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to the House of Commons

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Chapter 5

Maintaining and Repairing Military Equipment—National Defence

Office of the Auditor General of Canada

The Fall 2011 Report of the Auditor General of Canada comprises Matters of Special Importance, Main Points—Chapters 1 to 5, Appendices, and five chapters. The main table of contents for the Report is found at the end of this publication.

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Chapter

5

Maintaining and Repairing Military Equipment—National Defence

Performance audit reports

This report presents the results of a performance audit conducted by the Office of the Auditor General of Canada under the authority of the *Auditor General Act*.

A performance audit is an independent, objective, and systematic assessment of how well government is managing its activities, responsibilities, and resources. Audit topics are selected based on their significance. While the Office may comment on policy implementation in a performance audit, it does not comment on the merits of a policy.

Performance audits are planned, performed, and reported in accordance with professional auditing standards and Office policies. They are conducted by qualified auditors who

- establish audit objectives and criteria for the assessment of performance;
- gather the evidence necessary to assess performance against the criteria;
- report both positive and negative findings;
- conclude against the established audit objectives; and
- make recommendations for improvement when there are significant differences between criteria and assessed performance.

Performance audits contribute to a public service that is ethical and effective and a government that is accountable to Parliament and Canadians.

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Maintaining and Repairing Military Equipment—National Defence

Main Points

What we examined

National Defence and the Canadian Forces own, operate, and are responsible for maintaining and repairing military aircraft, ships, and land vehicles costing more than $30 billion. In 2009–10, National Defence spent more than $2 billion to maintain and repair its military equipment. This included expenses for routine inspections, preventive maintenance, corrective repairs, spare parts supply, periodic repair and overhaul, engineering changes, and other related tasks.

Thousands of personnel are engaged in maintenance and repair activities, which include everything from turning wrenches on bases or while deployed on missions to engineering, logistics and spare parts management, training, contracting, and administrative support.

We examined how National Defence allocates and manages financial resources for the maintenance and repair of its military equipment. We also examined its approaches to contracting for maintenance and repair services.

Audit work for this chapter was substantially completed on 30 April 2011.

Why it's important

To undertake training and to meet assigned missions safely and successfully, military equipment must be kept in good working condition and be ready for action on short notice. How National Defence allocates the funds available—and the reliability of the information it uses to support short- and long-term decisions—is critical to the ability and readiness of the Canadian Forces to meet their assigned missions.

Military spending on maintenance and repair also makes a significant contribution to the Canadian economy every year. Many Canadian companies depend on it for a portion of their business. According to the 2008 *Canada First* Defence Strategy, the government plans to spend $60 billion on new military equipment over 20 years and $140 billion for spare parts, maintenance, and training.

Over the last decade, National Defence has made sweeping changes in its approach to contracting for maintenance and repair of both existing and new equipment. The changes transfer much of the responsibility to the private sector, with significant implications for National Defence and Canada's defence industry. The new contracting approach for existing equipment was intended to reduce the Department's contract management activities and costs by bundling hundreds of short-term maintenance contracts into a few longer-term contracts. The approach for new equipment goes even further, awarding both the acquisition and the long-term maintenance and repair contracts to the original equipment manufacturer or supplier. The Department has identified significant risks in this approach, including limited flexibility if requirements change over the life of the equipment, dwindling maintenance and repair skills and expertise in the Canadian Forces, and total dependence on one supplier for each fleet.

What we found

- Overall, National Defence has planned and managed the maintenance and repair of military equipment to meet operational priorities in the short term. The annual process of allocating available funds provides an effective forum to discuss priorities, with wide participation of those responsible for maintaining and repairing military equipment and those who need it for operations and training.
- National Defence's ability to meet training and operational requirements over the long term is at risk due to weaknesses in implementation and oversight of its contracting approaches for maintenance and repair, deficient management information systems, and the lack of sufficient cost and performance information.
- The Department has not taken the actions or provided the central resources and oversight required to support the implementation of its new contracting approaches successfully. The lack of concerted action and follow-through on the new contracting approach for existing military equipment has resulted in slower and more limited implementation than planned. As a consequence, National Defence has lost opportunities to derive the potential benefits of improved performance, improved accountability, and reduced costs. In addition, National Defence is not adequately monitoring and mitigating the significant risks created by its approach for new equipment.
- There are long-standing deficiencies in information management systems used to support decision-making for maintenance and repair activities, first raised by us in a 2001 audit. As a result, National Defence lacks complete, reliable, and integrated

information on the total actual costs of maintenance and repair, because some of the costs—salaries and infrastructure, for example—are not captured in its asset management information systems. The absence of this information impedes its ability to make informed decisions about the life-cycle management of its fleets or to determine whether it is putting enough funds each year into maintenance and repair. In 2001, National Defence expected to fully implement an integrated asset management system by 2004. The Department now expects a new system to be introduced on all Canadian Forces bases by mid-2012. Fully implementing this new system will likely take many years.

- There is a significant gap between the demand for maintenance and repair services and the funds made available. In addition, National Defence has indicated it is likely that its long-term investment plan for new equipment has allocated insufficient funds for equipment life-cycle costs. Although National Defence knows that postponing maintenance and repair tasks creates future risks—such as reduced availability of equipment, more laborious and expensive repairs, and reduced life expectancy of military equipment—the Department does not regularly monitor these impacts. Consequently, it does not know the specific long-term impacts of the funding gap on operations and training activities.

The Department has responded. The Department agrees with all of our recommendations. Its detailed responses follow the recommendations throughout the chapter.

Introduction

5.1 The *Canada First* Defence Strategy, released by the government in 2008, defines six core missions that the Canadian Forces must be prepared to undertake in Canada or abroad. Based on these missions, National Defence determines the capabilities that it needs to develop and sustain. To a large extent, sustaining these capabilities depends on **military equipment** being kept in good working condition and at a certain level of **readiness**. Effectively planning, supporting, and executing maintenance and repair activities for military equipment is therefore crucial to the Canadian Forces' ability to meet their core missions.

Military equipment—In this report, military equipment refers to ships, submarines, airplanes, helicopters, and land vehicles (armoured or not, wheeled or tracked) used by the Canadian Forces for training and operations. This equipment is also sometimes referred to as weapon systems. Each equipment or weapon system is made up of a number of subsystems (engines, radars, guns, radios, etc.), which consist of different parts. Military equipment is managed as a fleet when there are many ships, aircraft, or vehicles of the same model.

Readiness—A measure of the ability of a Canadian Forces unit to undertake an approved task. Readiness includes several aspects, including personnel, training, and equipment. National Defence establishes readiness standards or targets for most of its military equipment. This chapter focuses on equipment.

5.2 National Defence and the Canadian Forces own, operate, and are responsible for maintaining and repairing military equipment costing more than $30 billion that is used for domestic and international operations and training. This military equipment includes 4 submarines, more than 30 large ships, over 350 aircraft, and about 9,000 military land vehicles. Maintaining and repairing all this equipment involves thousands of civilian and military personnel and many private sector firms in a diverse and often complex set of activities.

5.3 Military spending on maintenance and repair makes a significant contribution to the Canadian economy every year, and many Canadian companies depend on it for a portion of their business. If current trends continue, this contribution could increase in the future as more and more responsibility for providing maintenance and repair services is transferred to private sector firms in Canada and abroad. As announced in the 2008 *Canada First* Defence Strategy, the government plans to spend $60 billion on new military equipment and $140 billion on spare parts, maintenance, and training over 20 years.

Maintenance and repair activities, responsibilities, and budgets

5.4 At National Defence, maintenance is a preventive, scheduled activity that is intended to reduce the probability of equipment failure and extend the life of the asset. Repair is an activity that restores an item to serviceable condition by correcting faults or replacing unserviceable pieces with new, overhauled, rebuilt, or reconditioned components. Repairs are unpredictable and are thus more difficult to plan for and forecast than maintenance activities.

5.5 In the 2009–10 fiscal year, National Defence estimated that it spent just over $2 billion to maintain and repair its military equipment. This included expenses for routine inspections, preventive

maintenance, corrective repairs, spare parts supply, periodic repair and overhaul, retrofits, engineering changes, preparation for special operations, and other related tasks. This amount did not include the salaries of personnel or the costs of infrastructure used to maintain and repair military equipment. The full spending on maintenance and repair activities is thus greater than $2 billion.

5.6 The useful life of military equipment can sometimes extend more than 40 years from initial acquisition to final disposal. Maintenance and repair activities are categorized by National Defence into four different lines of work, based on their level of complexity and the time required to complete them. These activities can be performed by Canadian Forces technicians or by private sector firms:

- Simple and short-term preventive maintenance and minor repair activities (first- and second-line) are carried out relatively frequently by civilians and military personnel on bases across the country or in the field. These tasks are typically completed within 24 hours.
- Lengthier and more complex inspection, major repair, or complete equipment overhaul activities (third- and fourth-line) are centrally managed by the Assistant Deputy Minister (ADM) for Materiel, and are executed by the Department or by the private sector in specialized facilities. These tasks can take days, weeks, or months to complete.

5.7 These maintenance and repair activities are supported by equipment program management divisions that report to the ADM for Materiel. These divisions are responsible for the life-cycle management of aircraft, ships, and land vehicles; they identify maintenance and repair needs for each fleet, provide engineering and technical support, manage upgrade programs, and ensure that sufficient stocks of spare parts are purchased and made available to maintenance and repair technicians on a timely basis. Considerable variations exist in the specific ways that the Army, Air Force, and Navy carry out maintenance and repair for their equipment.

Findings from previous audit

5.8 We reported on National Defence's maintenance and repair activities in our 2001 chapter National Defence—In-Service Equipment. At the time, we observed that, in general, the information the Department needed to manage its maintenance and repair activities was often unavailable, incomplete, inadequate, or inaccurate. We also noted that budget restrictions, shortages of qualified

maintenance personnel, problems with spare parts supply, and aging equipment were having detrimental impacts on the Canadian Forces' ability to meet equipment readiness standards. Some training exercises and deployments had been affected by the unavailability of military equipment.

Changing approaches to maintenance and repair

5.9 Since our previous audit, National Defence has faced a number of circumstances that have changed the context in which maintenance and repair activities take place.

- **Increased pace of operations.** Canadian Forces have been deployed in Afghanistan since 2002, resulting in an increased pace of operations in the Army and the Air Force. This effort has accelerated the usage rates for various land vehicles and aircraft, increasing the need for maintenance and repair. In addition, deployment of qualified maintenance technicians to areas of operation abroad has meant that Army and Air Force units in Canada have had fewer technicians available to carry out maintenance and repair work.
- **Human resources challenges.** For many years, the Department has faced shortages of skilled employees in some maintenance and repair trades. In addition, cuts made in the 1990s to National Defence human resources have resulted in fewer employees who are responsible for planning, managing, and contracting maintenance and repair activities. The looming retirement of baby boomers and ongoing competition with the private sector for qualified personnel are further challenges in this area.
- **Increasing cost.** As they age, the cost of maintaining, upgrading, and repairing existing military fleets increases. In addition, modern replacements for old fleets usually carry more technologically advanced systems that cost more to maintain than the ones they are replacing. Total maintenance and repair costs over the complete life cycle of military equipment are often two or three times greater than the equipment acquisition cost.

5.10 In response to these and other challenges, over the past decade National Defence has explored new ways of meeting its maintenance and repair needs. In 2002, National Defence introduced the Optimized Weapon System Management (OWSM) program for existing military equipment and, in 2008, the In-Service Support Contracting Framework (ISSCF) for new equipment acquisitions. Consistent with practices in other countries, National Defence is increasing its use of

long-term, performance-based contracts with original equipment suppliers and/or specialized private sector firms. These new contracting approaches have meant sweeping changes for National Defence and its personnel, for federal departments (such as Public Works and Government Services Canada), and for the Canadian defence industry.

Focus of the audit

5.11 This audit examined whether National Defence planned and managed the maintenance and repair of its military aircraft, ships, and land vehicles to meet its operational and training requirements. More specifically, we examined whether the Department had

- appropriately allocated and monitored financial resources for the maintenance and repair of its military equipment to meet training and operational requirements; and
- appropriately established and implemented maintenance and repair contracting approaches for its military aircraft, ships, and land vehicles.

5.12 Our examination of the management of the various maintenance and repair funds covered the planning cycles for the 2009–10 and 2010–11 fiscal years. Our examination of contracting approaches covered the decade that has elapsed since our 2001 audit, because work on many of the long-term maintenance contracts that we looked at started in the early 2000s and is ongoing today.

5.13 More details about the audit objectives, scope, approach, and criteria are in **About the Audit** at the end of this chapter.

Observations and Recommendations

Allocation and monitoring of financial resources

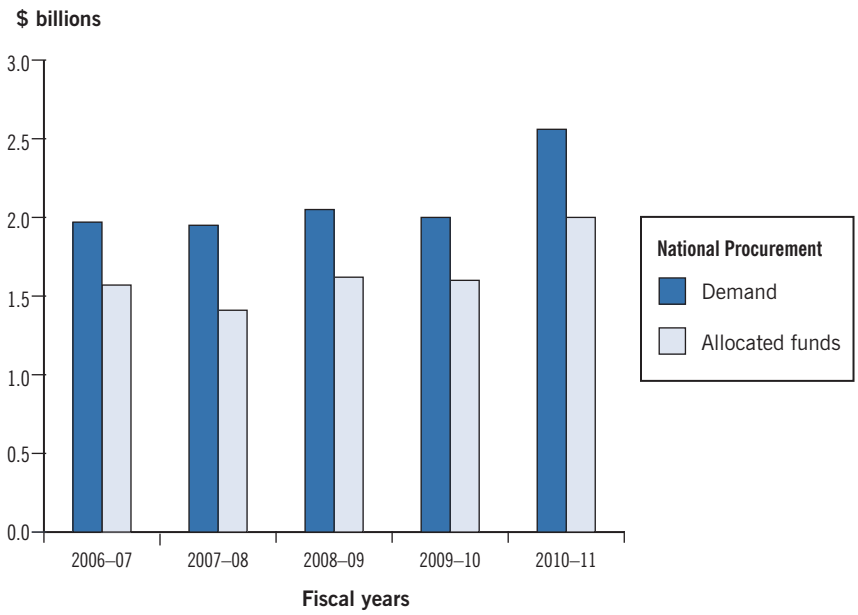
5.14 The ultimate purpose of maintenance and repair activities is to ensure that military equipment meets operational requirements in a cost-effective manner over its intended useful life. If adequate maintenance cannot be sustained, then, over time, a fleet can go from being very reliable to one that is struggling to meet operational needs. We examined whether National Defence appropriately allocated and monitored financial resources to maintain and repair its military aircraft, ships, and land vehicles to meet operational and training requirements.

5.15 Funds to maintain and repair National Defence's military aircraft, ships, and land vehicles come from different budgets within the

Department. The largest is the National Procurement (NP) budget, managed by the Assistant Deputy Minister (Materiel). This budget provides for the purchase of spare parts, maintenance equipment, and contracted services for third- and fourth-line activities, as well as limited first- and second-line activities. Although portions of the overall NP budget are allocated to the procurement of ammunition, common equipment such as clothing, and other miscellaneous purchases, this chapter is strictly concerned with the portion allocated to maintenance and repair activities. In the 2009–10 fiscal year, about $1.8 billion of the total NP budget was spent on maintenance and repair activities. The total amount allocated by the Department to the NP budget is not fixed. The amount specifically allocated for maintenance and repair fluctuates year to year. Exhibit 5.1 presents the NP allocations for the 2006–07 to 2010–11 fiscal years.

5.16 Over the past several years, funds allocated by National Defence did not cover the expressed demand for maintenance and repair activities. The size of the gap between demand and NP funding has been relatively consistent in recent years. The government noted in its 2008 *Canada First* Defence Strategy that the financial resources allocated to the NP budget covered only 70 percent of demand in recent years, significantly impeding the Canadian Forces' ability to train personnel and to maintain high readiness levels.

Exhibit 5.1 Allocated funds have not covered the cost of demands for maintenance and repair activities for the past five fiscal years



Source: Prepared based on National Defence documents

Financial resources for maintenance and repair activities were allocated to priorities

5.17 According to the Treasury Board of Canada Secretariat Guide to Management of Materiel (2008), effective planning and resource allocation are essential for delivering a program, for achieving value for money, and for sound stewardship. In this context, we examined whether the Army, Navy, and Air Force equipment program management divisions had established priorities for maintenance and repair of their military equipment, and whether National Defence had allocated financial resources based on these priorities.

5.18 The annual planning cycle for the NP budget is an elaborate process that involves many individuals and different organizations within the Department, under the leadership of the Materiel Group. The objective of this process is to allocate available funds among the different maintenance and repair activities. At the beginning of the planning cycle, the equipment program management divisions of the Air Force, Army, and Navy are notified of a preliminary amount of NP funding (known as the planning allocation), which they subsequently allocate to their various fleets. Specific needs and their level of priority are then reviewed by various planning committees, and included in a business plan. These business plans provide estimated cost demands for each priority, expressed by fleet. The demands are based on historical usage, planned usage, and known and anticipated special requirements.

5.19 The business plans feed into the deliberations of the National Procurement Oversight Committee. The Committee's mandate is to provide strategic advice and make recommendations to the National Defence Program Management Board—a committee of the most senior managers who provide advice and guidance on resource management—on major NP activities, plans, and policies and to facilitate their implementation. The final decisions on NP allocations for the next fiscal year are taken by the Defence Finance Committee, an advisory body that provides high-level strategic financial guidance to the Deputy Minister.

5.20 Overall, in our view, the NP planning process provides an effective forum for discussing needs and priorities with a wide range of personnel responsible for maintaining and repairing military equipment, as well as those who use such equipment for operational and training purposes. We found that the equipment program management divisions of the Army, Navy, and Air Force had each defined their maintenance and repair priorities in their respective business plans for the 2010–11 fiscal year.

The final allocation decisions generally reflected these priorities. The business plans also identified the potential impacts of not funding their priority activities, such as reduced purchase of spare parts, deferred maintenance and repair activities, and reduced operational output (for example, flying hours).

5.21 During the year, circumstances can change, and some planned activities may be either postponed or cancelled. In response, financial resources must be reallocated and used before the end of the fiscal year; otherwise, they will lapse. We observed that processes are in place to reallocate funds that become available during the year. A review takes place regularly to assess the availability of funds, and to identify funds that are unlikely to be spent by year-end. In these cases, a decision can be made to cancel or to postpone an activity to a future year, and to reallocate the funds to another current-year activity. When funds cannot be spent before the end of the fiscal year, managers try to reallocate to other priority activities that can be rapidly undertaken before year-end. However, the reallocation of funds does not always result in complete spending by year-end. For the 2010–11 fiscal year, National Defence estimated that it was unable to spend $193 million of NP funding dedicated to maintenance and repair.

Total cost information on maintenance and repair is missing

5.22 The Treasury Board Policy on Management of Materiel (2006) requires that a materiel management information system be in place to collect and generate complete and accurate data on materiel assets. Such a management information system should be integrated with departmental financial information systems, and should support timely and informed materiel management decisions. We examined whether National Defence has an integrated asset management system to collect and use financial information required to support resource allocation decisions for its maintenance and repair activities.

5.23 To support informed decisions about where to allocate overall financial resources for maintenance and repair activities, National Defence must have, among other things, reliable information on the total costs of these activities. For example, having total cost information can help the Department determine whether it would be more cost-effective to assign maintenance and repair tasks for a given fleet to the private sector, rather than to retain the required in-house capacity. Having total cost information on specific fleets can also enable the Department to determine when it will become more cost-effective to replace a fleet, rather than to continue to maintain it. The need for reliable total cost information is heightened by the fact that

National Defence has indicated that it is likely that its long-term investment plan for new equipment has allocated insufficient funds for equipment life-cycle costs.

5.24 In general, assessing the total costs of maintenance and repair activities for the Department as a whole or for individual military fleets involves determining the costs of

- the salaries of all personnel (civilians, regular forces, and reserve forces) involved in planning and executing maintenance and repair;
- contracted services (which may include provision of spare parts);
- acquiring spare parts through the central Canadian Forces supply system or locally, through a base's budget;
- maintaining the required facilities; and
- specialized maintenance and test equipment.

5.25 While National Defence has tools to estimate the costs of maintenance and repair activities, we found that it does not track the total actual costs of these activities for the Department as a whole or for specific fleets. These costs cannot be readily determined, to a large extent because the Department has not yet put in place adequate information systems. For example, the salaries of most personnel are not captured by the Department's various current asset management information systems. Other maintenance and repair costs, like those related to infrastructure, are also not captured.

5.26 In addition to the NP budget, each Canadian Forces base dedicates a portion of its operations and maintenance budget to support first- and second-line maintenance and repair activities. These base expenditures add up to several hundred million dollars per year. However, because base-level maintenance and repair expenditures are not accounted for by fleet, exact figures are not available.

5.27 The National Procurement Oversight Committee has acknowledged the lack of good financial information for decision making. This issue is not new. In our 2001 audit, we concluded that National Defence needed to improve its management information systems, and the quality of data they contained. The Materiel Acquisition and Support Information System (MASIS) project, intended to fill this need, was launched in September 1999. At the time of our 2001 audit, National Defence had expected to fully implement MASIS across the Canadian Forces by 2004, and had indicated that it had made this implementation a priority.

5.28 By April 2010, MASIS had not been fully implemented across the Canadian Forces. It was then merged with the Department's Financial Management Accounting System (FMAS) to become the Defence Resource Management Information System (DRMIS). Although this merging represents an important step toward implementing an integrated asset management information system, its full potential will not be realized until all Canadian Forces bases have transitioned to the new system, personnel have been adequately trained, and analytical tools to derive useful trend information have been implemented.

5.29 National Defence now expects the DRMIS system to be introduced on all Canadian Forces bases by mid-2012. Based on the experience with MASIS, in our opinion, fully implementing DRMIS will likely take many years and will require sustained efforts on a priority basis. In the meantime, in our opinion, the absence of complete, actual, and reliable overall and fleet-specific cost information impedes National Defence's ability to make informed decisions regarding the allocation of funds for the maintenance and repair of its military equipment or to analyze options related to the life-cycle management of its fleets. Ultimately, the Department does not have a firm basis on which to determine whether it is putting enough funding into maintenance and repair activities each year. In our view, this lack of information, coupled with the funding gap, creates a risk that, over time, the Canadian Forces may not be able to maintain all of its current capabilities and therefore may be limited in the size and variety of missions it can undertake.

5.30 **Recommendation.** National Defence should ensure that it develops the ability to produce overall and fleet-specific total cost information for its maintenance and repair activities. These costs should include, at a minimum, expenses related to personnel, contracted services, spare parts, maintenance equipment, and infrastructure.

The Department's response. Agreed. Project Management Office (PMO) MASIS is rolling out Systems, Applications, and Products (SAP) in support of maintenance of weapon systems and equipment. The SAP system, called the Defence Resource Management Information System (DRMIS), is currently in place for over 90% of the Army and Navy, and approximately 10% of the Air Force. There are plans to implement DRMIS in the remainder of the Canadian Forces and this system has the capacity to meet the information requirements identified in this recommendation. This is planned for completion by December 2013.

The MASIS Phase V on-going project has integrated spares inventory with procurement, financial and maintenance engineering data under a single platform. This integration paves the way to equipment, fleet and overall cost reporting. As the implementation of MASIS progresses, personnel, spare parts and procurement costs are being captured. At this time, infrastructure cost is not captured in MASIS, but will be in the future as the Department continues to advance its Enterprise Resource Planning strategy and its SAP implementation.

In parallel, the Repair and Overhaul business process involving the management of the repair line will be assessed against best industry practices to determine the improvements required to optimize this part of the supply chain. This will take place prior to MASIS Phase V blueprinting for repairs and overhaul scheduled in the fall of 2011.

The Maritime equipment program management division is actively moving towards a class-focused program that will improve the ability to capture total maintenance and repair costs for each class of naval platform.

Finally, the work being conducted in developing costing tools and guidelines in response to the Auditor General's audit report on the Acquisition of Military Helicopters will also assist in meeting this recommendation.

National Defence needs better performance information

5.31 The Treasury Board Policy on Management of Materiel (2006) states that departments should ensure that their materiel management framework provides them with relevant performance information, and supports informed decision making. We examined whether National Defence collected and used the performance information it requires to support financial resource allocation decisions for its maintenance and repair activities.

5.32 National Defence does gather some information about the utilization rates or state of its military equipment. For example, the Air Force gathers data on the number of hours of flying per year, the Navy collects data on days at sea and state of readiness of each ship, and the Army measures the percentage of vehicles that are not serviceable.

5.33 The stated purpose of NP expenditures is to keep military equipment at a planned state of readiness. The primary indicator that National Defence uses to measure the performance of the NP allocations is the actual readiness status—that is, the current state of an item of equipment or a fleet measured against its expected readiness level. In our opinion, however, readiness status is not a meaningful or sufficient performance indicator for three reasons. First, quantifiable readiness targets do not exist for all fleets of military equipment. Also, whether or not readiness targets are being met is influenced by factors other than NP funding, such as the availability of personnel. Most importantly, readiness targets for many fleets are based on existing capacity and capability; they have been developed on the basis of what is achievable, not what is needed to meet expected mission and training requirements. In practice, over time, some readiness targets have been downgraded to meet the capacity that is affordable under available funds. In effect, this means that NP funding will generally be sufficient to meet readiness targets, because the targets are related to the availability of funds.

5.34 For maintenance and repair work that is contracted to private sector firms, National Defence sets and measures performance indicators, such as turn-around time for repairs, the availability of spare parts, and the reliability of repairs. In our view, these are the types of measures that National Defence could apply in its own operations. Although the Department has recognized the need to systematically measure the efficiency and effectiveness of its own equipment management activities, it does not currently do so. The Navy's equipment program management division is now developing a performance management framework that aims to measure support activities, such as provision of spare parts or engineering changes. The Navy expects the framework to help

- establish the link between maintenance and repair activities and the impact on the state of its fleets, and
- predict the future state of its fleets.

5.35 The above means that National Defence has limited capacity to assess the impact of its annual NP allocation decisions. Together with the lack of total cost information, this means that the Department does not have a firm basis for determining whether the same result could be achieved at less cost or if the same expenditure could achieve better results.

5.36 National Defence is aware that postponing maintenance and repair tasks has immediate consequences, and also creates the risk of future impacts. In 2008, it undertook a one-time study of the impact of the NP funding gap in previous years, which demonstrated that it has had serious impacts on the Air Force, Army, and Navy, such as

- backlogs of required work,
- fewer sea days and flying hours,
- reduced **availability** of equipment for training activities and operational requirements,
- more laborious and expensive corrective repairs, and
- reduced life expectancy of military equipment.

Availability—The proportion of time that a fleet of military equipment is in an operable state (not undergoing maintenance) in relation to the total operational time available during a stated period.

However, National Defence does not regularly conduct such studies and does not regularly monitor these impacts; consequently, it does not know the specific long-term impacts created by its estimated funding gap on operations and training activities.

5.37 **Recommendation.** National Defence should develop and implement a capacity to provide information on the performance and impacts of maintenance and repair activities, their effectiveness, and their efficiency within each of the Army, Navy, and Air Force, using common performance measures where possible.

The Department's response. Agreed. As noted in the previous response, PMO MASIS is rolling out the Defence Resource Management Information System (DRMIS) in support of maintenance of weapon systems and equipment, which will have the capacity to provide the information outlined in this recommendation. This implementation is planned for completion by December 2013.

Business Intelligence specific queries made available through MASIS Phase V enable some searches on equipment and environment-specific performance and measures. Further development is required to introduce advanced queries and tools to enhance this Department's ability to perform forward planning so that overall effectiveness and efficiency are improved. The Department is also pursuing work on the development of performance measures in the area of inventory management.

Contracting approaches for existing equipment

5.38 Treasury Board policies on risk management and management of materiel require federal departments to assess the risks to which their assets and program activities are exposed, and to implement cost-effective measures to control those risks. We examined whether National Defence had designed its contracting approaches to address the key risks to which its military equipment and its maintenance and repair activities were exposed, and whether it had appropriately implemented these approaches.

The Optimized Weapon System Management program was designed to address key risks

5.39 National Defence has historically relied on the private sector to maintain and repair various components and systems of its military aircraft, ships, and land vehicles, especially for third- and fourth-line activities. This work has generally been managed with contracts to private sector firms that get paid for the time and materials needed to complete prescribed inspections and repairs; this approach is known as the traditional approach. Because complex military equipment can have thousands of components, hundreds of contracts were sometimes required to maintain a single fleet. In the 1990s, the Department was managing thousands of these "time and materials" contracts every year. Following significant staff cuts in the mid-1990s, National Defence recognized that its traditional approach to contracting would no longer be sustainable, because it would not have the personnel needed to manage all the contracts.

5.40 During the same period, National Defence recognized that the traditional approach had often resulted in unsatisfactory performance and poor contractor accountability, which put at risk the availability of military equipment. For example, several contracted aerospace firms were often late in completing aircraft maintenance and repair activities, which diminished the availability of the aircraft for operations and training activities.

5.41 As it looked for solutions to these problems, the Department became interested in new contracting approaches employed by the militaries in the United States, the United Kingdom, and Australia to reduce costs and improve performance. Known as "performance-based logistics" and sometimes called "contracting for availability," these approaches set measurable performance targets (such as turn-around time for repairs, quality of work performed, and availability of spare parts) and provide financial incentives for private sector firms to meet or surpass these targets.

CC-130 Hercules

CP-140 Aurora

5.42 In 1998, the Air Force took the lead in designing a new contracting strategy for its main existing fleets. This effort led to the adoption of the Optimized Weapon System Management (OWSM) approach in 2002, with the intent to

- move from having many short-term contracts to fewer long-term contracts,
- decrease the number of civilian and military personnel needed to manage and execute maintenance and repair activities,
- transfer more responsibility to the private sector, and
- establish performance objectives for private sector firms and provide incentives to improve performance and reduce costs.

5.43 Exhibit 5.2 presents OWSM's main characteristics, as compared to the traditional approach. The Aerospace Equipment Program Management Division (Air Force) under the Assistant Deputy Minister (ADM) for Materiel was responsible for the development of the OWSM program. By bundling hundreds of traditional maintenance contracts under only a few OWSM contracts, and by offering incentives to private sector firms, the Department expected to improve the firms' accountability for performance. The OWSM directive also required internal project teams to generate 15 percent cost savings compared to the annual fleet support costs of their previous maintenance approach. Overall, we found that the OWSM contracting approach was designed to address the key pressures and risks facing the Air Force's maintenance and repair activities.

Exhibit 5.2 Two new contracting approaches have introduced significant changes within National Defence

	Traditional approach	Optimized Weapon System Management approach	In-Service Support Contracting Framework approach
Applies to	Many existing fleets	Several existing fleets	All new fleets
Number of contracts	Hundreds of support contracts per fleet	1 to 5 support contracts per fleet	1 support contract per fleet, established at fleet acquisition
Level of application	Component level (e.g. radar)	Major system level (e.g. avionics)	Fleet level (e.g. aircraft)
Contract type	Time and materials	Performance-based, with incentives; fixed price where possible	Performance-based, with incentives; fixed-price
Contract term	1 year	5+ years	20+ years
Required management resources	Large departmental management staff required	Moderate departmental management staff required	Smaller departmental management staff required

Source: National Defence

CH-146 Griffon

CF-18 Hornet

Implementing new contracting approaches for existing equipment has been slower and more limited than intended

5.44 In 2002, the OWSM program was to be applied to four Air Force fleets that could benefit from the new approach: they had high annual maintenance and repair costs and enough years of useful life left to justify the initial investments in the program. These fleets were the **Hercules** transport airplane, the **Aurora** maritime patrol airplane, the **Griffon** helicopter, and the **CF-18** jet fighter. The objective was to put in place by December 2005 nine contracts to support these four fleets. We examined whether National Defence had met its target dates for the establishment of these contracts. Where contracts were signed, we examined whether they included the required elements, as set out in internal guidance.

5.45 Three of the nine planned contracts were awarded by the original target date of December 2005 (Exhibit 5.3). According to National Defence, these OWSM contracts have led to performance improvements, such as faster maintenance turn-around times, increased aircraft availability, and improved management of spare parts. Two of the nine planned contracts were awarded in late 2010 and early 2011. As of April 2011, the remaining four contracts had yet to be awarded.

Exhibit 5.3 **Only three of nine contracts were awarded by the target date**

Aircraft	Type of contract	Contract awarded by target date of December 2005: date of award	Contract awarded after target date of December 2005: date of award	Contracts still not awarded as of 30 April 2011
CC-130 Hercules	Airframe	October 2005		
	Avionics			Contract pending
	Engines*			Contract pending
CF-18 Hornet	Airframe			Contract pending
	Avionics		October 2010	
	Engines			Contract pending
CP-140 Aurora	Airframe	June 2005		
	Avionics	June 2005		
	Engines*			Contract pending
CH-146 Griffon	All systems		January 2011	
Total		**3**	**2**	**4***

*The CC-130 Hercules and the CP-140 Aurora use the same engine model. A single engine maintenance contract is being sought for both fleets.

Source: Prepared based on National Defence documents

5.46 Although the five contracts that we reviewed generally included the expected OWSM contract elements, we found that the incentive and penalty clauses called for in the OWSM framework have so far been fully implemented only in the case of the Hercules **airframe** contract. Since the incentives in OWSM contracts are intended to drive better performance, which translates into increased availability of fleets, delays in their implementation mean that the expected program benefits will not be realized to their full extent.

Airframe—The structural components of an aircraft, such as fuselage, empennage, wings, and landing gear, but excluding propulsion (engines, rotor, or reactors), electronics systems, and any mounted weapon.

5.47 The Air Force established a board of directors to review progress on OWSM program implementation and related organizational changes. Housed within the Aerospace Equipment Program Management Division, the Board started operating in 2003 and met regularly in 2003, 2004, and 2005 to review progress and provide management attention and oversight. Meetings became less frequent starting in 2006, following the departure of the program leader, and the last one was held in February 2009. As a result, oversight by the Board has diminished.

5.48 Over the years, National Defence has identified several challenges that contributed to delays in the OWSM program implementation:

- **Resistance to change.** The OWSM approach entailed significant changes in the roles and responsibilities of officials working in equipment program management divisions. The required culture change has faced resistance and has been slow to happen.
- **Lack of capacity.** OWSM implementation required new, specialized skills for contract management that often did not exist in project teams. Training to develop the required skills was insufficient, and the high turn-over rate of military personnel did not favour skill retention within project teams. In addition, personnel numbers were often insufficient to undertake planned tasks.
- **Approval processes.** Completing the work necessary to seek approval from the Treasury Board of Canada sometimes took longer than planned. In 2009, National Defence was required to complete a study of the potential impacts on the projected CF-18 OWSM contract on Canadian small and medium enterprises. National Defence did not seek contract approvals until the study was completed in 2010.
- **Negotiations with private sector firms.** The OWSM approach was new for private sector firms, and they had to adapt to it, too. In certain cases, firms have been reluctant to adopt the new approach, and this reluctance has made negotiations more difficult.

5.49 We are concerned that a lack of capacity within the Aerospace Equipment Program Management Division and the reduced activity of the OWSM Board of Directors in recent years mean that current and planned OWSM contracts will not be completed and implemented as expected. Given that the Aurora, Hercules, and CF-18 fleets are all scheduled to be retired between 2014 and 2020, only a few years remain for the Air Force to derive benefits from the implementation of these contracts.

5.50 Of greater concern is the lack of concerted action across the Canadian Forces to implement new contracting approaches for existing equipment. The Navy and Army were facing similar staffing pressures as the Air Force a decade ago. Indeed, in 2004, National Defence's Materiel Group developed a concept for operations that aimed to provide consistency in rolling out an OWSM approach across the Canadian Forces. We could find no evidence that this concept was implemented. Neither the Navy nor the Army adopted a formal program or directive to require their equipment program management divisions to review or change their maintenance and repair contracting approaches. Rather, the decision to adopt or not to adopt a performance-based approach for a given fleet has remained the prerogative of the responsible equipment program management teams.

5.51 In one instance, an Army management team used a contracting approach similar to OWSM to support its several fleets of wheeled light armoured vehicles. As explained in the Case Study on a new contracting approach, the Army claims to have achieved positive results with the performance-based contract it set up for these fleets in 2004. The Navy also has some experience with long-term maintenance contracts for the maintenance of its minor vessels, including the Kingston class of maritime coastal defence vessels. However, these contracts were not performance-based, and did not include the incentive clauses that characterize OWSM contracts.

5.52 In our opinion, the lack of concerted action and follow-through has resulted in slower and more limited implementation than planned of the new contracting approach for existing military equipment and related contracts. Further, we believe that implementation has relied too much on the initiative of selected individuals. As a consequence, National Defence has lost opportunities to derive the potential benefits of improved performance, improved accountability, and reduced costs. Reducing costs, in particular, might have helped to reduce the financial gap between demands for maintenance and repair and available funding.

Case Study—A new contracting approach has led to improved availability of wheeled light armoured vehicles

The Army owns more than 1,000 wheeled light armoured vehicles of different models, including the Bison, the Coyote, the Light Armoured Vehicle III, and the armoured patrol vehicle. All of them entered service between 1990 and 2006.

Light armoured vehicle

Prior to 2004, the Army's maintenance and repair approach for these fleets was based on the traditional model: private firms were retained for third- and fourth-line services through time and materials contracts. This approach proved to be inefficient, creating a significant backlog of engineering issues.

In 2004, the Army applied principles similar to those of the Air Force's Optimized Weapon System Management program and awarded General Dynamics Land Systems–Canada (GDLS), a specialized Canadian defence company, a three-year sole-source, performance-based contract with two one-year options, for an initial maximum value of $392 million. Third- and fourth-line work was then centralized in two separate locations, with the Army's Montreal workshop depot kept as a strategic backup in the event that demand temporarily exceeded GDLS's capacity. In addition to carrying out maintenance and repair work, GDLS was responsible for managing suppliers and subcontractors, as well as for providing training to National Defence personnel.

The contract was renewed in 2008 for another five years, with 21 one-year options to be granted one year at a time if the company meets specified performance targets. The total maximum value of this second contract, over 26 years, is about $3.1 billion.

According to National Defence, the contract has resulted in significant performance improvements. For example, the percentage of on-time delivery for spare parts has increased from an average of 75 percent in 2006 to 94 percent in 2009, and the percentage of on-time repair and overhaul projects has increased from an average of 13 percent in 2006 to 97 percent in 2009. The observed reduction of delays has led to increased availability of wheeled light armoured vehicles.

Source: Prepared based on National Defence documents

5.53 Recommendation. National Defence should review its Optimized Weapon System Management (OWSM) concept for operations, formally assess whether OWSM should be pursued for other existing fleets, and document its decision for each fleet. For fleets where OWSM will be pursued, actions should be taken to ensure prompt and complete implementation in accordance with the Department's plans and priorities.

The Department's response. Agreed. National Defence will review the OWSM Concept of Operations and update it as required by July 2012. National Defence will then investigate the feasibility of implementing OWSM to other existing fleets.

Demonstrating cost savings is a challenge for the Optimized Weapon System Management program

5.54 One of the objectives of the OWSM program was to reduce the costs of maintenance and repair contracts. The program directive fixed a target of 15 percent savings on maintenance and repair contract costs for selected Air Force fleets. This potentially represented hundreds of millions of dollars in savings over many years. We examined whether the Air Force had achieved this target through OWSM program implementation.

5.55 In its 2009–10 Departmental Performance Report, National Defence reported that its OWSM approach had lowered fleet support costs. However, National Defence was unable to provide complete information to us to support this assertion, primarily because of the lack of reliable baseline cost information. As explained in paragraphs 5.27–5.29, National Defence has not yet fully implemented an integrated asset management information system that would provide it with the cost information it needs to do a before and after comparison. Other factors make comparisons difficult, including aging equipment, changing fleet size, the transfer of new responsibilities to the private sector, and the fact that the Department does not generally consider the cost of its own personnel's salaries when accounting for its maintenance and repair costs. In our opinion, implementing our recommendation in paragraph 5.30 would allow National Defence to develop reliable baseline cost information for its military fleets.

Contracting approaches for new equipment

5.56 In 2005, National Defence started to formally develop a contracting approach for maintenance and repair of new fleets of military aircraft, ships, and land vehicles. The resulting In-Service Support Contracting Framework (ISSCF) has been applied as policy under the Assistant Deputy Minister (ADM) for Materiel since July 2008, and became a departmental directive in August 2010.

5.57 The ISSCF has been developed with the intention of furthering the changes that began under the Optimized Weapon System Management (OWSM) program. Under the ISSCF, there is only one prime contractor per fleet, who is awarded both the acquisition and **in-service support** contracts to create a single point of accountability. The original equipment supplier is the prime contractor by default. The contracted in-service support period can extend up to 20 years, and the contract will include many fixed-price elements. Additional responsibilities, such as the ownership and management of spare parts,

In-service support—Activities required to sustain the operation of a military fleet over its lifetime, including engineering, training, inspection, maintenance and repair of equipment, and provision of spare parts.

and the management of all subcontractors, are transferred to the prime contractor. Exhibit 5.2 compares the ISSCF characteristics to those of the OWSM and traditional approaches.

5.58 The ISSCF has been formally applied within ADM (Materiel) since July 2008, although National Defence had applied some of the Framework's principles in several acquisition projects before then. Since 2008, two new military fleets have been acquired and subjected to the ISSCF process. Project teams within National Defence are currently working on the development of in-service support concepts, pursuant to the ISSCF, for numerous other planned equipment acquisitions.

5.59 The first of the two recent acquisitions is a new fleet of 17 CC-130 Model J Hercules transport planes, first contracted in 2007, and for which deliveries started in 2010. In this case, a contract amendment worth $723 million was awarded in 2009 to provide for maintenance and repair services until mid-2016. The Case Study on the Hercules fleets illustrates how maintenance arrangements for the Air Force's old and new Hercules aircraft have evolved over time.

5.60 The second recent acquisition is a new fleet of 15 Chinook helicopters, contracted in 2009, with first delivery expected in 2013. The acquisition contract for this fleet includes provisions for 20 years of in-service support. Pricing negotiations for these provisions are scheduled for completion in 2013; their estimated value is several billion dollars. Other acquisition projects are currently under way but, overall, experience with ISSCF implementation remains limited at this point.

While In-Service Support Contracting Framework's risks have been identified, mitigation measures are limited

5.61 By favouring the original equipment supplier as the prime contractor for maintenance and repair services, and by combining acquisition and support contracts into a single procurement process, the ISSCF significantly changes the procurement process for these services and introduces new risks, as identified by National Defence. We examined whether National Defence designed the ISSCF to address key risks related to its maintenance and repair activities, and whether it adequately assessed and managed the risks associated with the approach.

Case Study—The maintenance approach for the Hercules fleet has evolved over the years to meet changing needs

CC-130 HERCULES — Models E and H

National Defence has operated fleets of CC-130 Hercules transport aircraft for over 50 years. Various Hercules models have been used during that time. In early 2011, the fleet included 29 active aircraft of three different models. Models E and H were acquired in 1960 and 1996, respectively, and will be retired by 2012 and 2017, respectively.

For decades, National Defence has relied on a combination of in-house capacity and contracted services to maintain and repair its fleets of Hercules aircraft. First- and second-line work was usually carried out by National Defence staff, while third-line work was usually conducted by private sector firms under traditional time and materials contracts. National Defence managed the supply chain for spare parts and was responsible for engineering modifications and configuration management, among other tasks.

In the early 2000s, faced with declining fleet availability, National Defence decided to change its maintenance and repair approach for Models E and H, and made plans to transfer third-line work for the airframe, the engines, and the avionics systems to Optimized Weapon System Management (OWSM) performance-based contracts. The Department has since transitioned to the OWSM approach for airframe maintenance, but contracted work for the engines and the avionics systems is still managed under more than 20 traditional contracts.

The OWSM airframe contract was awarded in 2005 to Cascade Aerospace, a Canadian company, for five and a half years. Under this contract, worth about $423 million, the contractor has incentives to meet performance targets that are defined each year in an annual operating plan. Twice a year, a contract performance review board assesses the contractor's performance, and decides whether a performance bonus or penalties are warranted. In 2010, the contract was renewed for an additional five-year term, based on good performance results.

CC-130 HERCULES — Model J

In 2007, National Defence contracted Lockheed Martin, an American aerospace company, to provide it with 17 new Model J aircraft, which will gradually come into service between 2010 and 2012. This new Hercules fleet will be maintained under an In-Service Support Contracting Framework (ISSCF) contract. This in-service support contract, which has a maximum value of $723 million, was awarded to Lockheed Martin in 2009, and will extend until mid-2016, with potential optional years beyond that.

Under this contract, National Defence remains responsible for the first line of maintenance and portions of the second line, while the contractor has responsibility for the remaining second-line activities, as well as for all third-line maintenance and repair work for all systems. The contractor is also responsible for the supply chain, the management of all subcontractors, and in-service support for the Department's training facility. This arrangement provides National Defence with a single point of accountability for aircraft maintenance and repair.

When fully implemented, this contract structure will enable National Defence to hold the contractor accountable for aircraft availability. The contractor will be required to provide an annual average of 11.5 planes out of 17 (68 percent) per day. The contractor's performance will be measured against this standard, and once a year, this performance will be assessed to determine whether any of the penalties defined in the contract need to be applied. National Defence personnel will retain responsibilities for contract oversight and strategic decisions.

Source: Prepared based on National Defence documents

5.62 The ISSCF development started in 2005, supported by personnel who had experience with the OWSM approach. Essentially, National Defence developed the ISSCF as the logical extension of OWSM to apply to new acquisitions. We found that rather than conducting a new analysis of the risks to maintenance and repair activities, the Department accepted that the previously identified pressures and risks that gave rise to the OWSM program were still valid: traditional time and materials contracts did not promote innovation and high performance in industry, lacked sufficient accountability, were resource intensive for the Department to manage, and had proven to be operationally ineffective, often resulting in poor equipment availability.

5.63 National Defence acknowledges that the ISSCF is based in part on untested concepts related to long-term performance-based contracts, and reliance on a single point of accountability for maintenance and repair performance and fleet availability. The Department identified a number of new risks created by the ISSCF itself, recognizing that it could have unforeseen and unintended adverse consequences. These risks include

- loss of work traditionally conducted in Canada if ISSCF contracts are awarded to foreign suppliers;
- total dependency on one supplier for each fleet;
- reduced financial flexibility and ability to change requirements and priorities as needed, because of long-term, fixed-price contracts;
- loss of skills and expertise required to assess value for money and industry proposals, resulting from the transfer of responsibilities to the private sector;
- overpayment for services, especially in a **directed contract** situation; and
- uncertainty that the required culture change will be successful within federal departments faced with having to adapt to the new contracting approach.

Directed contract—A federal government contract awarded to a preselected contractor when the contracting authority can justify setting aside the requirement to solicit competitive bids.

5.64 The ISSCF includes some potential measures to mitigate these identified risks. While some of these measures are within National Defence's control, others, such as the ISSCF's call for developing a culture change plan for the Government of Canada, depend on the authority and collaboration of other federal organizations. And still others, such as the training of civilian and military personnel by the original equipment supplier, depend on industry. While some measures have already been acted upon, others are still at the planning stage, or will be implemented only when new acquisition contracts are awarded.

5.65 Although we recognize that ISSCF implementation is still in its early days, we are concerned that some risks may not be sufficiently mitigated by the identified measures. For example, a risk exists that long-term contracts could limit the Department's financial and operational flexibility to adapt to changing circumstances in the future. Inflexible, fixed-price long-term contracts for specific fleets may reduce the amount of funding available for other fleets. We asked the Department to provide us with more information on the discussions and analysis that were related to the risk of reduced financial flexibility. Officials told us that discussions had been held on this topic at senior levels, and that the ISSCF had been modified to require that contracts be flexible by including predetermined maintenance and repair costs for increasing or decreasing levels of equipment usage (for example, yearly flying hours). However, no detailed financial analysis was prepared to support the risk analysis in this area. Considering the potential consequences that a loss of financial flexibility in the National Procurement budget could have on the Department's military capabilities, we are concerned that a comprehensive financial analysis was not undertaken.

5.66 More importantly, while processes exist within National Defence to review in-service support concepts for individual projects, we are concerned that there is no departmental forum that provides oversight of overall ISSCF implementation, and that reviews risk mitigation over the long term. In our opinion, National Defence has not demonstrated that it is sufficiently monitoring and mitigating key risks, like the risk of losing important maintenance and repair expertise within the Department, nor is it providing sufficient assurance that these risks will be adequately mitigated. Reducing ISSCF risks will be important, given that most of the new major military equipment acquisitions planned under the *Canada First* Defence Strategy for the next two decades will be subject to ISSCF requirements.

5.67 **Recommendation.** National Defence should regularly review the In-Service Support Contracting Framework to update its assessment of risks as well as mitigation measures and their status. It should identify specific actions and responsibilities for doing this, and monitor progress on an ongoing and long-term basis.

The Department's response. Agreed. National Defence will examine the ISSCF's risk assessment and mitigation measures with a view towards identifying specific actions that might be warranted, and to establish an ongoing monitoring system by July 2012.

Insufficient resources and oversight threaten implementation of the In-Service Support Contracting Framework

5.68 The ISSCF has significant implications for National Defence beyond risk management. For example, implementation requires considerably detailed upfront planning by National Defence personnel, because they need to make projections over a 20-year period, and to consider different scenarios about future fleet usage and maintenance and repair needs. We examined whether National Defence had put in place actions and oversight mechanisms to ensure successful implementation.

5.69 To support implementation of the ISSCF by individual project teams, National Defence staff prepared an action plan in 2008. We found that this plan remains unapproved. In addition, because of a lack of assigned resources, many of its action items have not been undertaken or completed, such as

- developing a model ISSCF contract,
- drafting a contract performance management framework,
- preparing a procurement skills development plan, and
- rolling out a communication plan about ISSCF.

During the course of our audit, the central team responsible to support ISSCF implementation had only two members, only one of whom was assigned full-time.

5.70 Regarding oversight mechanisms, project teams for new acquisitions are required to submit in-service support concept proposals for new acquisitions to the Assistant Deputy Minister (ADM) for Materiel for approval. Any deviation from the framework requirements must also be approved. In practice, the proposals have been presented to the Management Group Program Management Committee (MGPMC) chaired by the ADM (Materiel).

5.71 To facilitate its oversight of individual proposals, in March 2009 the MGPMC directed that a project review committee be established for the purpose of independently reviewing in-service support concept proposals before they are submitted to the MGPMC. However, this did not happen. In its absence, there is no independent review process to assess in detail whether in-service support concept proposals comply with ISSCF requirements, and to ensure consistency in application.

5.72 We reviewed all six presentations made to the MGPMC by acquisition project teams between 2008 and 2011. We noted significant variations related to the level of detail they provided, and to the point in the acquisition process at which they were presented. In several cases, a support concept proposal was approved by the MGPMC, even though the project was still at the conceptual stage and neither the specific type of equipment, nor the manufacturer, had yet been identified. We found that there is no clear guidance about the proper timing for support concepts to be presented to the MGPMC or ADM (Materiel), nor about the need to return to MGPMC or ADM (Materiel) when project details are more fully known, or in the event of significant changes to a procurement project or an in-service support concept.

5.73 While the MGPMC reviews and approves proposals on a project-by-project basis, this committee is not dedicated solely to ISSCF implementation. As already noted, there is no departmental forum that provides oversight of ISSCF implementation, like the Board of Directors did for the Optimized Weapon System Management program.

5.74 Overall, we are concerned that limited central resources and oversight threaten the successful implementation of ISSCF. We do not believe that ISSCF implementation has received the attention and resources it needs. Our recommendation on the implementation of ISSCF is found at paragraph 5.79.

Coordination with other federal departments and Canadian industry needs to be strengthened

5.75 As noted in the Introduction to this chapter, the government plans to spend substantial amounts of money over 20 years on new military fleets and associated maintenance and repair. The Treasury Board Contracting Policy requires that contracting for goods and services be conducted in a manner that will support long-term industrial and regional development. Public Works and Government Services Canada (PWGSC), the department responsible for government contracts, and Industry Canada, responsible for industrial regional benefits, both have roles to play in the procurement of new military equipment. Thus, ISSCF implementation requires collaboration with these federal departments and others, as necessary, to ensure consistent and effective application.

5.76 National Defence is expected to have the technical expertise to draft statement of requirements or statement of work that will be used in contractual agreements. The management of a contract is typically

done jointly between National Defence and PWGSC to best benefit from the expertise of both departments. PWGSC, by contrast, is expected to ensure that its staff has the specialized skills required to draft complex performance-based contractual agreements, monitor them over long periods, and effectively challenge claims from contractors, especially in directed contracts, where the risk of paying higher prices is greater. In doing such work, PWGSC must work closely with National Defence. However, National Defence took no action to ensure that PWGSC would be able to support ISSCF implementation as intended. We also noted that, in the internal implementation action plan, resources have not been assigned to any of the identified actions that relate to working with other federal departments.

5.77 Beyond federal departments, the ISSCF also has potential implications for the Canadian defence industry. Current trends suggest that more and more responsibility for providing maintenance and repair services is being transferred to the private sector. Thus, it is important that National Defence both understand and support industry capacity. In the course of developing the ISSCF, National Defence informed industry of the direction it intended to take, and made some changes to the framework in reaction to concerns expressed at the time. Notwithstanding, industry associations have more recently expressed concern about designating the original equipment supplier as the default prime contractor for maintenance and repair. Because few manufacturers of military aircraft, ships, and land vehicles exist in Canada, industry is concerned that opportunities for Canadian defence companies will diminish, and that most of the value-added work, like engineering design, will be done outside Canada. National Defence believes that robust application of the government's Industrial Regional Benefits policy will address these concerns. The ISSCF does not include a plan or mechanism to monitor its impact on the Canadian defence industry as implementation proceeds, or to address issues as they arise.

5.78 National Defence will need to strengthen internal processes and better coordinate its efforts with other federal departments and the Canadian defence industry to ensure that maintenance and repair contracts for all new acquisitions provide good value for Canadian taxpayers, good results for the Canadian Forces, and good business opportunities for the Canadian defence industry.

5.79 **Recommendation**. National Defence should review and revise the In-Service Support Contracting Framework (ISSCF) governance structure to ensure adequate and timely departmental oversight and control. The Department should adequately resource the specific

actions it has identified that need to be taken to ensure ISSCF's successful implementation, including the need to coordinate its efforts with other federal departments and the Canadian defence industry.

The Department's response. Agreed. By July 2012, National Defence will review its governance structure to ensure adequate and timely visibility and control of: (a) fleet support concepts; and (b) ISSCF institutionalization. National Defence has already identified specific actions that need to be undertaken to ensure successful institutionalization, including the need to coordinate its efforts with other federal departments and Canadian industry; resourcing of those actions is in progress.

Conclusion

5.80 We witnessed dedicated military and civilian personnel in the field working diligently to achieve assigned objectives and missions. Our audit determined that National Defence planned and managed the maintenance and repair of military equipment to meet operational priorities in the short term. However, its ability to meet training and operational requirements over the long term is at risk, because of long-standing deficiencies in management information systems, the lack of sufficient cost and performance information, and ongoing weaknesses in the implementation and oversight of its contracting approaches for maintenance and repair services.

5.81 Regarding maintenance and repair funding allocations, we determined that National Defence has an effective forum in place to allocate financial resources to defined priorities. However, National Defence has limited ways of assessing the long-term impacts of its annual National Procurement (NP) allocation decisions and lacks important information on total costs and performance of maintenance and repair activities. Without this information, National Defence has a limited basis on which to determine whether it is putting sufficient funding into maintenance and repair activities each year to optimize its support of military equipment over the long term.

5.82 Regarding contracting approaches, we found that National Defence did establish maintenance and repair contracting frameworks for its military vehicles, ships, and aircraft in response to risks and pressures it was facing at the time. However, implementation of the Optimized Weapon System Management approach for existing fleets

has been slower and more limited than intended. Consequently, opportunities for improvements have been missed and benefits have been postponed.

5.83 Implementation of the In-Service Support Contracting Framework (ISSCF) for new military equipment is still at an early stage. Many actions needed to ensure successful implementation by individual project teams are yet to be approved, and central resources required for implementation have been limited. Although risks associated with the ISSCF have been identified, many mitigation measures have yet to be put in place, and there is no suitable forum to oversee implementation. Considering the long-term implications and risks for National Defence, other federal departments, and the Canadian defence industry, we do not believe that ISSCF implementation has received the attention and resources it needs to ensure success.

About the Audit

All of the audit work in this chapter was conducted in accordance with the standards for assurance engagements set by the Canadian Institute of Chartered Accountants. While the Office adopts these standards as the minimum requirement for our audits, we also draw upon the standards and practices of other disciplines.

Objectives

The overall objective of the Audit was to determine whether National Defence planned and managed the maintenance and repair of military aircraft, ships, and land vehicles to meet operational and training requirements.

The two sub-objectives were as follows:

- To determine whether National Defence appropriately allocated and monitored financial resources to maintain and repair its military aircraft, ships, and land vehicles to meet operational and training requirements.
- To determine whether National Defence appropriately established and implemented maintenance and repair contracting approaches for its military aircraft, ships, and land vehicles.

In this audit, "appropriately" means making decisions based on a clearly communicated rationale that takes into account risks and departmental directives.

Scope and approach

Our audit focused on the allocation and management of financial resources for maintenance and repair activities of military equipment, as well as on contracting approaches used by National Defence for maintenance and repair services.

The audit examined how National Defence allocated its financial resources to its priorities for the maintenance and repair of military equipment. Specifically, we examined whether National Defence had systems and practices to provide managers with the information necessary to make decisions about allocating financial resources for maintenance and repair purposes, as well as how this information was used.

The audit also examined how National Defence designed and implemented contracting approaches for the maintenance and repair of military equipment. Specifically, we examined whether National Defence's new contracting approaches were based on a strategic analysis of the risks to which the Department's equipment assets and maintenance program activities were exposed, and whether the risks created by the new approaches were adequately assessed and managed. Finally, we examined whether National Defence had appropriately implemented its new contracting approaches.

The audit examined documents contained in National Defence files, as well as maintenance and repair contracts for military fleets managed under the Optimized Weapon System Management and In-Service Support Contracting Framework approaches. We did not audit the records of private sector firms. Accordingly, our conclusions do not pertain to private sector practices.

During the course of the audit, we conducted over 100 interviews with National Defence officials and Canadian Forces members located in the Department's headquarters in Ottawa or on Canadian Forces bases (CFBs) across Canada. We visited maintenance and repair installations used by the Army (CFB Montreal and CFB Valcartier), the Air Force (CFB Shearwater and CFB Trenton), and the Navy (CFB Esquimalt and CFB Halifax).

We also met with representatives of private sector companies that were awarded long-term maintenance and repair contracts for Canadian Forces aircraft, ships, or land vehicles. As part of this work, we interviewed representatives for associations of Canadian defence and aerospace companies. We did not audit private sector entities.

In addition, we had discussions on maintenance and repair contracting approaches with our counterparts in national audit offices in the United States, the United Kingdom, and the Netherlands. We also had similar discussions with representatives of the defence departments of the United Kingdom and the Netherlands.

The audit did not examine recruitment and retention practices related to maintenance personnel, nor did it examine the management of infrastructure used for maintenance purposes. We did not audit the portions of military equipment acquisition contracts that were not related to maintenance and repair.

Criteria

To determine whether National Defence appropriately allocated and monitored financial resources to maintain and repair its military aircraft, ships, and land vehicles to meet operational and training requirements, we used the following criteria:	
Criteria	**Sources**
National Defence allocates its budgeted resources toward its priorities for the maintenance and repair of military equipment.	• Guide to Management of Materiel, Treasury Board of Canada Secretariat
National Defence has systems and practices that provide information necessary to make decisions about allocating financial resources for maintenance and repair of military equipment.	• Policy on Management of Materiel, Treasury Board, 2006
The Army, Navy, and Air Force manage equipment readiness planning and monitoring to meet operational and training needs.	• Guide to Management of Materiel, Treasury Board of Canada Secretariat
To determine whether National Defence appropriately established and implemented maintenance and repair contracting approaches for its military aircraft, ships, and land vehicles, we used the following criteria:	
National Defence develops maintenance approaches for the maintenance and repair of military equipment that are based on a strategic analysis of the risks to which the Department's equipment assets and maintenance program activities and interests are exposed.	• Policy on Management of Materiel, Treasury Board, 2006 • Risk Management Policy, Treasury Board, 1994
National Defence appropriately implements applicable approaches to maintenance and repair.	• The Way Ahead (Optimized Weapon System Management (OWSM) directive and guidance), National Defence • In-Service Support Contracting Framework for Canadian Forces Platforms During the Initial Acquisition Stage, National Defence, 2008, 2009 • Defence Administrative orders and directives 3022-0 and 3022-1, National Defence

Management reviewed and accepted the suitability of the criteria used in the audit.

Period covered by the audit

Our examination of the management and allocation of the maintenance and repair funds covered the planning cycles for fiscal years 2009–10 and 2010–11. Our examination of contracting approaches covered the decade from 2001 to 2011.

Audit work for this chapter was substantially completed on 30 April 2011.

Audit team

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Appendix List of recommendations

The following is a list of recommendations found in Chapter 5. The number in front of the recommendation indicates the paragraph where it appears in the chapter. The numbers in parentheses indicate the paragraphs where the topic is discussed.

Recommendation	Response
Allocation and monitoring of financial resources	
5.30 National Defence should ensure that it develops the ability to produce overall and fleet-specific total cost information for its maintenance and repair activities. These costs should include, at a minimum, expenses related to personnel, contracted services, spare parts, maintenance equipment, and infrastructure. **(5.14–5.29)**	Agreed. Project Management Office (PMO) MASIS is rolling out Systems, Applications, and Products (SAP) in support of maintenance of weapon systems and equipment. The SAP system, called the Defence Resource Management Information System (DRMIS) is currently in place for over 90% of the Army and Navy, and approximately 10% of the Air Force. There are plans to implement DRMIS in the remainder of the Canadian Forces and this system has the capacity to meet the information requirements identified in this recommendation. This is planned for completion by December 2013. The MASIS Phase V on-going project has integrated spares inventory with procurement, financial and maintenance engineering data under a single platform. This integration paves the way to equipment, fleet and overall cost reporting. As the implementation of MASIS progresses, personnel, spare parts and procurement costs are being captured. At this time, infrastructure cost is not captured in MASIS, but will be in the future as the Department continues to advance its Enterprise Resource Planning strategy and its SAP implementation. In parallel, the Repair and Overhaul business process involving the management of the repair line will be assessed against best industry practices to determine the improvements required to optimize this part of the supply chain. This will take place prior to MASIS Phase V blueprinting for repairs and overhaul scheduled in the fall of 2011. The Maritime equipment program management division is actively moving towards a class-focused program that will improve the ability to capture total maintenance and repair costs for each class of naval platform. Finally, the work being conducted in developing costing tools and guidelines in response to the Auditor General's audit report on the Acquisition of Military Helicopters will also assist in meeting this recommendation.

Recommendation	Response
5.37 National Defence should develop and implement a capacity to provide information on the performance and impacts of maintenance and repair activities, their effectiveness, and their efficiency within each of the Army, Navy, and Air Force, using common performance measures where possible. **(5.31–5.36)**	Agreed. As noted in the previous response, PMO MASIS is rolling out the Defence Resource Management Information System (DRMIS) in support of maintenance of weapon systems and equipment, which will have the capacity to provide the information outlined in this recommendation. This implementation is planned for completion by December 2013. Business Intelligence specific queries made available through MASIS Phase V enable some searches on equipment and environment-specific performance and measures. Further development is required to introduce advanced queries and tools to enhance this Department's ability to perform forward planning so that overall effectiveness and efficiency are improved. The Department is also pursuing work on the development of performance measures in the area of inventory management.
Contracting approaches for existing equipment	
5.53 National Defence should review its Optimized Weapon System Management (OWSM) concept for operations, formally assess whether OWSM should be pursued for other existing fleets, and document its decision for each fleet. For fleets where OWSM will be pursued, actions should be taken to ensure prompt and complete implementation in accordance with the Department's plans and priorities. **(5.38–5.52)**	Agreed. National Defence will review the OWSM Concept of Operations and update it as required by July 2012. National Defence will then investigate the feasibility of implementing OWSM to other existing fleets.
Contracting approaches for new equipment	
5.67 National Defence should regularly review the In-Service Support Contracting Framework to update its assessment of risks as well as mitigation measures and their status. It should identify specific actions and responsibilities for doing this, and monitor progress on an ongoing and long-term basis. **(5.56–5.66)**	Agreed. National Defence will examine the ISSCF's risk assessment and mitigation measures with a view towards identifying specific actions that might be warranted, and to establish an ongoing monitoring system by July 2012.

Recommendation	Response
5.79 National Defence should review and revise the In-Service Support Contracting Framework (ISSCF) governance structure to ensure adequate and timely departmental oversight and control. The Department should adequately resource the specific actions it has identified that need to be taken to ensure ISSCF's successful implementation, including the need to coordinate its efforts with other federal departments and the Canadian defence industry. **(5.68–5.78)**	Agreed. By July 2012, National Defence will review its governance structure to ensure adequate and timely visibility and control of: (a) fleet support concepts; and (b) ISSCF institutionalization. National Defence has already identified specific actions that need to be undertaken to ensure successful institutionalization, including the need to coordinate its efforts with other federal departments and Canadian industry; resourcing of those actions is in progress.

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