, 1987).

The vehicle fleet came in three variants: the Cougar tank trainer, the Grizzly personnel carrier, and the Husky recovery vehicle. The Auditor General (1987) found that to obtain lower capital and operating costs, the Department chose

a wheeled vehicle. This has meant that these vehicles have limited cross-country mobility and therefore cannot accomplish their reconnaissance and tactical training missions. The Cougar cannot be used effectively as a tank trainer. The Husky was also found to be unable to lift and tow another armored vehicle even though it is supposed to be a recovery vehicle. During an exercise in 1982, the Husky could not take 74% of the recovery calls. Furthermore, the readiness of these vehicles was brought into question when the Auditor General inspected a subset of the fleet that was reported by the Department to be operationally ready and found that only 41% were actually operational. The Auditor General (1987) inspected the gun turrets, the power train and the waterproofing. He found that 23% of the sample had problems with battery failure, 46% had problems with the revolving gun turret and 30% had swimming deficiencies.

Again the Department got the number of vehicles that it wanted by using the contingency funding that goes along with capital programs. They lived within the letter of their budgetary restrictions if not the spirit of it. The Government got its industrial offsets package, although this came at a cost to the Department of a reduced capability when they chose a wheeled vehicle instead of a tracked vehicle and were not able to obtain the cross-country mobility that they needed. The Department originally tried to hide the problems that were identified by the Auditor General but then stated that they were planning to invest in modifications to the equipment to meet the requirements (Auditor General, 1987).

### **CF-18**

The CF-18 was chosen by cabinet as Canada's new fighter aircraft in 1980. One hundred and thirty-eight aircraft were purchased from McDonnell Douglas at

a fixed-cost ceiling of \$5B. The CF-18 was to replace the CF-101 Voodoo aircraft in the air defence role and the CF-104 in the ground attack role. The Auditor General (1984) focused on two particular problems with the CF-18 program, namely, the logistics support elements and the mission equipment planned for later procurement.

The logistics support elements turned out to be a case of ‘low balling’. In 1980, the project management office began the process of procuring spare parts and maintenance support equipment. Contractor cost information was used for rough costing of these parts. The Auditor General (1984) found that these costs were ‘unreliable’ in that there were major discrepancies between the initial estimate and the ‘not-to-exceed’ prices. Table 4.1 is a list of the differences between the initial costs and the not-to-exceed price proposals taken from the Auditor General’s report<sup>2</sup>.

Table 4.1: Examples of Low-Balling in the CF-18 Program

Item Description	Initial Cost Estimate	Not to Exceed Price Proposal	Percentage Increase
Antenna Assembly	\$9.00	\$2,077.29	22,981%
Resistor	\$1.19	\$299.19	25,042%
Self Locking Bolt	\$2.00	\$140.43	6,921%
Door Hinge Pin	\$50.00	\$1,495.61	2,892%
Circuit Card Assembly	\$180.00	\$4,920.74	2,633%
Manifold	\$3,000.00	\$12,008.71	300%
Actuator	\$1,008.00	\$3,095.61	207%
Fuel Tank	\$26,376.00	\$45,227.75	71%

The Department admitted that these cost estimates were ‘unreliable’. They claimed in testimony before the Public Accounts Committee (1985) that they

<sup>2</sup>This was taken from Table 1 in Auditor General (1984)

had pointed out the discrepancies to the Department of Supply and Services<sup>3</sup> and in fact, the table in the Auditor General's report was extracted from the Department of National Defence's own internal working papers. The Department went on to claim that even though the initial cost estimates were poor, they did not effect the quantity of spares purchased because the processes of determining quantity were done by technical specialists from the Department of National Defence and the determination of the final price was done by 'hard-nosed' negotiators from the Department of Supply and Services who come along later (Public Accounts Committee, 1985).

In response to this claim by the Department, the Auditor General countered:

But if those numbers are too unrealistic, I think it is going to affect the whole program and it would affect future decisions. If suddenly the budget for the spares is all gone, then it has to come out of some future funding. Three years of operational spares – some of them were in the original package; some of them becoming operating and maintenance (Public Accounts Committee, 1985).

Although the Auditor General did not call it 'low balling', the Public Accounts Committee was familiar with this term. One of the members stated:

There have been a number of congressional hearings on this subject in the United States over the years. Is this not a case of McDonnell Douglas *low-balling* you in the first place to get the contract and then

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<sup>3</sup>This department is now called Public Works and Government Services Canada.

coming up with revised figures? It strikes me that they have *low-balled* you on some of these figures to begin with. . . . The contractor comes in, gives a bid, and then he makes his profit on the add-ons (Public Accounts Committee, 1985, emphasis added).

The cost of the spare parts and maintenance support equipment was so high compared with what was originally planned that the initial spares budget was used up before all the necessary spare parts were purchased. Therefore, some \$200M worth of spare parts had to be budgeted outside the project.

Similarly, \$148M worth of repair and overhaul start-up costs were charged to the operations and maintenance budget when they should have been charged to the capital budget. The Department argued in front of the Public Accounts Committee (1985) that they had intended to budget the repair and overhaul start-up costs against the operations and maintenance budget in the first place. However, the Auditor General produced a 'smoking gun' document that was found in the Department's files that stated:

As repair and overhaul requirements are identified it will be necessary to provide up-front monies for certain spares, tools, test equipment. Since [CF-18] program management funds are not available for this procurement, it will be necessary to make provision for it in the national procurement, or otherwise operations and maintenance charges (Public Accounts Committee, 1985).

The other major scandal found by the Auditor General in the CF-18 program was 'buy in'. The Auditor General (1984) found \$3.5B worth of projects

related to the CF-18 program but not included in the original purchase price. These items were considered by the Department as 'indispensable' in some cases and 'highly desirable' if funding permits (Auditor General, 1984). The Deputy Minister in testimony before the Public Accounts Committee (1985) countered by saying the "I guess our view is that indispensability is in the eye of the beholder".

The members of the Public Accounts Committee suggested that there was a plot behind these follow-on expenses. That by keeping the cost of the original acquisition down, it is easier to gain approval from Cabinet and, then once the equipment was procured, the Government was on the hook for all kinds of future investments to make the equipment operational. The Auditor General (1984) summarized this problem as follows:

For some major Capital projects, approval of funding levels by Cabinet resulted in a financial ceiling that remained fixed despite changes to performance specifications, project cost or concept of operation. In these cases, the Department faced a difficult choice between reducing the number of equipment items or deferring important support elements in the hope that they could be accommodated in future budgets. In the case of the CF-18, for example, the Department elected to defer certain components and sub-systems (para. 12.54).

A member of the Public Accounts Committee (1985) put it this way:

There is a mechanism in the Government of Canada, which is a submission to Treasury Board for some kind of reduced amount that flies though; once you have made that expenditure, you are really on the

hook for all kinds of subsequent expenditures, because you cannot abandon it.

This was a major controversy for the Department and the Government because of the previous publicity that similar scandals had received in the United States (Stubbing, 1986). The exchange came with the acceptance of the problems of 'buy in' and 'low-balling' by the Government. The Department got its 138 aircraft and the Government got a major boast of high-technology job creation with a program that came in on time and apparently within budget. When the Auditor General discovered the problems of 'buy in' and 'low-balling' and suggested that the Department provide the total life cycle cost of its acquisition programs for future decision making by Parliament, the Department and the Government's response was that although they agreed in principle, they felt the Auditor General was holding the Department to a higher standard of reporting than other Departments and never fully implemented this recommendation (Auditor General, 1984).

### **Tribal Class Upgrade and Modernization**

The Tribal Class destroyers are also referred to as the DDH 280 destroyers. They were commissioned in the early 1970s. In 1983, Cabinet approved the Tribal Class Upgrade and Modernization Program that was to be a mid-life refit and would replace the air defence missiles and add a new command and control system. The Cabinet directed that the work should be given to a shipyard that was not already working on the Canadian Patrol Frigate.

In 1984, the Department solicited bids for the Definition Stage. Three bids were received: one for \$7.9M, one for \$10.7M and one for \$12.9M. All three

proposals were considered technically compliant. Thus, the lowest bidder was chosen. However, between 1984 and 1986, three amendments to the contract were approved by Treasury Board that raised the contract to \$19M (Auditor General, 1987). This would appear to be a case of 'low balling' in which the contractor won the contract by underestimating its costs in the original bid and then when it won the contract, it used its monopoly power to 'get well'.

After the definition stage had been completed, the Department recommended and Treasury Board accepted that the implementation contract be awarded to this contractor without a competition. The total estimated cost was \$1.3B. Thus, the contractor was rewarded for underbidding on the original definition stage with more than just contract amendments in the short-term but with a highly lucrative implementation contract after the definition stage.

This implied that the contract would be a sole-source type. The Auditor General (1987) was very concerned that competition was not being employed in this decision and asked if the Department had considered the costs and benefits of this approach. He felt that since this was a \$1B contract that the Department might not be getting the best value for its money because it was a monopolistic situation and the Department had no negotiating power (Public Accounts Committee, 1988). Furthermore, the decision to sole-source was not in compliance with Treasury Board policy regarding competitive bidding. The Treasury Board policy on competitive bidding is intended to achieve maximum economy in the purchase of goods and services (Auditor General, 1987).

The exchange in this case was between the Treasury Board and the Department to overlook the fact that this was a sole-source contract. The Department

got a speedier program without having to go through all of the deliberations of a competitive bid and the Government got the ability to direct the repair work to a shipyard that was not already getting work from the Canadian Patrol Frigate program. When the Auditor General complained, the Government and the Department could claim that it was in the national interests to maintain a viable organic shipbuilding industry in Canada.

### **Towed Howitzer**

The close support artillery weapon is called the Towed Howitzer and comes in two caliber: the 105mm and the 155mm. The original plan was to purchase 32 105mm Towed Howitzers and 63 155mm Towed Howitzers. Then the number of 155mm Towed Howitzers was increased to 80. Finally, the decision was made to reduce the number to 26 155mm Towed Howitzers. The Auditor General (1987) found no documentation on the operational impact of these changes in the number to be purchased. This shows that the Department has not been able to hold to its original goals. The Department has suffered from 'sliding goals' that are independent of the actual military requirement.

As was discussed in earlier case studies, a capital purchase is intended to consider all the equipment needs for the first two years of operation. In the case of the Towed Howitzer, the Department originally planned to buy two year's of training ammunition within the program in accordance with Government policy. This would have cost \$40M. However, this purchase of ammunition was transferred to the Land Recurring Ammunition Project. This allowed the Towed Howitzer project to stay below the \$100M level that would have made it a major capital project. A major capital project must go through Treasury Board that would

be “more demanding in terms of approval and reporting requirements” (Auditor General, 1987, para. 9.41). This is another example of the Department playing games with capital and operations and maintenance monies. The Chairman of the Public Accounts Committee noted “not only in your Department but also others, we see Departments being very ingenious in avoiding Treasury Board requirements” (Public Accounts Committee, 1988).

In this case, the Government overlooked the fact that the ammunition for the Towed Howitzer was not included in the program costs and this allowed the program to avoid additional scrutiny. The Department got the program through the decision making process quicker. When questioned about the lack of Treasury Board scrutiny, the Department suggested that their own decision making processes provided significant oversight comparable to the Treasury Board procedures (Public Accounts Committee, 1988).

#### **4.3.2 Downsizing**

##### **Challenger Electronic Support Trainer**

Twelve Challenger aircraft were purchased in the mid-1980s. Four were assigned to administrative flight services to transport Government officials. Seven were to become electronic warfare trainers and one was assigned to the role of avionics test bed aircraft. These latter two requirements were earlier considered unaffordable by the Department (Auditor General, 1987). The purchase was primarily an industrial bailout of the manufacturer Canadair and did not go through the normal Defence Program Management System procedures. The Auditor General (1987) found that this project had been exempted from the Treasury Board

supervision that would be required for a major capital project even though the budget ceiling was \$211M which is well above the \$100M limit. The Auditor General concluded that “most of the aircraft were bought contrary to the Department’s planned priorities of equipment acquisition” (Auditor General, 1987, para. 9.102).

The Auditor General (1987, 2000) kept a close eye on the Challenger aircraft that were to be used to provide a platform for an electronic support and training system. This project’s budget was set at \$203M. The Auditor General (1987) noted that this project suffered from a large technical risk with a high probability of occurrence. However, the Department reported to Treasury Board that the risk of a cost overrun was low, the risk of a schedule delay was low, and risk of technical problems was low to medium. By the time the Auditor General returned to review the project’s progress in 1998, the project had overrun its cost by \$22M and was 22 months behind schedule (Auditor General, 2000).

Eventually, it was decided that installing high powered electronic warfare gear on a small commercial pattern aircraft produced unforeseen technical risks and these technical risks could not be compensated for by additional funding. The Auditor General (2000) found that “this meant that the development and purchase costs of this equipment and engineering costs of the attempted installation were written off” (Exhibit 16.3). The Challenger aircraft no longer met the requirements and in 1999 the partially completed Challenger was declared surplus. This fiasco was a combination of the Department accepting an aircraft that did not meet the requirements and the Department’s ‘can do’ attitude to make a good thing out a bad situation.

In this case, the exchange involved the attempt to utilize a commercial pattern aircraft for a particularly risky military function. The Department got twelve new aircraft and the Government was able to save Canadair from bankruptcy. When the Auditor General questioned the risk acceptance of the Government and the Department, the Department suggested that the risks were acceptable and they could overcome the technological difficulties. Unfortunately, they were not able to overcome the physical problems and had to write off the aircraft (Auditor General, 2000).

### **Griffon Helicopter**

The Auditor General (1998a) was highly critical of the purchase of the utility tactical transport helicopter, the Griffon. The Griffon was purchased to rationalize the helicopter fleet. There were originally three helicopter types in the Canadian Forces to conduct various light, utility and transport missions. The Griffon was intended to replace these three helicopter types and thereby save money through commonality. It was a commercial pattern helicopter that was built in the riding of the Minister of National Defence at the time. One hundred helicopters were purchased in the mid-1990s for \$1.2B.

The Auditor General (1998a) found that the performance of the Griffon helicopter did not meet the original specifications. The original requirement was to lift a minimum of 5000 pounds. However, the statement of requirements was downgraded to 3100 pounds when the contract was let. A departmental study stated that because of this change 460 sorties would be required to evacuate casualties from a mid-intensity conflict and this was considered an unrealistic proposition (Auditor General, 1998a).

The statement of requirements for the contract stated that the helicopter must be able to carry 3100 pounds 100 kilometers. This was based on the expected weight of the new Towed Howitzer artillery system. However, because the Towed Howitzer that was eventually purchased was heavier than expected, the Griffon could only carry it 25 kilometers. This is another example of 'sliding goals' in the Department. As the departmental representative testified in front of the Public Accounts Committee:

It is important to understand exactly what the operational needs are. We established the need at between 5,000 and 10,000 pounds, 10,000 being optimal, although we now agree the 3,100 capacity is sufficient for the army's operational needs at this time. We really must look at the present use of the helicopter and ask ourselves whether it satisfies present needs and is accepted by the army and the air force commands (Public Accounts Committee, 1998b).

To this the member of the Public Accounts Committee skeptically retorted:

When I read the Auditor General's comments and then listen to you, I get the impression that the army is willing to do with less because it fears getting nothing. ... Were you afraid to miss the opportunity, even if the budget was not adequate and you are hoping to improve them later? I'm not sure that will save us money (Public Accounts Committee, 1998b).

The Auditor General (1998a) quoted the Commander of 10 Tactical Air Group who said that “a utility helicopter is not optimized for the conduct of reconnaissance missions”. However, the Department said that they had acquired “some equipment to enable the Griffon to conduct reconnaissance” and was planning to buy more equipment (Auditor General, 1998a, para. 4.71). The Griffon did not have a radio rebroadcast capability but the Department was planning to acquire one under a separate project. These are examples of ‘buy in’ in which the equipment is purchased without the necessary kit to accomplish its mission and then after the equipment is in-service it is hoped that money will be available to upgrade the capability.

This was another case of the Department accepting a commercial pattern vehicle for a demanding and complex military function. The military got a large number of new aircraft and the Government could say that they created a number of jobs in the regional area of the Minister’s riding. When the Auditor General questioned the Department on the capability deficiencies associated with this helicopter, the Department suggested and the Government accepted the fact that although the Griffon could not meet the originally intended requirements, it could be a useful aircraft for other reasons (Public Accounts Committee, 1998a). They also suggested that the Department and the Government would be acquiring modifications to make the Griffon more capable (Auditor General, 1998a).

### **Maritime Coastal Defence Vessel**

Another example of ‘buy in’ was the Maritime Coastal Defence Vessel. This is a ship built to commercial standard. It was intended for use as a remote mine-hunting capability. However, the Auditor General (1998a) discovered that

after the Maritime Coastal Defence Vessel was built the Department told the Treasury Board that the remote mine-hunting capability was unaffordable. The Department said it would acquire route survey equipment, mechanical mine sweeping gear, and a bottom object inspection vehicle. The ships lack bow thrusters that would be needed to position the ships for mine-hunting and clearance operations. Some of the 12 ships have been fitted with degaussing systems to reduce the magnetic signature of the hulls. The Auditor General (1998a) noted that the Department stated that a full set of these equipments were not provided because they were unaffordable but some of the equipment may be purchased later if funds become available.

The 'established priority' in the initial requirements was mine counter-measures (Auditor General, 1998a). However, when the Maritime Coastal Defence Vessel was purchased without this capability, the Department started a separate project for remote mine-hunting that would not be completed for many years. Thus, much of the useful life of the ships will have been already used up.

The Auditor General found an original 'essential' requirement for a data link integrated in the command and control system for the ship had been eliminated because it was not affordable. Similarly, passive electronic surveillance equipment was originally considered 'essential' but was never acquired (Auditor General, 1998a).

In a classic case of obfuscation, the Department stated that the Maritime Coastal Defence Vessel "attained its goal of providing a 'credible' mine counter-measures capability". However, when the Auditor General questioned them about the word 'credible', the Department stated that "credible should be interpreted

to mean that whatever limited capability was acquired must be effective, that is credible, within those limits” (Auditor General, 1998a, para. 4.75).

Similar to the Challenger and the Griffon, the Maritime Coastal Defence Vessel was a commercial pattern vessel that was built to meet a number of complex military missions. The exchange involved the fact that even though it could not meet most of these missions, it was accepted by the military to help the shipbuilding industry on the Eastern Canada. The Department and the Government had two strategies when questioned by the Auditor General on the viability of this capability. As we have seen, one of these strategies was to obfuscate about what a capability really means. The second approach was to suggest that future investments would be able to introduce the required capability when desired (Auditor General, 1998a).

### **The Airbus A310 Strategic Lift Aircraft**

The A310 Airbus was purchased in 1992 from the failing Canadian Airlines International as a way for the Government to keep the company solvent. This came out of departmental capital and operations and maintenance money to the amount of \$440M. The Auditor General (1996c) rightly claimed that the Department saw this as an opportunity to replace an aging fleet of Boeing 707 aircraft. As with the Challenger purchase, the Government direction to purchase the Airbus A310 did not allow the Department to follow its own Defence Program Management System which reviews alternatives and recommends alternatives that are affordable (Auditor General, 1996c). In fact, the Department had told the Government earlier that it could not afford to replace the existing Strategic Lift Fleet. However, to

take advantage of the bailout of Canadian Airlines International, the Department agreed to change its priorities (Auditor General, 1996c).

The Auditor General (1996c) noted a number of problems with the replacement strategy that was finally adopted by the Department. The existing Strategic Lift Aircraft had four primary roles: strategic airlift of personnel, strategic airlift of freight, VIP transport, and strategic air-to-air refueling.

However, the Airbus A310 could only accomplish the strategic passenger role. It required major modifications to handle freight and VIP's. These modifications were sole-sourced to a European firm and would not be completed for a number of years after the purchase. The strategic air-to-air refueling requirement was not even being considered. The Department stated that they would keep two Boeing 707 in-service until the end of their service life in 1999 and then make do with their tactical air-to-air refueling capability (Auditor General, 1996c). Therefore, to complete the military mission, two of the Boeing 707's were retained for their freight and air-to-air refueling capabilities. Thus the Auditor General concluded that "the strategic airlift fleet is currently using seven aircraft to accomplish a role previously fulfilled by five aircraft" (Auditor General, 1996c, para. 39.31).

This was another case of efficient exchange between the Government and the Department. The Government got credit for saving Canadian International Airlines from bankruptcy and the Department got relatively new aircraft. The Department had to accommodate the Government by changing its priorities and accepting a commercial pattern aircraft that required major modifications and even then did not fulfill the roles of the aircraft it was intended to replace.

### 4.3.3 Revitalization

#### The Maritime Helicopter

The Maritime Helicopter Project is unusual because it started in the mid-1980s during the rearmament period and has continued until the present. In 1986, the Government signed a contract with European Helicopter Industries to acquire the EH-101. However, as Plamondon (2010) notes the Department did not act in a timely fashion in the negotiations with European Helicopter Industries and there were many delays in the project. The project became vulnerable to cancellation in 1993 with the change in Government at a cost of \$478M in cancellation fees.

The project was restarted in the downsizing period when it was mentioned as a high priority in the White Paper (Minister of National Defence, 1994). However, the project was slow getting started and the 'statement of operational requirements' was not approved until 1999. Then the 'preliminary project plan' took another four years to get approved by Cabinet and Treasury Board. Then in 2004, a contract was signed with Sikorsky based on a competitive process. During the competitive process, two companies were involved and the decision was supposedly based on meeting the technical requirements and providing the most industrial and regional benefits at a lowest overall price.

However, costs increased from an estimated \$2.8B in 2000 to an estimated \$3.1B in 2003 which was caused, according to Sikorsky, by additional work directed by the Department. The most notable change in the design of the helicopter was the introduction of more powerful engines for 'growth potential'. This was not part of the original essential requirements and it was explicit in the contract

evaluation that no credit would be given to a design that exceeded the originally stated requirements. This is a case of ‘buy in’ in that the Department obtained approval for a helicopter based on one set of requirements but once the approval was obtained they modified their requirements to obtain more capability than they originally stated that they needed. The Auditor General (2010c) states:

The procurement strategy, which was communicated to industry, was based on the lowest-price bid that met the stated [essential] requirements. The process did not give any credit to bids ... that exceeded the stated requirements ... The contract amendment is not consistent with the original lowest price compliant procurement strategy (para. 6.25).

In the 2000 preliminary project plan, the Department told Cabinet and the Treasury Board that this purchase would be ‘off-the-shelf’ and Canada would not be the first buyer. Therefore, the Department suggested that this procurement would be a low to medium risk. However, the Auditor General found that there were over 3000 technical requirements specified by the Department that required additional one-time engineering costs of \$612M. In an interview with the Auditor General (2010c), a Department of National Defence official said this would result “in a state-of-the-art helicopter that has never existed before” (para. 6.30).

These design changes resulted in airworthiness problems. The original contract had specified that the basic commercial helicopter was required to be certified at the time of signing the contract and the certification of the military version of the helicopter would be required at the time of the first delivery. However, because the maritime helicopter was basically a developmental helicopter that had

many novel features introduced by the Department, there were delays in the certification process. The original plan was to deliver 28 helicopters to the Department from 2008 to 2011. This was later amended to have the delivery scheduled between 2010 and 2013. The latest word from the Department is that the delivery schedule has been further amended to 2012 to 2014.

The life cycle costs for the maritime helicopter were based primarily on the 20 year support contract with Sikorsky at a cost of \$2.5B. However, the Department later found that there would be \$1.1B in additional cost for in-house personnel, operations and maintenance. The Auditor General (2010c) states that “National Defence did not seek additional funding for the in-service support provisions, so these incremental costs will need to be covered by its existing operations and maintenance budget” (para. 6.39). Also it was initially assumed that the old Sea King infrastructure would be sufficient for the new helicopter. However in 2005, a separate submission to Treasury Board was undertaken by the Department for \$340M in new infrastructure costs. Finally in terms of life cycle cost, there was an additional requirement for \$168M to conduct a life-extension for the Sea King Helicopter because of the delivery delays mentioned earlier.

The Auditor General found that there was a lack of departmental oversight during this project. The senior review board and the program management board did not meet between May 2007 and March 2010. This was a time when there were “significant changes to the cost, scope and schedule of the project” (Auditor General, 2010c, para. 6.44). This brings into question statements made by the Department to the Public Accounts Committee during the Towed Howitzer

inquiries, mentioned in an earlier case study, that departmental oversight processes are comparable to those of Treasury Board.

This case study demonstrates the control of the Government over the Department. First, the EH-101 was cancelled, although, the Department could be criticized for delaying the procurement (Plamondon, 2010) to obtain a ‘Cadillac’ helicopter (Williams, 2006). However, there was no doubt in the Government’s mind that the Sea King had to be replaced as seen in the 1994 White Paper which was approved in the middle of the downsizing period. To appease the Government, the Department spent a great deal of time revising their requirements so that the Sikorsky helicopter would win the competitive contract. However, once the Sikorsky helicopter was approved, the Department began revising their requirements. The efficient exchange here is that the Government could say the cancellation of the EH-101 was justified but then would overlook the design changes to the Sikorsky helicopter. The Department would accept the less capable Sikorsky helicopter instead of the EH-101 but would be allowed to modify the Sikorsky to meet most of its needs.

### **The Chinook**

The Chinook Helicopter project is more indicative of the revitalization projects. It is interesting to note that the Department used to own Chinook helicopters but sold them in the 1990’s downsizing based on the helicopter rationalization program that brought in the Griffon helicopter as the all-purpose utility transport.

The 2005 Budget announced that the Government would buy 16 medium to heavy transport helicopters for \$2B with a life cycle cost of \$4.9B. The reason

for this reversal in policy, as mentioned in the departmental proposal, was to fill the “gap in the helicopter support to the Land Forces in conditions like Afghanistan” (Auditor General, 2010c, para. 6.50).

The Department acted quickly on this initiative. In 2006, the statement of operational requirements was approved and the preliminary project approval was given by Cabinet and the Treasury Board. Also in 2006, an advance contract award notice was sent out by the Department of National Defence and the Department of Public Works and Government Services Canada which was a preliminary step before a sole-source contract could be directed to Boeing.

In the statement of operational requirements, there were seven high-level mandatory requirements and 136 rated requirements without which the capability would be ‘seriously diminished’. The seven high-level requirements included: internal carrying capacity; external carrying capacity; flying range; temperature and sea-level requirements; airworthiness; 16 helicopters would be purchased; and an aggressive delivery schedule<sup>4</sup>.

The basic Chinook helicopter (F Model) could meet the seven high-level requirements. However after the mandatory statement of operational requirements was approved, the Department began negotiating with Boeing to acquire a Canadianized version of the Chinook with extended-range fuel tanks, an upgraded electrical system and aircraft survivability equipment. Boeing informed the Department that these changes would involve a delivery delay and would increase the cost. The Department then decided to buy 15 helicopters instead of 16. The Auditor General (2010c) stated because of this Canadianization “one of the seven high-level

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<sup>4</sup>The requirements specified that the first delivery would be 36 months after signing the contract and the last delivery would be 60 months after signing the contract.

*mandatory* requirements had been changed (minimum fleet size) and two would not be met (airworthiness certification and scheduled delivery . . . which had both been delayed)” (para. 6.57 emphasis added).

The delivery schedule suggested by the statement of operational requirements was very aggressive. So it was important that the solution be an ‘off-the-shelf’ one. As late as 2006, the Department of National Defence had told Cabinet and Treasury Board that this purchase would be ‘off-the-shelf’ and therefore low to medium risk. However, the Auditor General (2010c) found that “it was evident that from the beginning, the Department of National Defence did not intend to procure an off-the-shelf Chinook but rather a modified one”, a unique Canadianized Chinook (para. 6.60). This Canadianization involved an additional cost of \$360M in one-time engineering changes and would result in a 70% increase in the cost of each helicopter. It would also result in a two year delay in the project.

The life cycle cost of the Chinook helicopters was estimated in 2006 to be \$6.9B. However, by 2009, the acquisition costs had increased from \$1B to \$1.2B even though 15 instead of 16 helicopters would be purchased. The infrastructure costs increased from \$62M to \$218M and the project management cost increased from \$48M to \$122M.

The Auditor General looked at the fairness and transparency of the acquisition of the Chinook helicopter. The Auditor General advocates that competitive processes can provide the best value for money in defence acquisition. However, in the case of the Chinook acquisition, the Auditor General (2010c) stated “it is evident from the files that the Department of National Defence concluded very early in the acquisition process that the Chinook helicopter was the only one capable of

meeting its needs. As early as the fall of 2005, the Department of National Defence was considering a sole-source procurement with Boeing” (para. 6.78).

After the Budget announcement in 2005 and throughout 2006, the Department of National Defence and Public Works and Government Services Canada met with Boeing. The Auditor General (2010c) found that “it was not until another company responded to the advance contract award notice that communications with Boeing were suspended” (para. 6.78). The Auditor General concluded that this raised “the potential for a real or perceived bias and lack of fairness” (para. 6.78).

The Department of National Defence had conducted market research and concluded that “the Boeing CH-47 Chinook is the only aircraft that meets the high-level mandatory capability requirements” (para. 6.79). However, the Auditor General found that only the technical requirements were considered. The airworthiness and delivery schedule were not included in this analysis. As mentioned earlier, an ‘off-the-shelf’ buy of the Chinook F model would have met these further requirements but the Auditor General (2010c) found that “the Department of National Defence did not intend to purchase an existing aircraft” (para. 6.80).

One other company responded to the advance contract award notice. They provided a submission based on the seven high-level criteria as well as other relevant criteria. This submission was evaluated not by the seven high-level criteria but against criteria that were developed during the advance contract award notice in “reaction to the company’s submission” (Auditor General, 2010c, para. 6.82). The company’s submission was found to be non-compliant. However, the Auditor General (2010c) found “no evidence that Boeing was evaluated in a similar manner

using the same criteria and documentation requirements” (para. 6.82). Therefore, the Auditor General (2010c) concluded that “the contract award process was not fair, open and transparent” (para. 6.83).

This project is typical of the revitalization of the Canadian Forces during the War in Afghanistan. The Government wanted to invest in military equipment to support the war effort. The military had learned from its earlier mistakes concerning delays in the approval process and was able to push their procurement plans through. The War in Afghanistan added to the urgency and salience of these investments in the minds of the Canadian public and this led to the immediate Government support. However, it should be noted that the justification of the Chinook helicopter was based on a “situation like Afghanistan”. There was no intention of rushing *these* helicopters into service<sup>5</sup>. Once the Chinook acquisition was approved the Department decided to take its time and obtain what it really wanted which was a Canadianized Chinook.

It will be interesting to see what happens to the acquisition programs planned in the Canada First Defence Strategy (National Defence, 2008) when the war fighting role for the Canadian Forces ends in Afghanistan. There are already signs that some of these investments in the Department might be re-evaluated and the situation might return to that of the downsizing years (Treasury Board, 2009).

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<sup>5</sup>The Auditor General (2010c) noted that “in 2008, the Government approved over \$400M to purchase and support six used Chinook D helicopters for use in Afghanistan from the United States Army through a foreign military sales contract. This acquisition was not examined in the course of this audit” (p. 38).

#### 4.4 Industrial and Regional Benefits

The Auditor General examined industrial benefits in 1984 with regards to the CF-18 program with a follow-up review in 1986 and again in 1992 for major capital programs in the Department with a follow-up in 1994.

The 1984 study which focused on the CF-18 stated that the industrial benefits would be around \$3B but they were mostly in Ontario (Auditor General, 1984). There was a lack of earlier guidance that the regional development aspects should have been considered. In the 1984 audit, they also noted that there were a number of procedural and administrative problems that they found in the follow-up audit were being worked out slowly (Auditor General, 1986). During the Public Accounts Committee Inquiry, the Auditor General said that he was reluctant to comment on the industrial and regional benefits program because he might be stepping into the policy area (Public Accounts Committee, 1985).

The original policy of industrial offsets was implemented in 1976 at the beginning of the rearmament period. These offsets were found to be short-term and ineffective in building a national industrial capacity because they were generally one-time buys of unrelated equipment and components. However, companies that competed for major capital programs knew that the industrial and regional offsets that they included in their proposals would be considered seriously in the decision of which company would win the contract (Auditor General, 1992b).

In 1986, the Government changed the policy to move to more direct benefits rather than offsets. This involved having Canadian companies involved directly in the major capital programs such as in assembly and integration. As the Audi-

tor General stated later, “value for money in major capital programs entails three major objectives: meeting operational requirements in the most cost-effective manner; achieving cost-effective, long-term industrial and regional development; and, achieving other national objectives” (Auditor General, 1992b, para. 16.1).

It was quite natural for the Auditor General to find in his 1992 review that:

Successful foreign manufacturers of major defence systems already have complete production processes. They often have amortized the costs of investment, design, project management and start up over large production runs and may also have achieved economies of scale. This makes for a highly competitive marketplace. Where a contract for manufacture or final assembly is awarded to a company, whether in Canada or elsewhere, that has never designed and manufactured high technology defence systems or products, there are bound to be higher costs and greater risks (Auditor General, 1992b, para. 16.39).

In the 1992 audit, the focus was on ‘value of money’. If the benefits were related to the defence industrial base, which they seldom were, they should be paid for out of the defence budget, but if they were more regional, they should be paid for from the Department of Regional and Industrial Expansion. The Auditor General (1992b) recommended that the premium paid for industrial benefits should be noted in Part III of the Estimates.

The Auditor General (1992b) did a survey of industry chief executive officers who were quite critical of the process and felt that it was useless to try

to establish a defence industrial base in Canada since the Canadian demand was so small and the chance of foreign sales dismal. The bottom line of the Auditor General's 1992 report was that operational requirements should take precedence over industrial development. If the equipment built for the Department is not cost-effectively built, there is no possibility of sustainable industrial situations that can compete internationally. The Auditor General (1992b) noted that industrial benefits increase because of "cost-overruns, inefficient production arrangements, layers of subcontractors adding costs and profits, and higher overheads" (para. 16.85). Furthermore, the extra costs involved in industrial benefits needs to be identified in the Estimates so that it can be approved properly by Parliament.

The Auditor General (1992b) was quite critical of the industrial benefits program. The Department agreed with the Auditor General and the follow-up examination put most of the blame for the failure of the industrial benefits program on the shoulders of Industry Canada who was slowly working on the problems identified (Auditor General, 1994a). Again this appears to be a situation where the Government agrees with the Auditor General to appease him but stalls when it comes to implementing solutions. However, it does demonstrate that the Government is using industrial benefits to make the expenditure on major capital programs in the Department satisfy secondary needs of the Canadian public for jobs in related industries.

#### **4.5 Summary and Conclusions**

In this chapter, the 'games' that were played by the Department with regards to capital procurement have been discussed. These were originally discovered in the United States Department of Defense by the General Accounting Office and

the Bureau of Budget Management. The Auditor General of Canada was looking for the same games being played by the Department of National Defence. These games included 'low balling', 'buy in', and 'transfer of money between capital and operations and maintenance budgets'. By discovering these 'games', the Auditor General has provided a useful service to the Government as a monitor of the Department of National Defence.

However, the principal did not wish to correct this misbehaviour by the departmental agent. It would appear that the politicians were conducting an efficient exchange with the Department to obtain their objectives of industrial and regional benefits. Starting in the late 1970's, a policy of industrial and regional benefits was imposed on departmental capital purchases. This allowed the Government to appease voters in that the off-the-shelf buying policies, which implied foreign designs, were not detrimental to Canadian industry but actually benefited Canadian industry and therefore the Canadian public. Thus the goal of the Department to obtain new military capability and the Government goal to create jobs in Canada were aligned and this might be explained as an efficient exchange in the rearmament period under study.

This efficient exchange became even more apparent when military equipment was purchased primarily as an industrial bail-out. In this case, the military did not receive very much immediate capability although it did receive equipment and some hope that future investments might be forthcoming to turn this equipment into a viable military capability. The Government, on the other hand, received the immediate benefits of potentially saving an industrial sector or at least delaying its demise. The Department was cooperating with the politicians to ob-

tain military equipment, even though this equipment was not militarily effective when it was purchased and would need much more investment to make it effective. The political principals seemed to encourage these games that were being played by the departmental agents with the capital program in the industrial bail-out case studies identified in the downsizing section of this chapter.

During the revitalization period, it would seem that, because of the War in Afghanistan, the Government had significant problems in controlling the behaviour of the Department. The Department appeared to return to a situation similar to that outlined in the previous chapter. That is, the Government would approve an acquisition program in which the Department professed that the purchase would be an 'off-the-shelf' equipment and therefore medium to low risk of cost overruns or delivery delays. Then the Department would proceed to make design modifications to Canadianize the equipment to obtain greater capability than was originally the specified requirement. The modifications in turn result in cost escalations and delivery delays. The Government is handcuffed because these equipment are being purchased during a period when the military is actively fighting the War in Afghanistan. Although the Government is at a disadvantage, it can get some political value out an efficient exchange in that it is helping the military in the war effort by investing in equipment and in exchange it will overlook the fact that the military is modifying its supposed 'off-the-shelf' purchases. Although the Auditor General identified these 'games' played by the Department of National Defence, this was of little help to the Government.

## Chapter 5

### Performance Measurement and Alternative Service Delivery As Seen Through the Eyes of the Auditor General

#### 5.1 Introduction

This chapter provides a second major study of the evolving nature of cost estimation and performance measurement in the Department. Again the Auditor General plays a central role as an external monitor that can be used by the politicians as the principals in their relationship with the Departmental agent. In the previous chapter, the cost and effectiveness aspects of major capital programs were examined which is a highly visible element of the defence budget. In this chapter, the cost and effectiveness of some aspects of the operations and training programs will be examined with emphasis on the measuring of performance and the games played in the alternative service delivery program.

In general, a principal contracts an agent to provide a service. In the defence context, the Government provides resources such as capital, labour and land and expects the Department to implement defence policies. The theory of performance measurement often refers to a 'logic model' which measures the resources that are inputs, the activities that turn these inputs into outputs, and the outcomes that are expected from these outputs in due course (McDavid and Hawthorn, 2005). The Auditor General has been mandated through the Auditor General's Act of 1978 to evaluate the 'economy' with which Government obtains resources, the 'efficiency' with which they use their activities to turn these inputs

into outputs<sup>1</sup>, and the ‘effectiveness’ measures in place to determine if these outputs are achieving the desired policy outcomes. In other words, the Auditor General is focused on ‘value for money’.

### 5.1.1 Outline of the Chapter

This study of the evolution of performance measurement in the Department of National Defence will be broken into two parts. The first part focuses on the operational readiness of the military. During the Cold War, this involved the readiness to fight the air-land battle in Northern and Central Europe, the anti-submarine battle in the North Atlantic, and the ability to intercept Soviet bombers in the Canadian North. There was an established system called the ‘operational readiness and effectiveness reporting system’ (Auditor General, 1994b) and there were regular exercises that Canada participated in in Northern and Central Europe as well as the North Atlantic and Northern Canada. After the Cold War, readiness was no longer the main focus and the operational readiness and effectiveness reporting system was disbanded. The Departmental Performance Report was established in its place.

Section 5.2 in this chapter will describe performance measurement; what Tullock (1965) refers to as the process of ‘pseudo-accounting’. In many ways, these processes have been formalized in the activity based accounting philosophy (Johnson and Kaplan, 1987). This coincides with the performance movement in the public sector (Radin, 2006; de Bruijn, 2001). The Auditor General’s findings of shortfalls in the Department’s performance measurement efforts will be examined. The Department responded to these findings in front of the Public Accounts Com-

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<sup>1</sup>This is often referred to as social efficiency and should not be confused with the efficient exchange that will be discussed between the principal and agent in this framework.

mittee in which they made many unfulfilled promises to implement performance measurement in the future (Public Accounts Committee, 1998b). The Government-wide initiative called 'Results for Canadians' (Treasury Board Secretariat, 2000) will be reviewed, along with the Departmental Performance Reports produced in defence (Auditor General, 2005b). It will be shown that these Departmental Performance Reports appear to satisfy the Government's requirements for performance measurement.

In Section 5.3, a program called 'alternative service delivery' is described that occurred when the 'peace dividend' was exacted from the Department of National Defence. Readiness was reduced and no longer a primary consideration. There were across the board cuts to the defence budget during program review in which all of the Government in Canada was under pressure to cut expenditures because of the debt and the deficit.

This period coincided with the advent of the philosophy of 'new public management' first in the United States (Osborne and Gaebler, 1992) and then in Great Britain (Savoie, 1994) and following that in Australia and New Zealand to a greater degree and in Canada to a lesser degree (Lane, 2000). This philosophy took the principal-agent 'contracting' approach one step further and moved to privatize much of the work of the public sector (Finley, 1989).

Alternative service delivery appeared to flounder on the general problem that costs were underestimated and performance overestimated. The principal-agent framework is based on establishing enforceable contracts in which principals will provide guaranteed remuneration for specifically requested services. The logical extension of this philosophy is that many public services can be provided more

efficiently by the private sector. This led ‘new public management’ advocates to promote the idea of contracting out routine government services, privatizing national industries and deregulation in general. A number of these programs in the Department of National Defence throughout the 1990’s, and in particular the NATO Flying Training in Canada program, are examined.

## 5.2 Performance Measurement

As discussed in the previous chapter, the Defence Structure Review of 1975 (Minister of National Defence, 1975a,b) was a pivotal document in the modern history of the Canadian Forces because it laid out the rearmament program from the late-70’s until the early-90’s. To convince the Government to invest in the Department’s capital programs, the Defence Structure Review used performance measurement. The first part of the Defence Structure Review (Minister of National Defence, 1975a) laid out a series of 15 objectives with 55 associated tasks that it was claimed the Government desired the Department to accomplish and then asked the Government whether they agreed to these commitments. These included such basic military functions: “deny the advantage of surprise in armed attack of North America”, “prevent or contain armed attack against the North Atlantic Treaty Organization area (Europe, North Atlantic and North America)” and “provide aid to civil law enforcement agencies on request in execution of their constitutional responsibilities”. It also contained less military functions (e.g. “support emergency relief and Search and Rescue”), and finally support to Government programs that were not really military oriented (e.g. “to foster economic growth, social justice, the quality of life and the preservation of a harmonious natural environment” and “to promote Canadian unity and identity”) (Minister of National Defence, 1975a,

Figure 1). Although the desirability of these objectives to the Government was probably unquestionable, the Defence Structure Review went one step farther. It outlined a series of performance measures that described how the accomplishment of the 55 tasks would be measured; what it meant to have 'nil' level of performance; what it meant to have a 'full' level of performance; and an estimate of the current level of accomplishment by the Department. One could imagine how these objective measures of performance could be used to pressure the Government into investing in defence if the current level of accomplishment of the agreed objectives and tasks was known to be unsatisfactory based on the current level of investment in the Department.

After this Defence Structure Review, the Government went on to complete an extensive rearmament program in the 1980's as described in detail in the previous chapter. Furthermore, the Auditor General in his 1982 review was very impressed with the performance measurement framework laid out in the Defence Structure Review of 1975 (Auditor General, 1982, para. 11.2).

By 1984, the performance measurement system was being neglected possibly because the rearmament program had already been accomplished or was irreversible. The Auditor General (1984) gave a mixed review of the performance measurement system. Although the Auditor General (1984) acknowledged that the 1975 Defence Structure Review had adopted performance measures for each of the 55 operational and 11 support tasks endorsed by Cabinet and that these measures were gaining "growing acceptance throughout [the Department]", he noted "discrepancies in reported operational readiness" that gave him concern about the quality of the input (para. 12.25).

Furthermore, the Auditor General (1984) noted that costs were not being adequately included in the performance measurement system to evaluate whether the Department was getting the most return in terms of its performance for the resources invested. The Auditor General (1984) made a specific recommendation that “the Defence Activity Performance Measurement System should assign, to the maximum extent practicable, the full range of costs, including capital and overhead costs, against tasks, and should provide performance data on support and logistic services” (para. 12.27). The Department responded that “the development of efficiency measures has been initiated. As this project develops, ways of expanding the scope of costing will be examined. Work is proceeding to include support and logistic services in operational readiness as well as measures of sustainability” (para. 12.27).

The Auditor General (1984) commented unfavourably on the state of the internal feedback mechanisms in the Department. These included: performance measurement, program evaluation, internal audit and operational feedback. With regards to these internal feedback mechanisms, we can see the situation well described by Halachmi (2005) of certain costs and uncertain benefits. For example, the Auditor General notes that the program evaluation function in the Department started in 1972 headed by an Assistant Deputy Minister (three-star general equivalent) and a staff of twenty-five but by 1984 it was headed by a Chief (two-star general equivalent) who reported to an Assistant Deputy Minister with a Director General and a staff of twelve. The Auditor General found that although the findings of the program evaluation team were reported to the Deputy Minister and Chief of Defence Staff, “action is often slow” (Auditor General, 1984, para. 12.30).

With regards to internal audit, the Auditor General noted that the “audit policy is still only partially developed . . . [and] the internal audit function is scattered” (Auditor General, 1984). At the time, internal audit involved 140 groups across the Department and cost about \$4M annually. Yet, the Auditor General found that “the capacity of internal audit to have a significant impact on central management processes has been low” (Auditor General, 1984, para. 12.35).

At the time of the 1984 Auditor General’s report, the Cold War was the primary focus of the operational feedback and the primary tool used was operational exercises. The Auditor General described the process of planning operational exercises as a combination of top-down direction from National Defence Headquarters and bottom-up initiatives as commands and formations interpret the top-down direction and form programs of exercises that are sent back to National Defence Headquarters for approval. However, there appeared to be a lack of co-ordination as the Auditor General (1984) stated “pertinent information does not flow to headquarters in a systematic way to advise management about the operational readiness of the Canadian Forces. The Commanders’ ‘monthly operational readiness reports’ provide only limited information on the capabilities of the formations” (para. 12.40).

Although this appears to be a situation in which the internal feedback mechanisms are not working, there may be significant benefits to a limited feedback mechanism. This can be seen in the two major controversies taken up by the Public Accounts Committee based on the 1984 audit: the CF-18 spare parts ‘low-balling’ and CF-18 follow-on purchases ‘buy-in’. Both of these scandals were created by internal reports generated by military officers in the CF-18 program

office documenting problems that they were encountering. These internal reports were found by the Auditor General and brought to the attention of Parliament and the public through their audit. As the Auditor General said, what they do is look at files for documents and if they find problems, they bring them to the attention of Parliament (Public Accounts Committee, 1985). This may be a reason why the Department may not want to have too effective an internal feedback mechanism.

Over the next ten years, the Auditor General was constantly encouraging the Department to develop accurate cost estimation procedures. Finally, in 1994, he did an audit on defence management systems and examined the issues of cost estimation more fully. When he examined the cost estimation process, he found four major problems. First, the Commands, who spend most of the operations and maintenance budget, do not know the costs of the resources they are using. The Auditor General (1994b) quotes an internal report that stated “it is somewhat difficult to control costs when one does not know what one’s costs are” (para. 24.83). Second, the Commands have no incentive to be efficient because the military has a cultural bias. As the Department stated, officers “should focus on military activity and not concern themselves with the cost of the resources used” (Auditor General, 1994b, para. 24.57). Third, the Department needs to link budgets to performance. Operational readiness is a primary focus of performance measurement in the Department but the Auditor General (1994b) found that the Department recognized “its inability to determine the impact of changes in the operations and maintenance budget on the readiness of the forces” (para. 24.60). Finally, the Auditor General (1994b) examined 15 cases where senior managers in the Department were considering important decisions. In four cases, they received adequate cost information that was relevant to the decision being taken. In four cases, cost information was

not essential to make the decision and in one case cost information was irrelevant. However, in six cases, cost information was relevant to the decision and it was not adequately provided.

In this 1994 audit, performance measurement was also examined. The Auditor General (1994b) emphasized the need for operational readiness information even in the Post-Cold War environment: “for military organizations to be able to measure how ready they are so as to ensure that forces will indeed be capable when called upon to perform an operation” (para. 24.75). The Auditor General noted the high level of peacekeeping operations in this period of departmental downsizing and budget cutting. The Auditor General (1994b) complained that they “have commented since 1984 on the need to improve readiness reporting systems” (para. 24.77). He applauded the introduction of the Department’s operational readiness and effectiveness reporting system. The report states “the Department has made efforts to respond to our findings and now uses several methods to assess military operational readiness. The Department has an overall reporting system called the operational readiness and effectiveness reporting system” (Auditor General, 1994b, para. 24.77).

However, the operational readiness and effectiveness reporting system when examined in detail was found to be lacking. It was intended to be a quantitative assessment of the operational readiness of the Commands. As the Auditor General (1994b) noted the instructions from the Vice-Chief of Defence Staff provides “quantitative levels that should be attained for personnel strength, personnel training, equipment availability, and materiel availability” (para. 24.26). However, the reality of the resulting system is that the information is highly aggregated and

there are implementation issues. For example, lower-level commanders do not report whether they have met certain standards, instead they report only exceptions that appear significant to them. These exceptions can be adjusted by senior-level commanders who believe that resources exist elsewhere to make good the deficiencies reported by junior-level commanders. The Auditor General (1994b) concluded that “instead of being primarily an objective and quantitative assessment of current readiness, the operational readiness and effectiveness reporting system is mainly subjective” (para. 24.6).

The Auditor General wrote a summary of his ten years in the position (Desautels, 2001) in which he reviewed the defence audits. With regards to performance measurement, he stated:

The Department has been unable to adequately measure readiness. . . . Over the decade [of the 1990's], there were failed attempts to build forces-wide measurement systems that would allow the Department and Parliament to know whether the Canadian Forces were ready to conduct operations. This is simply not good enough for a \$10 billion-a-year operation on which our security depends (para. 250).

The 1994 audit represented a turning point in the performance measurement and cost estimation processes in the Department and the Government as a whole. The Auditor General recommended that the Department improve its cost estimation and performance measuring systems such as the operational readiness and effectiveness reporting system but the Department responded that it would be including any improvements in these systems in its new business planning initiatives. By the time the Auditor General did a follow-up audit in 1996, the busi-

ness planning process was well underway. The Auditor General (1996a) stated: “The Department’s operational readiness and effectiveness reporting system . . . is no longer used to report to National Defence Headquarters and a new system is under development” (para 34.45). The Department planned to integrate a new system with business plans in the 1997-98 fiscal year.

In their audit of support productivity, the Auditor General (1996b) found that although the names had changed the problems of cost estimation and performance measurement had remained. The Auditor General (1996b) noted “the Department has defined business planning as an accountability process developed to link activities to performance measures through a contract between [superiors] and subordinates”. However, the defence support productivity audit “confirmed the lack of performance information at all levels of the Department. We did not find any improvement or development of new incentive policies to promote cost management” (Auditor General, 1996b, para. 35.39).

In response to a recommendation to improve cost estimation and performance measurement, the Department made an extensive statement with regards to performance measurement containing many promises. The Department said that “significant progress has been achieved through the issue of strategic performance measurement guidance” and that this strategic guidance document presented “a ‘strawman’ framework”. The process outlined in the document “would complete the development of a Department of National Defence performance measurement system” generating the “raw performance data that, once analyzed, will assist in strategic decision making”. The resource and capability report was mentioned as a replacement for the operational readiness and effectiveness reporting system and

was “due for presentation in the November-December 1996 timeframe . . . intended to fit with business planning”. The Department said that they “expected to produce a partially mature performance measurement system for Fiscal Year 1997-1998” (Auditor General, 1996b, para. 34.47).

However, in front of the Public Accounts Committee (1998b), the Deputy Minister admitted that the Department still did not have a performance measurement system. Apparently, the resource and capability report was a failure because it was never mentioned again but there were obviously new initiatives underway because the Deputy Minister then promised that a performance measurement system would be in place by 2001 (Public Accounts Committee, 1998b).

Even as recently as 2005, the Auditor General (2005a) stated that, with regards to the command and control system, “key performance indicators had not yet been developed at the time of this audit. The absence of indicators means that the Department can declare that any or all of its objectives have been achieved” (para. 4.65).

The question arises: If the Department cannot produce performance measures, how can the Government evaluate if the Department is delivering on the Government’s policy goals and objectives? They must be receiving measurements of value using some other vehicle. This is where the Departmental Performance Reports come into consideration.

In 1995, the Government through the Treasury Board modified the Estimates process and now required not only a Report on Plans and Priorities but also a Departmental Performance Report in Part III. The Auditor General applauded this initiative because he felt that the Department Performance Reports

would be “the prime vehicle through which Departments tell Parliament about how they managed their programs with due regard given to economy, efficiency and effectiveness” (Leighton, 2006, p. 3). However, after many years of reviewing these Departmental Performance Reports (Auditor General, 2002a, 2003, 2005b), the Auditor General concluded that there was “little evidence that performance information is used by Departments to manage their programs” (Leighton, 2006, p. 9).

In particular, with regards to the Department of National Defence, the Auditor General stated in his reflections on the 1990s that “our audits show that in their reporting to Parliament, National Defence [and other Departments] have tended to concentrate on good news at the expense of a comprehensive and balanced account of the program results” (Desautels, 2001, para. 141). He went on to suggest that there are three basic reasons for the lack of progress. First, public servants still have not completely accepted management based on measuring results and reporting their achievements to Parliament. Second, reporting performance to Parliament has political consequences and there is a fear that performance reports could become a political tool of the Opposition. Third, few incentives for reporting have been offered to individual managers or to Departments as a whole. Nothing really happens to an organization that does not improve its reporting. In fact, because of the political culture, poor reporting is safer (Desautels, 2001, para. 142).

The Public Accounts Committee in 1998 asked for “a comprehensive review and assessment of defence” with specific performance indicators (Desautels, 2001). However, the Government responded “information was already provided

in other public documents” such as the Departmental Performance Report. The Auditor General countered that “the annual Performance Report to Parliament has been a disappointing collection of ‘good news’ anecdotes rather than a source of genuine information on performance” (Desautels, 2001, para. 256).

### **5.2.1 Performance Measurement: What Has Been Learned?**

There is evidence that the Government is giving the Department autonomy in how it spends its budget and in return it is satisfied with the Department’s provision of an annual list of success stories in the Departmental Performance Reports. The Government and the Department seem to consider this an efficient exchange.

As discussed in Chapter 3, the underpinning of the rational management movement in defence was cost and performance analysis. In Chapter 4, the capital programs from 1975 to 2010 were looked at through the eyes of the Auditor General and numerous cases of cost overruns and performance shortfalls were found. In this study, cost and performance of the operations and training programs were looked at through the eyes of the Auditor General and it was found that not only are costs not being measured well, but in fact, there is a cultural bias against measuring the costs of operations and training in the military (Desautels, 2001). On the performance measurement side, the situation is probably even worse. The Auditor General concluded after 25 years of continuous effort that “the Department has failed to develop an internal performance management system” (Desautels, 2001, para. 256). As a matter of fact, the Auditor General suggested that there may even be incentives against measuring costs and performance because of the political culture in the Department.

Williams (2006) suggests that Parliamentarians are not interested in holding the Department to account if it means investing their time to become properly informed. As McCubbins and Schwartz (1984) have noted in terms of Congressional oversight in the United States, the Government seems to prefer to monitor the Department using ‘fire alarms’ from external sources, rather than ‘police patrols’ using their own resources. Finally, it is suggested that the Department seeks and receives autonomy from Government monitoring by providing ‘vacuous’ good news in the Departmental Performance Report and in exchange the Government seeks and receives budget controls and success stories.

### **5.3 Alternative Service Delivery**

The alternative service delivery program was an extension of the rational management initiative that started in the 1960’s with the Glassco Commission. This effort to bring private sector values into the public sector was given impetus with the Mulroney movement to the Right (Savoie, 1994). Mulroney started the process in Canada with the Nielsen Task Force. As Savoie (1994) suggests “Nielsen was thought to be particularly well-suited to the task: it was widely believed that he profoundly disliked bureaucrats” (p. 127). The goal of the alternative service delivery program was to encourage Government Departments to “cost the most efficient way to deliver their services and then identify alternative sources of doing so including contracting out” (Savoie, 1994, p. 155). There was an intention to conduct competitive tendering between the public and the private sectors.

The alternative service delivery program started in earnest in 1995 when Treasury Board Secretariat published a document called “A Framework for Alternative Program Delivery”. The intention was to look for new and better ways

to provide government services that increased the cost-effectiveness of public programs. Not only was this an extension of the rational management initiatives of cost-effectiveness, it was also an extension of the principal-agent framework that was attempting to convert the long-term contracts between Government and public servants to short-term contracts between Government and the private sector (Lane, 2000). In the Department of National Defence, the intention was to transfer non-core services that were currently being provided by in-house public servants to the private sector where it was believed that competition would lead to efficiency. The Auditor General (1999) estimated that as much as one-third of the Department's budget was being spent on these non-core services. Thus, the potential savings were considered substantial even after the downsizing that was on-going with program review in the mid-1990s. An earlier audit of the Department had evaluated support productivity in which the intended goal of the Department was to produce the current defence capabilities with 25% fewer resources. The Auditor General (1996b) found that even though the defence budget cuts had substantially reduced costs, the Department's productivity had in fact declined when they looked at concrete measures of performance such as through-put of their training programs. The number of students had been reduced but the number of instructors, classrooms and other infrastructure had not changed.

The rational management objective of providing the 'best value for the defence dollar' was to be realized in the alternative service delivery program through the extensive use of business cases for privatization. This would require a good understanding of the outputs of defence produced by the Department, the levels of service provided by the non-core support functions to the core functions of the Department, and the cost of delivery of these services. These outputs, levels

of service and costs would need to be compared to those that could be achieved by privatization options. It was hoped that this out-sourcing of support services would instill cost-consciousness in the departmental agents and encourage a more business-like corporate culture in the military and public service.

In 1995, the senior departmental agents took to this alternative service delivery initiative with high hopes of saving \$200M per year by 1999 and \$350M per year by 2001 (Auditor General, 1999). They were encouraged to do this because they were informed that they would be able to reinvest these savings into their highly valued capital programs (Public Accounts Committee, 2000). However, the Auditor General found that this was another case of project managers who oversold performance and underestimated difficulties. By 1999, the Auditor General estimated that the Department was only saving \$68M per year and in testimony before the Public Accounts Committee (2000), the Deputy Minister admitted the ‘true’ savings might be closer to \$62M per year. The Auditor General (1999) concluded that the original savings targets were “set arbitrarily” and were “not realistic” (para. 27.90). They were revised downward by the Department to \$175M per year by 2004.

The Auditor General (1999) examined 14 business cases for these alternative service delivery programs. He found eight were conducted satisfactorily, four were not conducted at all, and for two of these cases, there was not enough information available to determine if they were conducted satisfactorily. The Auditor General examined these business cases with regards to their: level of service measurements, baseline cost estimates, critical success factors identified, cost and risk analysis of options, and whether the best option was determined.

Only three business cases had the level of service measured for the current situation. One case in particular was of note. Project Genesis, which was a program to reduce the cost of the fighter aircraft fleet, resulted in savings by reducing the CF-18 fleet size and the flying rate but as the Auditor General (1999) found “the air force does not have adequate measures of readiness and sustainment to ensure reductions in flying hours will not reduce the air force capabilities below required levels” (para. 27.39).

In terms of the baseline cost estimates for the current way of doing business, the problem was often that support services are paid for from more than one budget. Therefore, the costs are hard to track. In the case of the Goose Bay support services privatization, “costs were rigorously estimated only after the decision had been made” (Auditor General, 1999, para. 27.41).

The estimation of cost and risk associated with the options and the determination of the ‘best’ option was found lacking by the Auditor General (1999). He was expecting to see the business case include estimates of quality, risk, cost and effectiveness. Then he expected that these issues would be ranked to determine the option that was overall the best option in terms of cost-effectiveness while minimizing risk. As will be shown in the following case studies, this was not the result.

Three small case studies will be examined: Goose Bay Support Services; The Aerospace Engineering Test Establishment; and the Canadian Aviation Training Centre. This will be followed by a larger case study in the next section based on the NATO Flying in Canada Program.

Goose Bay does not directly support the Canadian Forces. Instead, it is used for training European Allied Forces' fighter pilots. There has been a long standing agreement between the participating countries that pays the Department \$80M annually, representing 68% of the base's costs. In 1995, it was recommended by the Department that a request for proposal be sent to the private sector for alternative service delivery of the base's support services. In 1997, the request for proposal was issued and in 1998, a five-year \$135M contract was signed.

When the Auditor General (1999) looked at the business case for the Goose Bay Support, he found that it was not based on sound cost estimates. There were no critical success factors identified. There was no risk assessment. There was no option analysis; not even for the chosen option of contracting out. Therefore, there was no way to determine if the best option had been chosen.

The Goose Bay alternative service delivery program being one the first of its kind ran into a number of serious 'roadblocks' with regards to human resources. In particular, there was the Government's work-force adjustment legislation that was trying to find displaced public servants other jobs in the Government after they were downsized or appropriate compensation for leaving the Government and working in the private sector. The company that won the contract for the Goose Bay Support Services tried to subsume the current public servants but the jobs offered would require wage cuts, loss of various allowances and loss of their subsidized housing. There were also a number of white-collar workers that were offered blue-collar jobs in the new company when their white-collar jobs were eliminated. This caused great dissatisfaction among the public servants who were expecting

proper work-force adjustment to protect them. Eventually, the Minister of National Defence had to get involved in the negotiations.

This problem was exasperated by the Department who had informed the contractors bidding on the Goose Bay Support Service program that Government legislation on 'successor rights' would not apply. Eventually, the Canadian Labour Relations Board ruled that successor rights would apply. Successor rights state that a company that takes over positions previously held by public servants would have to abide by the collective agreements that were already in place until they expired. That is, they would have to pay the current employees higher salaries than the going private rates. The Department told the bidders that they would pay for the extra costs of the successor rights. One Government representative claimed this would cost \$30M over the five-year contract. The Auditor General (1999) concluded that in the future "the proper inclusion of these costs may change the relative ranking of the options being considered" (para. 27.70).

These problems with human resources may have caused the entire alternative service delivery program to collapse because the process of examining options for privatization was changed. After May 1998, the Auditor General (1999) found that "any new alternative service delivery initiatives that lend themselves to in-house competitive bids will first be tested for savings through a 'most efficient organization' to determine if they should proceed to competition with the private sector" (para. 27.69).

The second case study involves the Aerospace Engineering Test Establishment located in Cold Lake, Alberta. The Aerospace Engineering Test Establishment is the flight testing unit for the air force. It includes a varied fleet of aircraft

and a great deal of unique equipment as well as a large staff of technical and engineering personnel to plan and conduct operational tests, collect and analyze performance data, and provide conclusions and recommendations following each evaluation (Auditor General, 1999). The Aerospace Engineering Test Establishment became a candidate for alternative service delivery in 1995. The idea behind this privatization was that the company that took over the facilities could market its excess capacity to commercial airlines and foreign militaries. The Auditor General (1999) found that there was evidence that the market for the services of the Aerospace Engineering Test Establishment did not exist but the Department went through the process of conducting a business case anyway. Two internal options were examined and one external option was considered. There appeared to be a bias for the external option since in that option “the cost of the assets was based on the contractor’s proposal to sell equipment and lifetime spares as a package” (Auditor General, 1999, para. 27.53). In the internal options, the Department assumed that the equipment and spares would be purchased separately. Further analysis indicated “that if the same assumptions had been used for all three options, one of the internal options could have cost at least \$60M less over 20 years than the estimated \$400M cost of the external option” (Auditor General, 1999, para. 27.53). Even with this bias towards the external option, the fact that there was no market for the excess capacity led to the decision in March 1998 to retain the current option.

The third case study is the prelude to the NATO Flying Training in Canada program that will be discussed in a section of its own. The Canadian Aviation Training Centre began as a plan to privatize Canadian Forces Base Portage-la-Prairie after the Minister of National Defence announced in the 1989 budget

that it would be closed by 1992. The base was sold to a private non-profit corporation called Southport Aerospace Centre Inc. for \$1. The goal of Southport Aerospace Centre Inc. was to avoid a surge in unemployment in the region created by closure of the base. A contract was let to Bombardier Inc. for \$236M to provide the Canadian Aviation Training Centre for a seven-year period from 1992 to 1999. Then a \$100M extension of the program was approved to be completed in 2002. Bombardier provides the classrooms and offices, operates the airfield and air traffic control, student housing and feeding similar to those provided previously by the base.

This is a service contract to provide primary flying training, basic helicopter training, multi-engine aircraft flying training and continuation flying training. However, the provision of the aircraft is a combination of public and private ownership. The primary flying training aircraft are 'industry-owned', the multi-engine training aircraft are 'contractor-owned', while the helicopters are owned by the Department and loaned to the contractor. This 'creative' ownership arrangement has allowed the Department to avoid starting up a major capital program to replace the existing fleet of training aircraft. In other words, they are using operations and maintenance monies for what would otherwise be capital acquisitions and used the alternative service delivery initiative to avoid scrutiny by the Treasury Board in acquiring these aircraft for use by the Department.

The Public Accounts Committee (2000) admonished the Department's alternative service delivery program for inaccurate planning assumptions. They stated that the Department's business cases were so bad that decisions made based on this analysis "might result in the Department actually paying more for certain

services, receiving services that are lower quality, or both”. The Public Accounts Committee (2000) concluded that the Department’s alternative service delivery program was “unsuccessful”.

The Auditor General (1999) noted that there were significant changes to the program in 1997. The Department moved from a ‘bottom-up’ identification of programs for alternative service delivery analysis to a ‘top-down’ approach. The reason was the savings from the ‘bottom-up’ were small in comparison to the potential for savings from rationalizing the production of non-core services. As Savoie (1994) noted, the voluntary approach offered few incentives for lower-level public servants to privatize their functions and offered many disincentives. Therefore, a ‘top down’ approach was initiated and some large projects were identified by senior management for further examination: the Supply Chain, the Military Pay System, and Defence Research and Development. These were studied in some depth by the Department. The changes to the Military Pay System were touted as a success story by the Department. Defence Research and Development was made into a separate agency with little actual savings resulting, while the risks of modifying the Supply Chain were found to be insurmountable.

In 2001, the Auditor General did a follow-up on the alternative service delivery program and found that it was no longer identified as a separate program. It had been integrated into the ‘continuous improvement program’. The Auditor General (2001a) found that this was “due in part to the negative view of alternative service delivery held by many managers and staff” (para. 12.360) because of “the threat of job loss brought about by the program’s strong initial focus on cost savings and contracting out” (para. 12.362). The Auditor General (2001a) was told by

senior management in the Department that initial expectations for the program were too high, the timeframe for the necessary cultural change was underestimated, and the savings have not materialized. Therefore, “managers are neither committed to nor supportive of the alternative service delivery program” (para. 12.362).

However, the Departmental managers tried to placate the Auditor General by saying that the ‘continuous improvement program’ that was taking over alternative service delivery would include increased emphasis on performance measurement that would compare service levels to pre-agreed targets and measure the costs of all services.

Even though most of the alternative service delivery programs were failures, there was one highly notable exception to this situation which will be taken up in the next section.

### **5.3.1 NATO Flying Training in Canada**

The NATO Flying Training in Canada program was extensively studied by the Auditor General. It will be examined here in two parts. First, the acquisition program in which the case will be made that the program should have been a major capital acquisition. Second, the implementation program in which the case will be made that the air force is not able to utilize all of the capability that it acquired.

With regards to the acquisition program, the Auditor General found in its 1999 audit that the Department had determined that they had insufficient capital funds to renew the training fleet. A number of options on how they might renew the training fleet were defined in the Spring of 1994. These included: extend the

Tutor Fleet of jet trainer aircraft and close a CF-18 base; retire the Tutor Fleet and buy the training from another country; or, contract out the training.

Informal discussions with Bombardier Inc. began seven months before Bombardier provided an 'unsolicited' proposal in late 1994 to provide the training. This unsolicited proposal to contract out the training immediately became the preferred option in 1995 and in 1996 Cabinet approved a non-competitive contract with Bombardier for \$2.8B over the next 20 years. As would be expected when a contract this large is directed sole-source, the Auditor General was concerned about whether the Government was getting 'value for money'. The Auditor General (1999) found that the sole-sourcing of this contract was not adequately justified. Then the Department said that no other companies had shown interest in the contract. The Auditor General said this was not the case and that a foreign consortium was interested. The Department said that they were bidding on the NATO Flying Training program and needed to get the contract in place in a timely fashion and therefore the competition route was not in the 'public interest'. The Auditor General (1999) countered that the 'public interest' argument for sole-sourcing was intended for military security issues and since the NATO Flying Training in Canada program was for training this justification was not valid.

Furthermore, the profit policy for a sole-source contract was not followed claimed the Auditor General (1999). Bombardier Inc. stood to make \$200M in profit over the 20-year program. The Department claimed that this profit was justified based on the risk that the company was going to take that they estimated to be between \$360M and \$460M. When the Auditor General pressed the Department for the risk calculations, they could not produce the assessments. Finally, in

response to the 1999 audit, the Department hired a private consulting firm to conduct a risk assessment. When the Auditor General reviewed their report, he noted that although the risks had been identified, the probability of the risks occurring and impact of the risks was not assessed. In fact, the Auditor General identified a further significant risk to the Department based on the way the contract had been arranged. If the holding company that owned the training aircraft got into financial trouble, the Department would not only lose access to the aircraft, they would also have to continue paying the fixed fees to Bombardier on a semi-annual basis for the remainder of the contract. The Auditor General (1999) said that this led them “to believe that a more rigorous assessment of alternatives for acquiring the assets ought to have been performed earlier in the process” (Case Study 27.1).

The Department stated that its goals were to create employment, find a way to keep the base in Moose Jaw open, demonstrate the capability of the Canadian aerospace industry, and make a significant contribution to the North Atlantic Treaty Organization alliance. They did not state, what the Auditor General and the Public Accounts Committee implied, that one of the goals of the program was to acquire training aircraft without having to generate a major capital project. The Auditor General described the complicated manner in which the contract was structured as an example of ‘innovative’ financing of a major capital program. The precedent had already been set with the Canadian Flying Training Centre in Portage-la-Prairie. In case of the NATO Flying Training in Canada program, a non-profit corporation was set up called Milit-Air Inc. They purchased 42 military aircraft to replace the Tutor fleet that the Auditor General (1999) found could have lasted until 2015. They were able to fund this purchase by floating a \$720M bond on the open market. Then Bombardier leased these aircraft to provide the

training service to the Canadian Forces at a firm-fixed price per year independent of how many pilots they trained. This firm-fixed price was not only unconditional, it was irrevocable according to the contractual arrangements.

The Auditor General (1999) found that the Department of Finance had reviewed the contract and said that it would be better to buy training aircraft instead of having the contractor purchase them. However, their recommendation came too late in the negotiations. The analysis of the cost-effectiveness of the private agency purchase was after the sole-source procurement strategy was adopted (Auditor General, 1999).

By the time the Auditor General did a follow-up review of the NATO Flying Training in Canada program in 2002, the program had been in place for two years and many of the risks that were identified by the Auditor General in 1999 were showing up in the implementation program. The Auditor General had been concerned that the firm-fixed payment schedule was ‘unconditional’ and ‘irrevocable’ (Auditor General, 2002b). The Milit-Air \$720M bond was secured based on the knowledge that the Department would be making semi-annual payments of \$31.4M each for 20 years. This was to pay off the principal and interest on the bond and was not directly connected to the use of the aircraft. Thus when the ‘normal’ start-up problems occurred such as late delivery of aircraft, and maintenance and certification problems that reduced the aircraft availability, the Department was paying for the bond to Milit-Air Inc. but canceling pilot training courses because of a lack of aircraft.

In the first two years of the program, the Department paid \$179.5M for 355 pilot training positions. They used 136 positions and sold 10 positions to other

North Atlantic Treaty Organization nations. Therefore, they used only 41% of the capacity that they had paid for. The Auditor General (2002b) estimated that the Department had paid \$65M for unused training positions. Meanwhile, there was a shortage of trained pilots. The Department had expected to graduate 216 pilots in the first two years. When there were delivery delays in the aircraft, they downgraded their expectations to 160 graduates. In the end, because of further aircraft availability problems, the actual number of graduates in the first two years of the program was 61. The Department had cancelled eight of the first 17 courses. Three of the remaining nine courses that were scheduled were not fully loaded with the expected 16 pilots. Furthermore, the courses that were completed should have taken five to seven months but in fact took nine to ten months to complete. One of the problems was generating the necessary sorties. The Department had contracted for 80 sorties per day. They ended up scheduling on average 62 sorties per day in the first two years. Of those scheduled, the Department actually flew only 42 per day on average. The Auditor General (2002b) concluded that “although there has been some improvement, the actual number of sorties flown per day is still far below anticipated levels” (para. 4.26).

The Auditor General (2002b) noted there were no performance measures in place to evaluate the compliance of Bombardier and Milit-Air to the contract and because of the firm-fixed payments, there were no incentives for good performance or recourse if there was poor performance.

The Auditor General (2002b) suggested that this program should be considered a major capital project because of its \$150M per year price tag and its considerable risk. The Public Accounts Committee (2003) made an even stronger

recommendation saying “the program fits the definition of a major capital project and would benefit from the higher level of scrutiny and management regime attached to such status”.

The Public Accounts Committee (2003) also noted the lack of adequate information about the program in the Departmental Performance Report. The program is described in a table of other initiatives. There is a description of the program, its objectives, and an Internet link. However, the objectives do not include “what might be seen as its most important one: meeting the Canadian Forces need for trained pilots”. There is no mention of the difficulties identified in the audit. The Internet link leads to a website for the program, that consists of ‘promotional material’ and offers little insight into its actual performance. The Public Accounts Committee concluded that this did not represent a ‘balanced’ reporting on the NATO Flying Training in Canada program.

The Department rightly claimed that most of the problems mentioned in the Auditor General’s report were typical start-up issues. This prompted the Auditor General to do a follow-up audit four years later in 2006. As predicted by the Department, many of the start-up problems had been rectified by the contractor. By October 2002, the contractor was providing the established number of sorties per day. However, the Auditor General (2006) found that for new reasons, the Department continued to be unable to take full advantage of the training flights provided. Between 2002 and 2005, the Department paid for 654 training positions but used only 509. This represents 78% utilization which is a large improvement over the 41% utilization found in 2002. However, the Auditor General (2006) concluded that this still represents an overpayment for training of \$39M.

This time the problem was not as simple to identify and excuse as aircraft delivery delays or aircraft maintenance issues. It was systemic in the way the air force trains and utilizes its pilots. It was decided to under-enroll the NATO Flying Training in Canada program because there were problems with the basic flying training program in Portage-la-Prairie. That program leads into the NATO flying training program. There were also problems with the absorption rate of pilots in the operational training units after the pilots graduated from the NATO flying training program. Meanwhile, the firm-fixed payments to Bombardier and Milit-Air continue at a steady-rate although the training is not being utilized.

The Auditor General (2006) reiterated the findings from the 2002 audit which found that there was underuse of the NATO Flying Training in Canada program. She stated that the Department “assured us that the problems were temporary start-up problems and that training production would improve” (para. 3.32). However, when the implementation program was re-examined in 2005, the Auditor General (2006) “found that training had slowed again. But for different reasons, and the financial impact has been significant . . . The Department has not fully addressed problems with the pilot training program” (para. 3.31).

### **5.3.2 Alternative Service Delivery: What Has Been Learned?**

The alternative service delivery program was an extension of the rational management initiative that started in the 1960's with the Glassco commission. This effort to bring private sector values into the public sector was given impetus with the Mulroney government in the 1980's (Savoie, 1994). It was given a further push forward with the downsizing of the program review in the 1990's. The Department of National Defence was looking for ways to cut costs but protect its core military

functions (Auditor General, 1996b, 1999). The focus for this cost-cutting was on its non-core support services that made up one-third of the total budget of the Department.

For the most part, the initial process was a bottom-up approach starting in the lower levels of the Department filtering up to the Minister and Cabinet. Savoie (1994) found in the 1980's, and the case studies above from the 1990's corroborate, that there were no real incentives and plenty of disincentives for public servants to privatize the non-core activities in the Department. This was the reason that the Department realized such little savings that the Public Accounts Committee (2000) concluded that the program was unsuccessful.

Savoie (1994) suggests that the programs that were privatized were self-serving in that Department wanted to do them, independent of any efficiency gains. This appears to be the case with the air force programs of the Canadian Aviation Training Centre and the NATO Flying Training in Canada. The Auditor General (2002b, 2006) found that the Department appears to be paying for training services that they are not using and therefore it is costing more than necessary. On the other hand, the Department is obtaining access to new training aircraft that they would not have been able to obtain so easily through the normal route of major capital programs.

The question can be asked: what is the Government getting in exchange for these two air force programs? The answer may be that the Government is able to say that they effectively closed two air force bases (Portage-la-Prairie and Moose Jaw) by privatizing their support services without the negative impact of high unemployment in these regions. They removed a considerable number of

public servants from their direct and long-term payroll and created a large number of high paying and high skilled jobs in the private sector. Thus, the Government can promote these programs as 'success stories' (Williams, 2006).

These alternative service delivery programs are an efficient exchange between the Government, who gets credit for creating jobs, and the Department, who gets new equipment. The Auditor General and the Public Accounts Committee, one the other hand, are concerned about a different type of 'value for money'.

#### **5.4 Summary and Conclusions**

In this chapter, the relative failure of rational management techniques is described in performance measurement and cost estimation in operations and training in the Department. Similar, to the earlier chapter on major capital programs, there is evidence of an efficient exchange between the political principal and the departmental agent to the chagrin of the Auditor General acting as an external monitor.

During the Cold-War, the Auditor General focused on operational readiness as a performance measure for the Department's operations and training program. He praised the Department for attempting to set up the operational readiness and effectiveness reporting system. Then he admonished the Department for allowing it to become a subjective measurement system rather than the intended objective measurement system.

The emphasis on operational readiness was replaced after the Cold War by the business planning system. This was a form of contracting between superiors and subordinates. However, the Auditor General found that performance measurement

and cost estimation was still lacking in this process. The Auditor General felt that there was a cultural bias in the military against cost consciousness.

The introduction of Departmental Performance Reports in the mid-1990's was notable. The Auditor General found that these reports were vacuous compilations of 'good news' stories without any concrete quantitative performance measurement. However, since they were accepted by the Government over the past 15 years, the Government must be receiving benefit from these reports. The Auditor General noted that 'true' performance reporting is discouraged by the political climate and Opposition tactics in Parliament.

The alternative service delivery program had high expectations based on the 'new public management' philosophy that long-term contracts with the public service could be changed to short-term contracts with the private sector where competition would lead to efficiency. The Department felt it could privatize many of the non-core activities and reinvest the savings into its core programs, in particular its highly valued capital programs. The business case was intended to be the tool for the accountability necessary to justify these privatization decisions. The business case would estimate performance, cost and risk of public sector and private sector options and determine the 'best' option for the Department.

However, the business cases were almost non-existent. There were no performance standards. Costs were estimated after the decision to privatize was made, and the risks were substantially underestimated as seen when a number of unexpected human resources problems surfaced. The Auditor General stated that if the costs and risks had been correctly estimated, the ranking of the options would probably have changed. These problems led the Department to introduce a new

step to the process that allowed the in-house public sector to reconfigure itself into a 'most efficient organization' before the decision to privatize was even considered.

By 2001, the Department had to admit that the alternative service delivery program was a failure and would be subsumed into a 'continuous improvement program'. As was to be expected, there were few incentives for public servants to voluntarily privatize their functions and many incentives not to. The Department stated that internal managers had a negative view of the alternative service delivery program and were neither committed nor supportive of it.

As would be expected, the Department needed a great incentive to privatize its internal operations and training functions and saving money was not enough. There were two examples of privatization that demonstrated sufficient incentive. These were the Canadian Aviation Training Centre and the NATO Flying Training in Canada programs. Both of these cases, involved the saving of a training base from closure and the acquisition of new training aircraft using 'creative' financing that would not have been possible without the introduction of the alternative service delivery program.

This chapter again demonstrates an efficient exchange between the political principal and the departmental agent as opposed to the views of the Auditor General and Public Accounts Committee who are external monitors and are looking for a different type of 'value for money'. Through the performance measurement case study, Government and the Department may be conducting an efficient exchange where the Government gets success stories in the Departmental Performance Reports and obtains budget control in peacetime without complaints from departmental leaders, and the Department in turn gets autonomy to spend its

budget as it sees fit. The Auditor General spent at least 25 years complaining that the Department had not produced quantitative performance measures. The Department continued to say that it was working on the measures but to date have not produced any concrete results.

In terms of the alternative service delivery of non-core support functions in the Department, without sufficient incentives to privatize, the program floundered. However, in the cases where the Government turned a 'blind eye' to the Department's 'creative' financing of its replacement of training aircraft, the Department was eager to employ the alternative service delivery program. Again there may have been an efficient exchange between the Government who could say that they closed two bases while creating many high paying jobs in the private sector and the Department who got new training aircraft and a 20-year commitment to their training program.

Meanwhile, the Auditor General and the Public Accounts Committee continued to find significant shortfalls in performance measurement and cost estimation that neither the Government or the Department are willing to address.

## Chapter 6

### Conclusions

#### 6.1 Review of the Findings

This dissertation has looked at the Department of National Defence, and especially their capital programs, through the lens of a simple principal-agent-monitor framework. The purpose was to understand the history of cost estimation and performance measurement from World War II to the present. In this dissertation, evidence was presented of an ‘efficient exchange’ between the principal (Government) and the agent (Department of National Defence) which was complicated by the monitor (Auditor General) who reports ‘bad’ behaviour by the agent to Parliament rather than to Government. The Government buys votes through industrial and regional benefits, in exchange, the Department of National Defence gets new military equipment that it would not get otherwise. In terms of performance measurement, the Government receives success stories and budget controls, and in exchange, the Department of National Defence receives autonomy in the conduct of its business. The Auditors General, on the other hand, criticize this ‘efficient exchange’ because they have a narrower vision of ‘value for money’. The monitor’s reports are helpful to the principal in controlling the agent but also troublesome because the monitor has objectives that do not align perfectly with the principal.

Cost estimation in the Department of National Defence is obviously important to the Government of Canada because the budget for the Department is in the order of tens of billions of dollars per year. A substantial portion of the

budget of the Department of National Defence is made up of discretionary capital expenditure. Furthermore, the majority of the capital expenditure is based on a relatively small number of major capital projects that are each over \$100M in total cost. These are highly visible and well-publicized projects. They represent a significant part of the defence capability and they are the showpieces of the Canadian Forces.

These major capital projects are complex and involve 'cutting edge' technologies. Therefore, they are risky and have historically suffered from cost overruns and delivery delays. There is evidence in the case studies that to get their projects approved the departmental program managers demonstrate 'optimism bias' suggesting that their projects would be less costly and less risky than they really are. The most extreme cases occurred during the pre-control era from 1945 to 1975 that were discussed in Chapter 3. In particular, the Arrow fighter aircraft, the Bobcat armoured personnel carrier, the Bonaventure aircraft carrier and the Bras D'or hydrofoil all exceeded their budgets by such a large degree that they were eventually cancelled with no military capability retained. The Canuck fighter aircraft and the DDH280 destroyers suffered similar problems but were completed and served the military admirably.

Performance measurement is the other aspect of rational management based on benefit-cost analysis. This idea was first brought to the attention of Government with the Glassco Commission in 1962. Theoretically, this can be related to the principal's problem of information asymmetry. The agent, which is the Department of National Defence in this case, knows more about how it conducts its business than the principal, which is the Government. Thus as was

seen during the Diefenbaker years, there have been problems with civilian control of the military. The subsequent Pearson Government brought with it a plan to unify the three military services and integrate the military and civilian components of the National Defence decision making system in an effort to bring the Department under control. They also borrowed from the United States by bringing in the Defence Program Management System which was developed around the principles of the Department of Defense Planning, Programming and Budgeting System.

After the procurement scandals in the pre-control era, there was a subsequent 'rust out' of the Canadian Defence equipment base but the Department of National Defence was able to utilize performance measurement methods to its advantage in the 1975 Defence Structure Review that laid out the rearmament program for the next 15 years. Performance measurement played a major role in ensuring that this plan was accepted by Cabinet.

In the late 1970's, benefit-cost analysis was making headway in Government institutions. In particular, the Auditor General of Canada became focused on 'value for money' which is based on both cost estimation and performance measurement. In the 1980's, the philosophy of 'new public management' became popular and there was renewed emphasis on Government accountability. This led in the 1990's to a policy called "Results for Canadians" and the addition of a Departmental Performance Report to the Estimates process that attempted to provide concrete examples of the successful uses of Government expenditure.

What is revealed about cost estimation and performance measurement by a principal-agent-monitor framework of the Government, Department of National Defence and the Auditor General? The view that emerged from the study of

over 20 individual cases is that the Government and the Department conducted an 'efficient exchange' most of the time. The Auditor General found reasons to criticize the Department of National Defence in its cost estimation and performance measurement but the Government protected the Department of National Defence because it was providing services to the Government, primarily in the form of industrial and regional offsets but also by keeping defence spending under control.

For the rearmament period of the late 1970's and early 1980's, the Government introduced a policy of a fixed-price ceiling and off-the-shelf equipment buys. This meant that most of the equipment would be designed and developed outside of the country. To make this palatable to the Canadian public, the Government also brought in an industrial and regional benefits policy where companies bidding for acquisition programs would have to demonstrate that they would invest a considerable amount of money in Canadian industry. This would create high-paying jobs for Canadians and buy votes for the Government. Meanwhile, the Department of National Defence received new highly capable weapon systems that were interoperable with our allies.

There was also an 'efficient exchange' between the Government and the Department of National Defence during the downsizing period. There were a number of industrial bailouts conducted by the Government in which they stepped in to save troubled companies and industries by buying commercial equipment for military use. In this case, the Government saved high-technology jobs in various regions and industrial sectors while the Department of National Defence subsumed low capability commercial equipment and tried to convert it to military purposes.

During the privatization period, the 'efficient exchange' resulted from the alternative service delivery program. In this case, two Canadian Forces Bases, Portage-la-Prairie and Moose Jaw, were officially closed, and the departmental commitment to another base, Goose Bay, was reduced. This was a credit to the Government because their official payroll was reduced and public service jobs were privatized but there was limited negative economic impact because no unemployment was created. In exchange, the Department of National Defence received a long-term commitment to its pilot training programs and acquired new training aircraft without having to spend capital money or go through a lengthy competition of a major capital project with its inherent Treasury Board and Cabinet supervision.

In the area of performance measurement, there was an 'efficient exchange' in which the Department of National Defence produced 'success stories' in its Departmental Performance Reports for which the Government could take credit. In exchange, the Department of National Defence obtained a degree of autonomy in how it conducted its operations and was able to close down its efforts to produce quantitative performance measurement, such as the expensive and time-consuming operational readiness and effectiveness reporting system.

During the War in Afghanistan, the Government fed off the desire of the public to see investment in self-protection for the military while overlooking the fact that the Department was Canadianizing the Chinook helicopter and not buying an off-the-shelf aircraft as it had promised.

In the case of the Maritime helicopter, the Government had cancelled the European Helicopter Industries EH-101. The Department of National Defence

went along with this decision by choosing the Sikorsky Cyclone, thus justifying the Government decision that the EH-101 exceeded the requirements. The Government then overlooked the fact that after the contract was signed the Department of National Defence upgraded the Sikorsky aircraft above the original specifications.

Throughout this dissertation, we have seen that the Auditor General repeatedly finds fault in these 'efficient exchanges'. The Auditor General takes a narrow view of 'value for money'. That is, the Auditor General seems to be examining simply the military capability that is obtained for the dollars expended. The policy implications of the departmental acquisitions are not within their purview. The Government, on the other hand, is taking a wider view of 'value for money' that includes its mandate to support the Canadian public through departmental expenditure. This can be seen most clearly in the priority that is placed on industrial and regional benefits and industrial bailouts. However, it can also be seen in the need to demonstrate 'success stories' and the importance of supporting the military in the War in Afghanistan.

Thus, the Government has used incentives to obtain 'goal alignment' between their desire to get re-elected and the Department of National Defence's desire to obtain military capability and management autonomy. The Auditor General has had relatively little impact on the behaviour of the Department of National Defence because the Government has tried to protect them from criticism and scandal.

In the process of studying the Department of National Defence from the principal-agent-monitor perspective, it was possible to consider the quality of departmental estimates of cost as well as performance in the capital programs from 1975 to 2010 as reported by the Auditor General. Several patterns in this esti-

mation were observed. The general conclusion is that the Department of National Defence is typical of program managers in its 'optimism bias' and consistently underestimates cost and overestimates performance of its programs. This has resulted in cost overruns and performance shortfalls that were discovered by the Auditor General.

The Department of National Defence 'gamed' the Government in its cost estimation processes because the fixed-price ceiling created a number of problems for them. They had difficulty estimating the cost of the equipment ahead of time. The first 'game' discovered by the Auditor General was 'buy in'. In this situation, the Department of National Defence would gain approval for a project with a small program and then after approval is obtained would add capabilities that increase the 'true' cost of the program. The second 'game' discovered by the Auditor General in cost estimation was 'low balling' in which, encouraged by the Department of National Defence, the manufacturer originally bids low to win the contract then once it is in a monopoly situation tries to make up for losses by charging exorbitant amounts for spare parts and contract modifications. The final cost estimation 'game' that was identified by the Auditor General was the payment of capital expenses out of the operations and maintenance budget.

In discovering and reporting these 'games' played by the Department of National Defence, the Auditor General was fulfilling a valuable role as monitor for the Government. On the other hand, the Government often protected the Department of National Defence from criticism by the Auditor General because the Government was obtaining valuable political points through the Department's capital programs in terms of industrial and regional benefits. Thus, the Government

could use the Auditor General's reports as a tool to keep costs 'in check' while still using the Department of National Defence's capital programs to create jobs and address regional issues to buy votes.

In summary, this dissertation has examined the ability of the principal (the Government) to control the agent (the Department) through both incentives and monitoring. It has been demonstrated that spending on capital programs has worked quite effectively in the sense that there has been 'goal alignment' between the Government and the Department when they are able to make an 'efficient exchange'. The value of the Auditor General as a monitor in this dynamic has been less effective at controlling the Department of National Defence. The Auditor General continues to find fault in the Department's 'value for money' decision making. There is evidence that the Auditor General may be taking too narrow a view of 'value for money' to be an effective evaluator of the Department of National Defence's actions both socially and from the Government's perspective. The fact that the Auditor General reports to Parliament and not to the Government may be part of the explanation for its relative ineffectiveness. The next section of this dissertation will discuss the counterfactual situation that might occur if the Auditor General reported to the Government instead of Parliament.

## **6.2 A Counterfactual**

To provide a basis for examining the counterfactual situation of the Auditor General reporting to Government rather than Parliament, four cases will be examined: the pre-Henderson era, the United States Systems Analysis Organization, the current situation with the Privy Council Office and the Treasury Board, and internal auditing. These four situations indicate that the counterfactual situation

of the monitor reporting to Government rather than Parliament is not completely impossible.

The pre-Henderson era is well described by Ward (1962). He notes that, in the pre-Henderson era, the Office of the Auditor General was a small organization of career public servants. Their primary focus was financial indiscretions of departmental public servants. They had no mandate or interest in policy issues, 'value for money' audits or performance audits. They concentrated on looking at the records. When they found a problem in which a public servant was indiscreet with money, the appropriate Government manager was informed and it was handled quietly, avoiding controversy and publicity for the most part. The career path of the Auditor General was within the public service and there was a fair amount of co-operation between the Government politicians, the Departmental leadership and the Auditor General.

The second case of the systems analysts in the United States Department of Defense is well-described by Enthoven and Smith (1971). This case is particularly relevant to the situation of defence departments. In 1960, the Secretary of Defense, Robert McNamara, brought in a large number of economists from the RAND Corporation with expertise in the military to evaluate the decision making processes in the United States Department of Defense. These analysts conducted a serious 'challenge function' on major military programs. They had the mandate and ability to determine 'value for money' in an economic sense. They had a significant impact on the monitoring of decisions primarily because they had the confidence of the Secretary of Defense as the principal. President Johnson was so impressed with these systems analysts that he attempted to translate their capabilities outside

the defense department and make them a Government-wide process for Planning, Programming and Budgeting.

More recently, Good (2007), building on Wildvasky (1964), noted the Canadian Government institutions that play in the current game of 'spenders' and 'guardians'. Lagasse (2010) examined the particular situation of civilian control of the military in Canada. In both of these works, the role of the Privy Council Office and the Treasury Board is emphasized. The Privy Council Office has a direct link to the ultimate principal represented by the Prime Minister. Through this link, they can take a much wider view of 'value for money' in Government expenditure on defence compared to other Departments. The Treasury Board is the gate-keeper for Cabinet overseeing major capital projects of the Department of National Defence. Therefore, they have a significant role to play in the quality of the arguments made by the Department of National Defence for investment in their capital programs. As both Lagasse (2010) and Good (2007) state the Privy Council Office and the Treasury Board provide a counter-weight for the Government when it comes to the Department of National Defence's proposals.

As the fourth case, the internal auditor organizations can be examined as a proxy to the situation of the Auditor General reporting to Government. The departmental internal auditors have a limited viewpoint. However, they may have specific training and expertise inside their Department which helps them understand their Department's internal processes. Currently, their work is directed by senior bureaucrats of their Department based on internal priorities. If their mandate was given by the political leaders rather than the bureaucratic leaders, they could serve as a valuable monitor for the principal.

By looking at these four cases related to the situation that might occur if the Auditor General reported to Government instead of Parliament, it can be seen that there are a number of significant advantages that might be obtained from the principal's point-of-view.

First, by being inside of the Government decision making process, the monitor would have more of an incentive to consider 'value for money' from the point-of-view of Government. That is, they would have an incentive to take the political considerations of the Government into account. They would look more favourably on the 'efficient exchange' between the Government and the Department of National Defence. The Government would get its desired job creation, 'success stories' and budget controls without the questions arising about 'value for money'.

Second, there would be more directed audits because the Government could control what the monitor is focusing on. Particular problem areas for the Government could be examined rather than the relatively random and 'free-wheeling' approach that is done in the current auditing process. For example, a monitor that reported to Government rather than Parliament could focus on the particular 'games', such as 'buy in', 'low balling' and transfer of money between the capital and operations and maintenance budget, that are being played by the Department of National Defence in terms of cost estimation, performance measurement and industrial and regional benefits without creating the scandals that currently result from the Auditor General's Reports to Parliament. As Lagasse (2010) suggests these internal monitors, because they have the interests of the Government in mind and because the positions could be filled with people with specific skills in military affairs, could counter the information asymmetry of the

Department of National experts. The audits could potentially have more impact because the Government would take more interest and the findings would be more focused and the audits more 'sensible' from the Government's point-of-view.

Third, the consequences of a lack of co-operation by the Department of National Defence with the monitor would be more severe if the Government truly wanted the information gathered. The Government would not need to protect the Department of National Defence against the monitor as they do now because the possibility of embarrassment in the House of Commons would be much reduced. Thus, it would be expected that the Department of National Defence would be more forthcoming with relevant information for the audits.

One would expect that there would be some backlash from the Department of National Defence, and in particular the military component, about this type of auditing by a civilian agency that 'has the ear' of Government (Hillier, 2009). Thus, the monitor would need to maintain the confidence of the principal and provide a unique service. As suggested by Brehm and Gates (1997), if the principal makes an agreement with the agent of mutual benefit, an 'efficient exchange' in which the principal and the agent's goals are sufficiently aligned, it may not need or may not utilize the monitor's information.

It should be noted that 'efficient exchange' between the Government and the Department of National Defence does not imply that this type of agreement is 'socially efficient'. With regards to 'social efficiency', the current position of the Auditor General's view of 'value for money' may be better for the country as a whole. They can be seen as interested in obtaining the 'right' amount of Defence for the 'right' price. They attempt to 'root out' inefficiencies in the process. If the

Auditor General reported to Government and not to Parliament but took a position that 'social efficiency' was the emphasis of their work, they would be critical of job creation that was the result of inefficiency in the production processes. They would probably emphasize 'free trade' rather than the development of an inefficient defence industrial base. This would likely put their goals at odds with those of the Government and their recommendations would be 'buried'. Their mission would be fraught with the well-known difficulties of 'speaking truth to power'. Thus the position of the Auditor General reporting to Parliament rather than Government on the issue of 'value for money' may be more effective in many ways for 'social efficiency' than the alternative of the monitor reporting to the principal directly. Whereas today the Auditor General has a significant Opposition bias, if the Auditor General reported to Government instead of Parliament, this would result in the opposite problem of incumbent bias. If the Reports to Government by the Auditor General were publicly available, they would be of limited value because they would likely be similar to the situation with the Departmental Performance Reports (i.e. always glowing). If the reports to Government were not publicly accessible, then if they did not align with Government goals they would be easily ignored.

Therefore, there are pros and cons with the monitor reporting directly to the principal. It might resolve some problems in the current system such as the unnecessary scandals associated with the 'efficient exchange' between the Government and the Department of National Defence. On the other hand, it would not necessarily address the 'social efficiency' problem of defence in Canada because the manner in which the Government uses defence expenditure to create jobs in Canada is socially inefficient even though it is a political necessity. In conclusion,

the optimal structure between the principal, the agent and the monitor in the situation of Canadian defence is hardly evident.

### **6.3 Evaluation of the Principal-Agent-Monitor Framework**

In this section, the usefulness of the principal-agent-monitor framework in the examination of cost estimation and performance measurement in Canadian Defence will be discussed. This will lead to some suggestions about future directions that might be studied. First, the benefits of using the principal-agent-monitor in this dissertation will be identified. Then the additional complications that surround the institutionalization of the actors will be examined. Alternative frameworks in terms specifically of multiple agents and multiple monitors will be investigated. Finally, the meaning of the efficient exchange will be made explicit and differentiated from the concept of social efficiency.

In this dissertation, the principal-agent-monitor framework has been a useful method of examining the key pieces of information concerning capital procurement in Canadian defence. In particular, it brings into focus the nature of the 'games' that are played by the Department of National Defence such as 'buy in' and 'low balling' that were first identified in the United States Department of Defence. It attempts to answer the question of why, even though the Department of National Defence has been playing these games to a greater or lesser extent since 1945 as documented by the Auditor General in its role as monitor, the Government as the principal has not seen fit to stop this type of behaviour. Evidence is presented of an 'efficient exchange' in the Pareto sense between the principal and the agent with respect to these games played by the Department and the protection of the Department from scandal. Both players are getting what they want most (i.e.

potential re-election and new military equipment). As a minimum, it can be said that they are mutually benefiting from this exchange to such an extent that they ignore the potentially useful information provided by the Auditor General as the monitor about 'value for money'.

The major complication with this principal-agent-monitor framework involves the institutional arrangements related to the Auditor General as the monitor. In particular, the Auditor General's Act institutionalized the long-standing arrangement that the Auditor General reports to Parliament on the economy, efficiency and measures of effectiveness of Government programs. One could formulate an argument that Parliament is the principal and Government is the agent of Parliament and the Auditor General is the monitor of Government on behalf of Parliament. Parliament must accept the Government but can overthrow it with a non-confidence vote. All laws must be approved by Parliament to take effect.

The reason that Government was chosen as the principal in this dissertation's framework is that Government develops policy, while departmental agents adopt and implement policy on behalf of Government who directs its administration. In Canada, in the period under study, the governing political party has most often been in a majority. Thus, Parliament has less ability to overthrow Government and thereby control it. This has given Government some power to control the agenda of Parliament for long periods of time. Whether we consider Parliament or Government as the principal, they are not too dissimilar in their control over the departmental agents.

The second major issue with the principal-agent-monitor framework used in this dissertation is that the players are taken as unitary. There are in fact mul-

multiple principals, agents and monitors even without considering Parliament. For example, the Prime Minister, the Privy Council Office, Cabinet, and the Minister of National Defence, all play a role in policy development for the principal and they may be more or less strongly influenced by ideologies related to defence. The Minister of National Defence, the Deputy Minister and the Chief of Defence Staff are used throughout this dissertation as a single agent. However, a good case can be made that these individuals have quite different motivations and career goals. In fact, the so-called 'adversarial' nature of decision making in National Defence Headquarters may be a major advantage to the Government as the principal because they can use the self-interest of these players to check each other and thus 'divide and conquer'. Therefore, the claim by Paul Hellyer that unification of the Canadian military would improve the advice he was being given by his military staff because they would now be loyal to a single force rather than individual services is probably mistaken. This is borne out in the many case studies from the period after unification in this dissertation.

There are many monitors that could have been examined in this framework. In fact, a strong case can be made that the Auditor General was not the best choice as the monitor for the Government principal and that the principal is better served by the internal monitors that they have at their service, such as Treasury Board, the Privy Council Office, the Department of Foreign Affairs and International Trade, Industry Canada, Department of Finance and the Department of Justice. Evidence was found that these agencies have some significant knowledge of military affairs that the Government can use as a counter-weight in interactions with the civilians and military in the Department of National Defence.

Although not part of the research question examined in this dissertation, one could speculate about the relationship between the efficient exchange identified between the Government and the Department of National Defence and the social efficiency that the Auditor General claims to be interested in in their 'value for money' audits. First, this dissertation does not attempt to quantify the costs and benefits of investment in capital procurement for Canadian defence and neither does the Auditor General. The Auditor General claims that he or she is only interested in whether measures of effectiveness of Government programs are in place, not whether Government programs are effective. This makes their work easier since there are many problems with performance measurement methodology. Furthermore when measures of performance are made available, the Auditor General will not hesitate to question whether these represent 'value for money' no matter that alternative ways to spend that money are not considered. It is clear that the only way that cost and benefits of Government programs can be quantified is by comparison of alternatives and that decision is based on Government policy which is not in the purview of the Auditor General's examination.

The concept of efficient exchange presented in this dissertation is in the Pareto sense that a mutually beneficial arrangement is arrived at between the principal and agent in the game of capital procurement for Canadian defence. Nothing is said about externalities or alternative uses of the defence expenditure. Therefore, nothing can be said about social efficiency. The extent of this efficient exchange is such that it is difficult to measure the amount of movement towards Pareto optimality that each player obtains. However, it is clear that both players are able to move to some extent in a desirable direction through this exchange. The only signs that problems are occurring in this efficient exchange are when scandals

become public because of departmental resistance to Government initiatives or Government indifference to departmental needs. These scandals have been seen often during the period under study in this dissertation and the public awareness of these 'game failures' has been assisted by the work of the Auditor General.

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