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**THE FOURTH DIMENSION:**  
THE F-35 PROGRAM, DEFENCE PROCUREMENT, AND THE CONSERVATIVE  
GOVERNMENT, 2006-2015

RICHARD SHIMOOKA

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#### **Conference of Defence Associations Institute**

151 Slater Street, suite 412A  
Ottawa, Ontario K1P 5H3  
613 236 9903  
[www.cdainstitute.ca](http://www.cdainstitute.ca)

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151 rue Slater, bureau 412A  
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RICHARD SHIMOOKA

RESEARCH FELLOW, CDA INSTITUTE



*“All modern aircraft have four dimensions: span, length, height and politics. TSR2 got the first three right.”*

Sidney Camm, Designer of the Hawker Hurricane and the Harrier on the cancellation of his final project, the TSR2

## EXECUTIVE SUMMARY

Since 1997, the Government of Canada has engaged in a process to replace its tactical fighter fleet of 122 CF-18 Hornets, which were acquired in the 1980s. Much of that history has been intertwined with a single aircraft: Lockheed Martin's F-35. The public discourse has largely been dominated by criticism of the selection process, as well as the aircraft's capabilities, cost, and attendant industrial benefits.

Inside of government, a very different view emerged. The federal bureaucracy, initially led by the Department of National Defence worked to undertake a proper evaluation of the CF-18 replacement program. Far from being exorbitantly expensive or technologically defective, it discovered the F-35 was the best option for Canada and recommended a sole source selection in 2010. Program troubles in the United States, two deeply flawed oversight reports by the Parliamentary Budget Officer and the Office of the Auditor General of Canada, as well as a series of errors by the government resulted in a loss of support for the project. Consequently, a new assessment process was launched in 2013, known as the Seven-Point Plan. However, it too endorsed the sole-source selection of the F-35, resulting in a series of culminating events leading up to the 2015 federal election.

This study is a history of these events. It is a story not of bureaucratic mismanagement or military bias, but one of civil-military relations and political dysfunction. The Liberal victory in the October 2015 election might have initiated a new phase of the CF-18 replacement program history. Yet the preceding several years should provide a number of lessons going forward. Few, if any, of the program's fundamentals have changed. Many of the considerations that underpinned the original analysis are still valid. The current government would do well to take heed of what occurred before.



## SOMMAIRE

Le gouvernement du Canada est engagé, depuis 1997, dans un processus visant à remplacer sa flotte de 122 chasseurs tactiques CF-18 Hornet, qui ont été acquis dans les années 1980. Une grande partie de cette histoire est étroitement liée à un seul appareil : le F-35 de Lockheed Martin. Le débat public a été largement dominé par la critique du processus de sélection, ainsi que les capacités de l'avion, le coût et les avantages industriels qui en découlent.

Une vision très différente a émergé à l'intérieur du gouvernement. La bureaucratie fédérale, initialement dirigée par le ministère de la Défense nationale, a effectué une évaluation appropriée du programme de remplacement du CF-18. Loin d'être exorbitant ou technologiquement défectueux, on a découvert que le F-35 était la meilleure option pour le Canada et, en 2010, a recommandé de procéder avec un fournisseur unique. Les problèmes subis par le programme aux États-Unis, deux rapports de contrôle tendancieux qui ont été effectués par le directeur parlementaire du budget et le Bureau du vérificateur général, ainsi qu'une série d'erreurs commises par le gouvernement ont entraîné une perte de soutien pour le projet. Par conséquent, un nouveau processus d'évaluation a été lancé en 2013, connu sous le nom du Plan à sept volets. Toutefois, ce plan a aussi approuvé la sélection d'un fournisseur unique de F-35, provoquant une série d'événements qui ont précédé l'élection fédérale de 2015.

Cette étude est une histoire de ces événements. Ce n'est pas l'histoire d'une mauvaise gestion bureaucratique ou d'une partialité militaire, mais celle des relations entre les sphères civile et militaire et de dysfonctionnement politique. La victoire des libéraux aux élections en octobre 2015 aurait pu entamer une nouvelle phase de l'histoire du programme de remplacement de CF-18. Pourtant, les quelques années précédentes devraient fournir un certain nombre de leçons pour l'avenir. Très peu des principes fondamentaux du programme -- peut-être même aucun -- ont changé. Un bon nombre des considérations à la base de l'analyse initiale sont toujours valables. Le gouvernement actuel ferait bien de tenir compte de ce qui s'est produit auparavant.



## INTRODUCTION

*On 23 June 2014, an F-35 left its berth on the tarmac in Eglin Air Force Base in Florida. Coded AF-27, it had participated in a simulated dogfighting exercise the day before and undertaken several strenuous high-G maneuvers.*

*While on his takeoff roll, the pilot's screen lit up with warnings. He immediately aborted takeoff and exited the aircraft. While the pilot's quick thinking helped to limit the fire's damage, the F-35 was written off as a total loss. After three weeks of analysis, the cause was traced to the maneuvers of the previous day. A fan had become dislodged, which started to rub uncontrollably against the engine's exterior wall. This caused a catastrophic fire that consumed the fuselage of the jet. It was the type of issue experienced by many previous aircraft development programs, which are typically resolved with little fanfare after several months of engineering work.*

*However, the fire had far deeper reverberations than its immediate technical problems. In Ottawa, the government under Prime Minister Stephen Harper was mere days away from making a decision on purchasing the aircraft. The engine fire spoke to some of the most deep-seated criticism of the project in Canada, and fearing the potential political fallout, the Harper government elected to change course on the impending decision. Few realized that this fire was a crucial turning point in the program's history in Canada.*

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Since 1999, the Government of Canada has engaged in a process to replace its tactical fighter fleet of 122 CF-18 Hornets acquired in the 1980s. Much of that history has been intertwined with a single aircraft: Lockheed Martin's F-35, also known as the Joint Strike Fighter. Arguably, no procurement program in Canadian military history has come under such intense controversy since the cancellation of the Avro Arrow in 1959. The public discourse has largely been dominated by criticism of the process to select the F-35, as well as the aircraft's capabilities, cost, and attendant industrial benefits. A key element in the controversy was the highly critical reports by the Parliamentary Budget Officer (PBO) in 2011 and the Office of the Auditor General of Canada (OAG) in 2012. These oversight bodies called into question key aspects of the F-35's selection in 2010, including the government's cost estimates and the integrity of the process.

Far beyond the din of public debate, in the government offices around Ottawa, a very different view emerged – one that has not been reported. The federal bureaucracy, initially led by the Department of National Defence (DND), worked to undertake a proper evaluation of the CF-18 replacement program. They faced a challenging situation. First, their options were constrained by the shape of the international fighter market that was dominated by the F-35. Second, the program possessed a number of unique fea-



tures without any precedent in government history. Perhaps most significantly, Canada was a partner in the aircraft's development and industrial program since 1999. This provided the country the opportunity to purchase the F-35 at the lowest cost possible, and for Canadian companies to obtain valuable subcontracts on the program's production and sustainment operations.

Nevertheless officials within DND, and later the National Fighter Procurement Secretariat worked to overcome these challenges, exercising due diligence with a rigorous evaluation process. The work of both included numerous safeguards to ensure the integrity of the entire approach. Although the effort was not flawless, the assessments made by these bodies were accurate and validated in subsequent years.

The federal bureaucracy faced one insurmountable challenge: politics. The unique features of the F-35 project, chronic problems with the aircraft's development in the United States, and the public and media's unfamiliarity with military trends made it difficult for any government to sell the F-35. Critically, the Conservative Party also failed to grasp fully the program's features, and their media strategy was completely ineffective in communicating them to the public. It is also important to understand how significant errors made by the PBO and the OAG compromised the understanding of the price and costs. Those flaws were not effectively explained (or, in one case, revealed to the public), which helped to poison the public discourse towards the fighter.

Not having a comprehensive understanding of all factors – from a clear appreciation of the assessed future security environment, the F-35 capabilities to meet the assessed threats (especially the technical matters regarding the aircraft's performance capabilities), and to the intricacies of the development and procurement processes, a decision to essentially re-start the process was made.

This study traces the various phases of the planned procurement and identifies the critical failures in knowledge, understanding, and political will that led to the Government changing its mind at a critical juncture. It focuses on the Conservative government's period in power, which provides convenient bookends to frame the study. Most of the key decisions were taken in this period, and their outcome was influenced by the government's management style. Furthermore, 2015 provides a good endpoint to prevent the study from entering into present-day affairs.

A final note about sourcing. My primary concern is about the fidelity of my account. This study has provided a number of special challenges in terms of sources. Over the course of six years, I have interviewed over thirty individuals involved with the program, both in Canada and the United States, and conducted several hundred discussions. This included representatives from every major department involved. Unfortunately, given the ongoing situation with the program, no participant was willing to speak on



the record. As a result, this study relies heavily on confidential sources. This is problematic; so too is the difficulty in obtaining supporting documentation due to the sensitive nature of this event and the issues surrounding the Access to Information and Privacy (ATIP) process. Thus for each major event I sought to have at least two or more individuals to corroborate the account. While this does not discount that others may have a different recollection or perspective, it provides a level of reassurance that several people held this view, which resulted in a certain course of action. Nevertheless, I believe that what follows is an accurate reconstruction of the events surrounding the CF-18 replacement program.

### Origins of the F-35

The Joint Strike Fighter (JSF) program was launched in the 1990s as a solution to a predicted procurement crisis facing the United States military. The Clinton-era drawdown of the US armed forces after the end of the Cold War saw the budget for new acquisitions slashed, with fighters bearing the brunt of the cuts. At the time, the austerity program was viewed as being manageable; the military had an abundance of tactical fighters in their inventory that did not require immediate replacement. Typically, the US military would fly their airframes for about ten to twenty years, and then replace them with newer designs. The buildup and subsequent drawdown meant they could delay the acquisition of their next generation of fighters. As such, they would also need to replace three different types: the Marine Corps AV-8B (a vertical takeoff and landing fighter), the F/A-18A/C Hornet (a US Navy tactical fighter), and the F-16 (a US Air Force [USAF] tactical fighter). The JSF would be built in three versions to meet these different needs, but with high levels of commonality. In particular, it would share avionics, which accounted for over 50 percent of a modern fighter's aircraft costs.<sup>1</sup>

The JSF was envisioned as a major leap in aviation capability, incorporating new technologies that would bypass the current generation of aircraft. While stealth was the most noticeable feature, a more important development was its sensor capabilities. Since the 1980s, the US military became enraptured with a new approach to warfare known broadly as the Revolution in Military Affairs – one that mirrored the growing interconnectedness that the Internet brought to the civilian world. Sensors and units could be linked together into one massive network, allowing for unprecedented battlefield awareness. The F-35 would go a step further than simply linking current aircraft. Advances in drone and sensor technology were predicted to generate exponentially more data in the future, requiring the avionics to sift through the mass of information, and present the pilot with useful understanding of the battlespace. Moreover, the aircraft had to be adaptable for future needs, such as controlling drones.

This would turn out to be a massive engineering challenge whose scope was underestimated at the program's start. It was as if Lockheed Martin had to develop, construct, and program all of an average home's



electronics (home computer, phones and tablets), their apps, as well as Facebook and Twitter server and algorithm programming. They would need to do so as a single company, rather than the dozens of companies involved in the above example, and make it operational with almost no critical faults. It was quite possibly one of the single most complex programming efforts ever undertaken. But, as with so many other development programs, insufficient funding and unrealistic timelines led to delays and cost overruns.

The US government was aware of the international opportunities for this sale. Many of its core allies had purchased the same aircraft as the United States, which also required replacement. Most states chose the US Air Force's F-16: a maneuverable single-engine fighter that was produced in the thousands by General Dynamics (the F-16 production line was sold to Lockheed Martin after 1993). Canada's competition led it to select the US Navy's F/A-18 Hornet in 1980, a twin-engine fighter manufactured by McDonnell Douglas. As with the US military, all of these fighters needed to be replaced within the coming years.

The US government decided to implement a new policy. Often when foreign states purchased a weapon from an American manufacturer, an "offset" arrangement was established. This meant the selling firm had to reinvest a specific amount back into the purchasing nation. In Canada, this is now known as the *Industrial and Technological Benefits* (ITB) program, which requires 100 percent of a contract's value to be returned. The US government always disfavored offset arrangements, considering them "economically inefficient and market distorting" practices.<sup>2</sup> They often had disappointing economic outcomes, as a firm struggles to find investment opportunities for several billion dollars that have to be delivered in several years. What would frequently occur is that relatively low technology business would be advanced to an industry that would spool up and then close down after the contract was completed. The general low quality of ITBs led some within the government to refer disparagingly to these contracts as producing "garbage can lids."<sup>3</sup> For this reason, several allied states, including Australia and the UK, abandoned offsets for more flexible arrangements that focus on long term growth.<sup>4</sup>

Instead, the JSF program would adopt a manufacturing technique from the civil aviation industry. A formal partnership was established, where close allies were invited to join by paying a research fee. These countries' industries could then compete for manufacturing and service subcontracts on the F-35 program. This was unprecedented: most US weapon systems had extremely low foreign involvement. The F/A-18E/F Super Hornet only had 0.5 percent of its goods produced outside of the United States.<sup>5</sup> A 2003 US Department of Defense study suggested that industrial benefits were the primary motivation for several countries, including the Netherlands, Turkey, and Canada to participate in the initial phase of the F-35's development.<sup>6</sup>



Canada was immediately seen as one of the potential winners of this process. With the fifth largest aviation industry in the world, and a manufacturing set up that emphasized integration into global supply chains, national industries stood to reap billions of dollars: far more than what it could expect through traditional ITBs. Moreover, the quality of these contracts were far in excess of what could be obtained through offsets. They were likely to last twenty years or more, and would expose Canadian industries to high technology platforms significantly assisting their future business development. These considerations form a critical point, which is essential for understanding the Government of Canada's subsequent actions.

The JSF program was intended to monopolize the Western fighter market by offering capabilities that far outstripped those of any potential competitor, and an industrial participation scheme capable of delivering superior benefits to national companies. Yet the aircraft's cost, capabilities, industrial offsets, and participation scheme presented several unique challenges for the Canadian government. The first involved how to properly manage an acquisition process given the unusual nature of the JSF Partnership. With its cooperative development approach, the F-35 did not conform to any other program within the bureaucracy's experience. The government would need to guarantee two objectives simultaneously: managing a selection process that would ensure that Canada obtained the best possible replacement for the CF-18 (in terms of capability and cost), while cultivating the potential for tens of billions of dollars in opportunities for Canadian industry within the JSF program if the F-35 was selected as a replacement. The former was complicated by the program's highly technical and classified features, which restricted access to a small coterie of individuals. Thus, establishing policies and structures would require some level of innovation and good project management skills in order to achieve the best result.

The selection process presented the second major challenge for the government: how to establish criteria for selecting a replacement, when one option is clearly more capable and will be used by most of Canada's major allies? With the JSF almost certain to define the future of air warfare, DND could not ignore its capabilities. It was unavoidable that they would influence assessment criteria. This is particularly the case when interoperability with allies is a key consideration for the Canadian Armed Forces (CAF). This is not an issue limited to tactical fighters; it is a growing issue across the entire defence market. Consolidation within the industry often results in only one option available for a specific capability. The challenge facing DND staff is managing a balance between the capabilities of a unique platform and the requirements of the CAF.

### **Joining the JSF Partnership**

Canada's first exposure to the Joint Strike Fighter program came in 1997, even before the selection of a



specific airframe. Canada was identified as a potentially key member, after the United Kingdom was the first to be invited to join the program. At this stage Canada's contribution allowed it to access information on the program and influence the requirements that would lead to selection. In December 2001, the US government's competition to select the actual aircraft for the Joint Strike Fighter concluded, with Lockheed Martin's F-35 emerging as the winner. Canada remained involved in the aircraft's development, assisting with the F-35's System Development and Demonstration phase (SDD), as well as gathering information for its own selection process. The government was under no obligation to purchase the aircraft, but the involvement helped to define what sort of capabilities would shape the future fighter forces in reaction to evolving threat technologies and how Canadian industries could best unlock the opportunities envisioned by the partnership format.

One of the first major decision points of the program occurred in 2006: whether to sign a multinational agreement called the JSF Production, Sustainment and Follow-on Development Memorandum of Understanding (JSF PSFD MOU). This was a major document that governed the entire partnership, which included contracting and financial arrangements, security, and management structures.<sup>7</sup> Perhaps the most critical element was how Canadian industries were then enabled to compete for contracts in the SDD phase. Signing the agreement did not commit the country to purchasing the fighter; however, it did predispose the government to some degree. The JSF PSFD MOU also established a framework in which industries in partner nations could expect that work done in support of the System Development and Demonstration Phase (2001 to 2006) would lead to contracts for similar work in support of production, sustainment, and follow-on development. It would also require an initial financial investment of over \$250 million dollars, as well as a continuing commitment of approximately \$20 million dollars each year thereafter, subject to inflation (all dollars are in USD, unless otherwise noted).

In order to recommend Canada's accession to the JSF PSFD MOU, National Defence prepared an assessment of all the potential fighter options. In subsequent years, several critics cited the 2006 assessment as the point where DND selected the F-35.<sup>8</sup> This was neither its purpose, nor its outcome. The assessment was a key piece of due diligence; if DND could not reasonably foresee the purchase of the F-35, it would be irresponsible to invest the money into the program. The 2006 assessment was fairly clear, suggesting the F-35 was likely the most capable and lowest cost option – and one that offered major industrial benefits for Canadian firms. The government accepted the recommendations, and on its basis signed the MOU in December of that year.

With the MOU's signing in 2006, Canada started its actual process to procure a CF-18 replacement. In the early fall of 2007, DND established the Next Generation Fighter Capability (NGFC) Office. The office had several roles. First it was the primary point of responsibility for managing Canada's participa-



tion in the JSF program. This meant that it would sit on various steering board meetings and provide Canadian input into the program. Second, and more importantly, the NGFC office would be responsible for providing the final evaluation on the various fighters, and recommending a course of action to Cabinet. It would not do this alone. The Director of Air Requirements (DAR) would be tasked with developing a Statement of Operational Requirements (SOR).<sup>9</sup>

The SOR is a critical document: it is the basis upon which the potential candidates are evaluated. In the case of the CF-18 replacement it required nearly years of work to prepare one. Normally, in an Options Analysis phase, DAR would also be responsible for the subsequent evaluation. In this case, however, the NGFC office would bear the responsibility. This was an unusual arrangement, but it was implemented for two reasons. First, there were information security concerns. Tactical fighters involved among the highest level of classification, and handling that data would add complexity to DAR's work.<sup>10</sup> Fewer than a hundred people were cleared to view the material at any one time. The NGFC office was equipped to handle this type of information for the JSF project, so it was more effective to let it gather the information and evaluate the options.

Second, and more importantly, the arrangement was intended to remove undue bias on the requirements-setting process. DAR would be better placed to develop the SOR independently according to Canada's requirements, without being influenced by the F-35's particulars or indeed that of any other aircraft.<sup>11</sup> This did not mean the NGFC office operated without any direction between 2006 and 2010. Rather it received updates from DAR concerning that body's work.

The most important event in the SOR process occurred in 2008 with the promulgation of the high-level mandatory capabilities document to guide the development of the SOR. The mandatory high-level capabilities also opened up a key question concerning the upcoming competition; was a sole-source selection through the recently signed MOU possible?<sup>12</sup> This would not alter how the assessment process was undertaken, but would add another option to consider. If the NGFC project had the option to purchase through the MOU, they would need to study its prospective benefits vis-à-vis other approaches. Within weeks, senior departmental officials decided that this was a viable option.

After the decision on the possibility to go with the MOU, DAR officials routinely informed the NGFC office of the SOR's progress. This included passing new drafts of the document as they were produced, which helped the assessors focus their information gathering efforts on all of the options under consideration and refine their analysis. Thus, when it came time to select an aircraft it could make a quick determination, as it would have all of the relevant information at hand.



Shortcomings to the organization, however, would become apparent later. Perhaps none was so significant as the insufficient staffing. Since 1990, constant austerity measures placed on National Defence Headquarters meant that staffing levels for most programs were always under pressure. The NGFC office staff varied around five individuals, which was insufficient for what it was called upon to carry out.<sup>13</sup> For example, not all documentation was completed as normally required. A more problematic issue was that some areas of analysis could not be finished with significant depth, and assumptions were used until sufficient resources became available. While neither actually affected the program's ability to provide a definitive answer, they would later serve to undermine its efforts.

For over three years, NGFC members met with industry officials and visited the manufacturing facilities of the five major competitors. In addition, they also engaged contacts within foreign governments, such as the US Navy, the Royal Air Force, as well as the Royal Australian, Swedish, and French Air Forces to provide data about their experiences with specific aircraft, including the F/A-18E/F, the Eurofighter Typhoon, Saab Gripen, and the Dassault Rafale. While these sources had some limitations (they were often highly contextual), they were the most valuable source of information.<sup>14</sup> Subject matter experts from DND, Defence Research and Development Canada, and Public Works deconstructed the contextual information in order to make like comparisons between various aircraft. There were also limits on what information could be obtained due to classification. A notable instance occurred with the Super Hornet, on which Canada could not obtain direct information. However, the NGFC staff members had a very good understanding of it and other potential competitors' general level of capabilities through the JSF program office.<sup>15</sup> This would allow them to make a fairly detailed comparison of the different capabilities.

Overall there was high confidence within the NGFC office that they would be able to make a definitive recommendation when called upon to do so with the data they had collected.

## The Replan

While the F-35 file was progressing smoothly inside of Canada, the program started to encounter severe difficulties in the United States. The scale of challenges became revealed and the program started to accrue cost overruns and delays. In 2010, the JSF program hit a Nunn-McCurdy Breach. This was a technical threshold where the development program went over budget by 50 percent of its original baseline. This was the program's most vulnerable stage: Congress had the statutory ability to shut it down, unless the US Department of Defense justified continued spending on the program and showed progress on controlling costs.



The US government responded by a massive overhaul of the program. Vice-Admiral David Venlet, a decorated former naval aviator, was placed in charge of the program and instituted a comprehensive reform program, known as the Replan. In short, four years of development time was added to the program, slowing production while increasing funding. Cost targets were instituted for each year, which in the end would see the aircraft cost approximately \$75 million dollars a copy. In addition the Marine Corps vertical takeoff and landing version was put on “probation,” to be reviewed in several months time.

By most metrics, the Replan was an unqualified success. The first few years continued to see overages on individual lots, but costs quickly came into line with the predicted values.<sup>16</sup> In 2013, production of the aircraft was put onto a “fixed cost” contracts, where the manufacturers were responsible for any overruns. Thereafter the yearly production lot costs came into in line with estimates, which was a significant achievement for the program.

Although the events of 2010 helped to bring the program back to a better footing, it also broached the program’s problems to the public and opened it up to greater scrutiny. It became dogged by controversies, many of which overshadowed the emerging successes. The most apparent was the aircraft’s cost, which was portrayed to be rising inexorably despite the actual progress on controlling costs. This was partly due to early procurement and operational cost estimates that utilized very conservative modeling. For example, the US Office of Cost Assessment and Program Evaluation (CAPE) estimated the total cost of the program at \$1.45 trillion dollars in 2011.<sup>17</sup> However, assumptions like predicting fuel usage based on full afterburner meant that the cost estimates were significantly and inappropriately inflated.

By 2014, the JSF and CAPE could apply actual operational data to refine their analysis. Their revised estimates pegged the total cost of development, procurement, and lifetime operations at \$1.02 trillion dollars, a reduction of approximately 40 percent over earlier estimates.<sup>18</sup> Similarly, the program was criticized for lacking performance and technical deficiencies. Most of these were either fairly common developmental problems that would be corrected over the coming years, or issues taken completely out of context by the media and other pressure groups.

In the United States, these criticisms were taken in stride. The Joint Strike Fighter program was one of the only programs shielded from the damaging effects of sequestration – an automatic budget ceiling placed on Pentagon due to the inability of Congress to pass a budget. The F-35’s shielding provide an illuminating contrast to defence procurement in Canada.

First was the United States’ overall commitment to spending on defence. There was a general tolerance of overruns and other problems if a program was viewed as important for national security. Second, a



large body of individuals inside and outside of government were much more measured in judging the program's circumstances. This included the military, which was an active and at times, vocal proponent of the program; one that often helped to clarify its current status. They could understand the broader context behind statutory reports like those produced by the US General Accounting Office and other oversight bodies, and explain (or dismiss) their actual significance. Part of this was due to the vast experience the US military had with procurement projects. Between 1980 and 1990 the United States had launched at least twelve major fighter development or major upgrade programs. In that same period, Canada had only one; the original selection of the CF-18 in 1980.

### Perception and Reality

The CF-18's procurement process had a defining influence on how many communities viewed how to select its replacement, for better or for worse. Its decision came at a critical turning point in the history of the Royal Canadian Air Force (RCAF). By the mid 1970s, the Air Force was in desperate need to replace its obsolete fighter force after a decade of no funding. The CF-18's procurement and subsequent three decades of operations, had a profound effect on the RCAF, foreign policy, and public perceptions. The selection process itself was orderly and well managed. DND initiated its requirements process in the early 1970s and examined a wide range of aircraft types. It decided to evaluate two aircraft, the F-16 and F/A-18A, which resulted in the latter being selected in a competition.

While the process was a success, misperceptions have crept in over the years. Perhaps the most significant was that Canada selected the CF-18 due to its twin-engine design over the single-engine F-16, for reasons of flight safety when operating in the Arctic.<sup>19</sup> Similarly, many have claimed that the government selected the CF-18 due to McDonnell Douglas offering an industrial offsets package geared towards more politically favorable ridings to the incumbent party.<sup>20</sup> None of these were true. As stated by the Project Manager and later Chief of the Defence Staff, Paul Manson, the CF-18 was selected almost exclusively on the basis of its superior multi-role capability to the F-16, which provides superior value for the equivalent cost.<sup>21</sup> Perhaps the most notable lesson that the public took, which would influence views on CF-18's replacement, was that a competition was always possible and would always obtain the best price.

However, the most salient feature of the CF-18's selection process was what was absent: political interference.<sup>22</sup> DND was able to make its selection process and decision based on the best capability within a firm budget outlay. Furthermore, the political leadership took significant effort to explain and sell the program, which tamped down any potential controversy over the selection.<sup>23</sup> These should have been the lessons learned from the CF-18 process, but they were quickly overshadowed.



The CF-18 decision left an indelible mark on the CAF fighter community as well. For pilots, flying the agile supersonic CF-18 was akin to driving a Ferrari after driving a Minivan for twenty years. The number of pilots was also relatively small: there were only about a hundred qualified at any one time. These features would create a closely-knit fighter community that would have an inordinate effect on the future of fighter development in Canada. Many views were shaped by the unique experience of flying in the north, as well as a more tragic side to CF-18 operations.

In January 1990, Captain Richard Corver took off in the complete winter darkness of Inuvik, Northwest Territories for a training mission. He immediately lost his situational awareness and crashed his aircraft into the ground, killing him instantly. Sadly, Corver's death was not an isolated incident; ten aircraft were lost in controlled flight within ten years of the CF-18's introduction.<sup>24</sup> As the CF-18 pilots ascended through the ranks, their views would influence the RCAF and the selection of Canada's next generation fighter. One of the NGFC's SOR requirements reflected this: the aircraft required the ability to be visually operated in no-light conditions. This was written as a direct result of Corver's death: had a no-light visual system been present, he would have been able to correctly judge his aircraft altitude and not crashed.<sup>25</sup>

However, the CF-18 community also had other influences, not all of which were positive. The unique experiences created a number of views and biases towards the features of the Hornet. This predisposed many to view the Super Hornet as the logical choice for Canada's next generation fighter. As we will see, the CF-18 community would become a significant pressure group within the public discourse, many of whom advocated for the Super Hornet. Unfortunately, few had a detailed understanding of the contemporary fighter market. Many based their evaluation on highly prejudicial articles on the F-35's alleged performance appearing in the international press. Given the public's unfamiliarity, their imprimatur would harden Canadians' opinions against the F-35, and prove a challenge in explaining the government's assessment in the coming years.

Nowhere was the disconnect between public perceptions of the F-35 and the program's reality more evident than to the individuals tasked with determining which aircraft was to replace the CF-18. By the spring of 2010, the two tracks of the procurement process were reaching a conclusion.

The push to select the F-35 actually started a year earlier at the JSF Executive Steering Board meeting. At that time, the JSF Program Office (JPO) wanted to flesh out the global production chain for the program, which would be accomplished by states' firming up their commitment to the F-35.<sup>26</sup> For Canada this was a critical juncture. Through careful negotiations and preparations with Canadian industries, DND and Industry Canada predicted they would win approximately C\$12 billion dollars in contracts over the next thirty years.<sup>27</sup> That was over double what the country would have obtained through a normal offset



requirement. There was also pressure from impacted Canadian industries. Many had won contracts or desired to bid on new opportunities on the JSF program. However, this often entailed multi-million dollar capital investments which firms were unwilling to make without certainty on the country's commitment to the fighter. DND's Industry and International Programs division pushed this request within the government.<sup>28</sup> By this time, the DAR's process to develop the SOR was nearing completion, which would enable an evaluation and decision to take place.

The April 2010 evaluation has been the subject of significant scrutiny in the public's eye. A general view was that the process was rigged to ensure the F-35 was selected. Certainly, a number of the SOR's specifications could only be met by the JSF; six of the twenty-eight specifications could only be met by the F-35. These included:

1. The possession of stealth capabilities that make detection by enemy sensor systems exceedingly difficult.
2. Capable of secure data link communications permitting operations in a hostile environment.
3. Capable of permitting the pilot to visually operate the aircraft in no-light conditions.
4. Capable of automatically sharing data and sensor information between friendly aircraft to maximize own aircraft and formation effectiveness.
5. Capable of permitting the pilot to effectively detect and engage small targets at tactically significant ranges.
6. Capable of maximizing the probability of identifying and keeping track of friendly and enemy forces through the use of automatic sensor prioritization.<sup>29</sup>

With the exception of the third criterion (related to flight safety), the rest of the requirements were in large part derived from an understanding of the future threat environment as well as existing and emerging technologies that would define warfare in the coming years. The technical and operational justification for each criterion was included in a classified annex. On the basis of capabilities alone, DND could justify the F-35's sole-source procurement. However, as part of its assessment, the NGFC office also evaluated the competitors' cost and industrial benefits packages from the information they had gathered.

One of the concerns within the NGFC office during their early work was whether they would find competitors that might offer a lesser capability at a lower cost.<sup>30</sup> This would be a complicated scenario,



almost certainly requiring a competition that would try to assess the value of very different options. Therefore, it was a relief to many in the NGFC office in 2008 when the data received through government-to-government liaison indicated the F-35 was the lowest cost to acquire of all the options available. Data from the Eurofighter and Rafale sources found them to be significantly more costly than the F-35.<sup>31</sup> It was also a surprise when the Super Hornet was found to be more costly to acquire, and likely to cost more to operate as well.

The F-35's lower acquisition cost, despite entering into service fifteen years later than the F/A-18E/F, was in large part due its production scale and Canada's membership in the JSF Partnership. On the first part, the F-35 was projected to witness production rates as high as 20 aircraft a month, compared to Super Hornet's maximum rate of approximately 3 per month.<sup>32</sup> At that rate, economies of scale and learning curves take effect which create downward pressure on its unit price, and offset the fact that the aircraft incorporates much more advanced technologies. In addition, Canada's membership in the JSF Program meant the country would not be subject to the typical fees for Foreign Military Sales and would pay the same price as the USAF.

One area that was not as well defined was the cost of operating a fleet of F-35s. This was a consequence of the staffing levels within the NGFC office, which could not undertake as detailed an analysis as would be normally be completed in the time allotted. It was also affected by the relative lack of data from the Program office in the United States. Their estimates borrowed heavily from existing costs for their legacy platforms, like the F-16. Thus the NGFC office applied the same approach, making a number of assumptions for the F-35 based on CF-18 operational data.<sup>33</sup> However, when the upgrade costs were factored in (required to maintain interoperability and operational relevance) and the full lifetime costs were compared to existing data for other competitors, the analysis showed the F-35 to be significantly cheaper to operate over the entire lifecycle. The Rafale and Eurofighter again were much more costly to operate based on their national data. The F-35's cost benefit was much narrower over the F/A-18E, especially over the actual flight costs. However, a significant difference emerged over upgrade costs.

As part of the JSF program, the development of upgrades is pooled among the members, of which Canada would be expected to pay 2 percent of the total development costs (based on the expected number of aircraft it would procure).<sup>34</sup> The Super Hornet would be more aligned with Canada's experience on the CF-18, where the government had to either develop upgrades independently or purchase and adapt US Navy upgrades at full cost. Either of these approaches were significantly more expensive, which would vastly increase the RCAF's projected operating costs.



The costing estimates were prepared for twenty years of operations, which was the standard practice within DND for major capital programs. It corresponded to the amortization period for a capital acquisition. Instead of applying a potential multi-billion dollar purchase cost against the budget in the year it was completed (which would be highly disruptive), it would be spread across twenty years. The period was also seen as a useful cut off: calculating costs beyond twenty years was viewed as pointless for actual budgeting or comparative purposes because the actual fidelity of those figures were completely in question. The relative weakness of this area, as well as other categories, was communicated as a risk to the leadership. However, they judged them as being acceptable, which was an important point. The JSF's fundamentals were viewed as being very strong; the program would have to experience a catastrophic failure or cost increase for the assessment to appreciably change.

One question was whether a competition would produce a better price or outcome, as it had in 1980 with the original CF-18 purchase. In this case, it clearly would not. Canada's signing of the MOU guaranteed that it would receive the same price as the United States, without additional fees. Selecting the Super Hornet would trigger a process known as Foreign Military Sales, where the US government purchases a capability on behalf of a foreign buyer and provides the necessary training and other required items as a package. US law prevents a national company from selling goods cheaper to a foreign country than what the US paid for it.<sup>35</sup> Thus there was no ability for the cost of the F-35 and Super Hornet to drop appreciably in a competition. In fact, the opposite was true; the statutory Foreign Military Sales fees paid on the F/A-18E/F would increase the aircraft's cost by over \$7 million dollars per aircraft.<sup>36</sup>

One of the best illustrations of the general confidence in the NGFC's evaluation occurred during its interaction with Public Works. The assessment was convincing enough that lawyers at Public Works suggested that an "Advanced Contract Award Notice" (ACAN) was unnecessary. An ACAN is the typical government response when it determines that a sole-source selection is the best course of action. It announces that a selection is imminent unless a potential competitor can demonstrate they can meet the requirements. According to the lawyers, with the assessment so conclusively skewed to one side, there was no need for an ACAN.<sup>37</sup> Had any uncertainty existed, such a recommendation would not have been forthcoming.

In retrospect, it may have been prudent to issue an ACAN. This would have provided greater political cover in the coming years, as the other manufacturers would have had the opportunity to respond if they had any objections. Since they were unlikely to intercede, DND would have additional justification to their position that none of the other capabilities could meet their requirements. It was a missed opportunity that would come to haunt them later.



The evaluation and memo to cabinet were never made public, with only a small summary portion of the SOR released through the Access to Information Act process.<sup>38</sup> Ironically, for all the controversy that emerged afterwards, the main conclusions of DND's assessment remained largely correct. In a 2016 Danish government evaluation, the F-35 remained the lowest cost, most capable aircraft compared to other options, which offered the best industrial benefits for its national industry.<sup>39</sup> Those fundamentals never changed. What followed was a series of events in large part driven by political considerations.

### **The Conservative Party, Miscalculations, and Blunders**

One of the iconic photos of Canada's entire history with the JSF program is Defence Minister Peter McKay sitting in an F-35 mockup in Ottawa. It was taken during the July 2010 announcement of Canada's selection, which became the first in a long line of miscalculations and blunders on the program. The event opened the CF-18 replacement process to a torrent of criticism, from which it never really recovered.

Only several weeks earlier, the Conservative cabinet had met to discuss the F-35. With DND and Public Works assessments in hand, the senior ministers involved in the program agreed that the government should make a sole-sourced selection. Despite the assessment and recommendations, there was still resistance to the program. Some chafed at the C\$9 billion acquisition cost of the program, which was seen as excessive. This was not a view about whether the country should select the F-35 over another aircraft, rather the excessive cost of maintaining a fighter capability.

The government saw the situation as an opportunity to build up its narrative of supporting the military, and was described as an "easy win."<sup>40</sup> Refined down to its essential elements, this was evident: the F-35 was the lowest cost, most capable option and offered immense industrial benefits. However, the problem was that the program, and Canada's participation, was an extremely complex endeavor. It far exceeded anything the public service or even the military had previously encountered.

This was reflected in one of the primary concerns of the political leadership: cost certainty. With most government procurements, Canada obtained a single contract price that entailed the total acquisition cost, and in some cases, the in-service support contract with the manufacturer. After the contract is signed, the military would receive its new aircraft gradually over four or five years to facilitate an orderly transition of its pilots and support systems. The F-35 took a different approach. As a member of the partnership, Canada made its purchases on a lot-by-lot basis.<sup>41</sup> It would make an order each year for delivery and pay in that year. This meant that instead of one single outlay, the government would make five separate yearly purchases where cost fluctuations could occur. Furthermore, significant uncertainty remained with the operational costs, which had the potential to be more serious. This was a major concern for the



Conservatives; it could expose the government to serious financial risk for any cost overages, as well as political criticism.

The risks of a lot-by-lot acquisition were somewhat overstated. Canada planned to make its purchases when the program reached its optimum production rate, which meant the estimates were likely to reflect the actual contract price. Furthermore the lot-by-lot acquisition approach had benefits: the most evident was that the government would receive the benefits of any unit cost reduction that may occur over the period. Estimates did not include the potential cost reduction from a US government acquisition process known as *Multi-year procurement* (or a related process called *Block Buy*). This could decrease the cost by 5 percent or more, but it could not be accounted for before full rate production is implemented.<sup>42</sup> The lack of operational cost certainty was harder to accept: it would be several years before high confidence data was available. However, this aspect of costing always had greater uncertainty attached to it due to its variable nature. Furthermore the NGFC data did show that the F-35 was very likely to be significantly lower cost than its competitors. The cost estimates complexity was indicative of the program's nature; however, these nuances were largely lost on the political leadership.

The government's approach reflected all the hallmarks of their centralized media driven policy, but with the added challenge of failing to understand or effectively communicate the program's salient features. This would be a consistent problem, which manifested itself at every critical instance; from key decision points to its interaction with the media. It would have devastating consequences for the government's ability to sell the program.

The 16 July 2010 announcement embodied many of these problems. Ministers Rona Ambrose, Tony Clement and Peter McKay gave prepared remarks that touted the aircraft's capability and industrial benefits, but gave only passing references on the cost. The question and answer section offered a taste of the criticism they would face in the future. A particularly damaging line of questioning focused on the fact that the government representatives could not point to a precise cost for the in-service support, stating that this would be negotiated at a later date. It gave the appearance that the government had not completed a thorough assessment of the aircraft and its alternatives, which was demonstrably false. For example, no reference was given to the NGFC analysis that showed the F-35 to be much lower cost to operate than any competitor.

The Conservative government's centralized media approach also hindered the one group that could provide the nuance and context to the debate: the Department of National Defence, and other government agencies. In particular the individuals who had been given the classified briefing, or managed the program on a day to day basis, were the best placed to clarify its unique features and draw contrasts to



other options.

Prior to the Conservatives coming to power, the military had a generally open relationship with the media, where reporters were able to access subject matter experts without too much difficulty. This openness was a lesson borne out of the disastrous Somalia inquiry, where the military was accused of a major cover-up of its actions.<sup>43</sup> Upon its 2006 election, the Conservatives tightened its control over the department, restricting availability of subject matter experts and vetting the responses given to media. Several factors played into this decision. The government was generally predisposed towards a more antagonistic relationship with the media, which played itself out over the entire government. There was also a general tension between the political leadership and the bureaucracy, which the military did little to repair with a number of high profile gaffes. The DND was not a completely unwilling participant in such a policy at times. Tighter media control was seen to be a requirement for the war in Afghanistan, as public opinion was considered a major vulnerability of Canada's effort.

Consequently, message discipline was a hallmark of Canada's F-35 strategy, which often stripped out the nuances that would have helped to explain the program's key features. DND was allowed to conduct a technical brief after the announcement, and it provided significant detail on the program's features glossed over during the hangar announcement. Nevertheless, individuals still felt constrained in what they could talk about. A conscious decision was not to discuss the comparative costing of the F-35 versus other aircraft, which would be a major issue going forward. Furthermore, the department's request to do additional events was denied. These may have allowed officials to correct some of the emerging misperceptions of the program that would later damage its prospects.

The politicization of the program soon became apparent. In March 2011, the Conservative minority government fell to a non-confidence motion, triggering a federal election. Both opposition parties had already criticized the program, and the Liberal Party included opening up the CF-18 replacement program to a competition as a major part of their platform. This included identifying the F-35 as a waste of billions of dollars.<sup>44</sup> While the Conservative Party won the election, the F-35 would not recede from becoming a major political issue.

### **Assessing the PBO and OAG Reports**

In the immediate months after the July 2010 announcement, the program faced a slow boil of criticism, in part driven by the cascade of bad news that emanated from the United States in the aftermath of the Nunn-McCurdy Breach. Reporters started making access to information act requests, which put further time demands on the NGFC. Within the office, the five man staff worked to digest the consequences of the Replan for Canada's situation. The acquisition costs were expected to see a modest 10 percent rise,



which would be covered by the budgeted contingency. Yet the most significant effect would be felt in the replacement timeframe.<sup>45</sup> The Replan pushed the production schedule back by six years, though the cost was predicted to remain stable.

Nevertheless, the political fallout started to emerge. The first major blow came with the March 2011 publication of the Parliamentary Budget Officer report, detailing what it described as the serious questions on the estimates made by DND. The core of the PBO's analysis rested on a costing of the F-35, which suggested that acquiring and operating the aircraft would cost over \$29 billion dollars compared to \$17 billion stated by the government in 2009 dollars.<sup>46</sup> But the PBO's findings were incorrect. The report utilized a parametric formula that calculated the potential aircraft cost as a function of weight. Since tactical fighters costs were rising at a rough constant over time, and the F-35's weight was known, it was speculated one could discover what the cost might be.

The use of parametric formulas for judging potential aircraft costs are a reasonable approach in instances where no representative examples exist, such as early in the concept development phase. However, the F-35A was far past that point of its development: by 2011 initial production models were entering service, with a cost of \$125 million per copy in 2009 dollars.<sup>47</sup> Despite the existence of verifiable data, the PBO utilized the parametric formula that suggested a per-unit cost of \$147 million for a full production aircraft. However, this ignored lower costs due to economies of scale and production learning.<sup>48</sup> As of 2016, the current per-unit cost of an F-35 is \$75 million in 2009 dollars; these costs are roughly what DND estimates were at the time, while the PBO's figures are 200 percent higher than the program's actual outcome.<sup>49</sup>

Yet the PBO report's failings were not completely of its own making. Typically, it liaised with the department, which allowed its principals access to information and perspectives that would sharpen their analysis. However, senior Departmental officials refused to provide any assistance whatsoever to the PBO. Left without guidance and little to no understanding of this field, the PBO contracted a UK company to undertake the parametric analysis.<sup>50</sup>

Upon its publication, the PBO report was immediately picked up by the media, which claimed the DND costing for the F-35 was inaccurate and completely underestimated the actual costs by at least \$12 billion.<sup>51</sup> It fed into criticism that had emerged in the July 2010 announcement that the government failed to undertake the proper analysis, or had deliberately misled the public. DND attempted to bring attention to the report's flaws. This included commissioning several works by specialists in defence economics and aerospace from Defence Research and Development Canada and the private sector.<sup>52</sup> Although these works provided solid evidence of the PBO's shortcomings in regards to the report, it



was to little avail. Part of the problem was their inaccessibility; both were highly technical documents written by long-time experts in the field. They were ignored, while the PBO's flawed conclusions were left to define the debate.

While the PBO report undermined DND's credibility on the F-35's selection, the damage would pale in comparison to the April 2012 report by the Office of the Auditor General. In the summer of 2010 the OAG launched its study of the program, which involved interviews with staff members and access to information requests. From the outset, the study was a highly flawed effort. At the initial meeting with DND representatives, the OAG representatives informed the gathering that they were pursuing a line argumentation – one that stated DND selected the F-35 in 2006 and every decision after that point was merely a justification of that decision.<sup>53</sup> This left DND officials aghast: not only was this completely incorrect, it was highly inappropriate for the OAG to start its work with such a significant bias. The assertion was made without obtaining a single document or conducting an interview with relevant personnel. The auditor team would never depart from this conclusion.

DND encountered difficulty in providing unequivocal proof to contradict the OAG's view, partly because it could not freely release documentation. Any information the Auditor General obtained was through the normal access to information act process. Unfortunately, the critical part of the SOR was in a classified annex that provided the technical justification for each specific requirement. In this instance, the OAG's inability to access the documentation was not due to the government's refusal to provide the information. At two different instances, NGFC representatives offered to have qualified individuals within OAG be vetted so they could view the classified documentation. The OAG refused, claiming it would conflict with its timetable. Rather than acknowledge that it could not review the documentation, the OAG claimed just the opposite: "decisions were made without required approvals or supporting documentation," and,

In our view, many of the steps and documents used to support the government's 2010 decision were of little consequence, because the key questions of whether to procure the F-35 and whether to run a competition were effectively determined by decisions taken much earlier, calling into question the integrity of the process.<sup>54</sup>

This statement, more than any other, exemplified how the office's bias influenced and corrupted the report's outcome.

Another major issue that the OAG's work raised concerned costing timelines. As discussed earlier, DND policy was to account for a twenty-year lifecycle as it corresponded to the purchase amortization period and was seen as a reasonable period of time to predict costs. However, the US government policy was to



provide full lifecycle costing, and this was available for the F-35, over the course of an estimated 36 years. Consequently, the OAG criticized DND for failing to undertake a full life cycle costing for the aircraft, despite the fact this had never been DND policy nor was it ever highlighted as an issue in any previous report. In its 2010 report on the Maritime Helicopter program, the OAG accepted DND's 20-year life-cycle horizon without questioning that timeframe.<sup>55</sup> Moreover the rationale was well accepted by other departments. As the Secretary of the Treasury Board of Canada, Michelle d'Auray, stated to the Standing Committee on Public Accounts:

[W]hen we have received submissions from the Department of National Defence concerning the timeframe for the costing of a life cycle, 20 years has been deemed to be an appropriate timeframe. It is set by the Department of National Defence. Going beyond 20 years is considered too high-risk to ensure that the value in contracting with industry would be sustained, or the costs would be going beyond the 20-year mark. So that, for us, is considered to be reasonable...<sup>56</sup>

The situation was best summed up by one NGFC member:

On the costing issue, the auditor general would have us fix something that was never viewed or highlighted as a problem, and expect us to correctly select and implement a costing model that they deemed appropriate.<sup>57</sup>

Not all of the OAG's comments were erroneous. One recommendation suggested that DND officials should have involved their counterparts in Public Works earlier in the assessment process. This was seen as a generally fair suggestion: it may have provided a firmer interdepartmental foundation for the project. A primary factor that led to a lack of Public Works participation was the classification levels required to manage the sensitive documentation. Few staff had the necessary clearance to handle the material, which meant they would be limited in their ability to participate in the process. This would be a valuable lesson going forward for DND.

The draft OAG report was circulated in early March 2012 within the government, which allowed it to discuss the findings and offer a response. Inside DND, officials felt betrayed by the report, which they felt mischaracterized much of their work largely by ignoring the evidence offered to OAG. This animosity led to an unprecedented situation where two deputy ministers issued a protest to the Prime Minister's Office (PMO) about the report, which highlighted its numerous problems. Their efforts were to no avail.

One visible but acute effect of the OAG report was how it served to exacerbate the poisonous relationship between the government and DND. Many within the PMO and the cabinet felt that military officials had lied to them on key aspects of the selection, which led them to give some credence to the flawed



OAG analysis. The lack of trust went far beyond the report. Many of the nuances of the F-35 program, such as on industrial benefits or the lot-by-lot costing, required an acceptance of risk by the government. With the collapse of the relationship, the Conservative leadership had no confidence in those figures. Consequently, the PMO directed National Defence to largely accept the report's findings, and started to develop their own response.

### **The F-35 Program and Media**

The public's response to the report's publication was almost universally negative. A number of media outlets claimed that the government and/or DND had "hid" the true cost of the F-35 program, citing the difference of between the 20 and 36 year timeframe.<sup>58</sup> Many commentators also hammered the government on the apparently botched procurement process, and called for an actual procurement to be launched immediately.

The media's influence on the public was accentuated by the growing influence of the Internet and social media. With media reporting in the United States largely focusing on the program's problems, any on-line search would give highly misleading perceptions of its actual status. For example, in late June 2015, reporter David Axe provided excerpts of a classified test report that he interpreted to suggest the F-35 was unable to maneuver with its predecessor, the F-16.<sup>59</sup> Although his assertions were soon discredited by a number of experts, they were widely disseminated and influenced public opinion in Canada.<sup>60</sup> Axe's article's publication coincided with the greatest search volume on the F-35 program in the summer of 2015.<sup>61</sup> It also completely overshadowed a major milestone in the project's development, the US Marine Corps declaration of the F-35B's introduction into service.

The uncertainty over Canada's position allowed another group to enter into the fray: the rival manufacturers. To be sure, many of them were involved in perfunctory efforts between 1999 to 2010 to promote their aircraft, but they did not seem to view Canada as a real opportunity. For example, several European manufacturers questioned the NGFC evaluators' motives when then toured their facilities as part of the evaluation process.<sup>62</sup> To them, it made little sense for Canada to be looking elsewhere as a JSF partner. Further credence can be seen in the fact that none of them made a protest or comment, official or otherwise, after the 2010 announcement.

The OAG report and subsequent government response seemed to alter that calculus. In many ways, the manufacturers and their local proxies were attuned to the particulars of the Canadian public perspective on procurement. Thus their marketing reflected that, by utilizing terms and themes were familiar to the public discourse, while exploiting the supposed failings of the F-35. In some cases, they misrepresented



situations to provide their offerings an advantage. A good example of this was a 2013 *CBC News* article titled “Boeing touts fighter jet to rival F-35 — at half the price.”<sup>63</sup> The article claimed the F/A-18E’s acquisition price was \$55 million dollars, compared to an F-35 cost of \$110 million, which was extremely misleading. This included citing price figures from different base years, meaning that the F/A-18E would appear significantly less costly than the F-35 for Canada to purchase. Furthermore, it did not include key costing considerations such as Foreign Military Sales fees, ancillary equipment, and requisite future upgrades that would actually make the Super Hornet significantly more costly to acquire and operate than the F-35 when properly evaluated.

Considering the controversy’s scale, the foreign manufacturers were effective at distorting public perceptions of the program.<sup>64</sup> Few individuals had the ability to properly evaluate those claims, and DND was prevented from providing guidance. The only other party that may have provided a contrary point of view was Lockheed Martin, but it elected to take a passive role in the process. Canada remained a partner in the JSF program, which complicated the firm’s relationship with the country. There was no funding available to mount a marketing campaign, particularly when the country was already in the JSF program. There was also an expectation the government would eventually select the fighter, since it was clear the F-35 was much superior to the other options. Their lack of presence, as well as that of DND, basically resulted in a public discourse heavily dominated by parties who were against the F-35.

### **NFPS and the Seven-Point Plan**

The Conservative government’s response to the Auditor General’s report was swift: it placed the program “on hold” and announced a Seven-Point Plan. The effort would have two objectives. First it would kick the contentious program down the field several years and diffuse the immediate crisis. Second, unofficially, the Conservatives hoped the Seven-Point Plan would provide the legal and technical foundation upon which a proper competition to be launched.<sup>65</sup>

To this end, the Seven-Point Plan’s particulars included: freezing the C\$9 billion dollar acquisition envelope for the program; the creation of a National Fighter Procurement Secretariat (NFPS) within Public Works to coordinate the overall assessment; a number of reporting and oversight requirements for involved agencies to evaluate the cost, capability, and schedule of the F-35 and other options; and finally, an independent review of DND’s life-cycle costing, and another on the overall effort.<sup>66</sup> The former would be conducted by accounting firm KPMG, while the latter would be a specially selected panel of four experts: Keith Coulter, Rod Monette, Phillipe Lagassé, and James R. Mitchell. Coulter was a former CF-18 pilot, who had since served in a number of high-level positions within the bureaucracy, while Lagassé was a respected University of Ottawa professor (now at Carleton University) who had critiqued



a number of DND policies. Monette and Mitchell both had extensive experience within government, and brought unique perspectives in auditing and policy analysis.

The NFPS would produce a report on the appropriateness of the statement of requirements, and oversee the entire effort. The original SOR was set aside, as it was seen as being unacceptable as a basis to go forward. The process did not preclude another sole-source selection, but there was a general feeling that this would not occur again.<sup>67</sup> Another important part would be the so-called “Options Analysis” to help to inform the development of a new SOR. Immediately they sent out a request for non-binding information to all of the major fighter manufacturers for information on their fighters and capabilities. The questionnaire covered a wide variety of cost, capability, and industrial issues.

Among the first outcomes of the Seven-Point Plan was a pair of reports released in late November 2012. The first was DND’s regular update on the F-35’s acquisition and lifecycle costing that it would produce every year thereafter. The DND annual update largely validated the original costing data undertaken by the NGFC for the 2010 recommendation to purchase. The costing was undertaken by a larger team within DND, who were now armed with much more accurate costing data from the United States.<sup>68</sup> The most significant difference was the inclusion of 42-year lifecycle compared to the previously employed 20-year period. However the report also presented an updated figure for a 20-year lifecycle cost, which showed only a 2 percent cost increase from 2010.<sup>69</sup> This would be an important point that was largely lost to everybody except those involved in the NGFC and NFPS effort. Despite the JSF overall problems, the F-35 would remain the lowest cost option of all the aircraft available. The estimates’ confidence only increased as the project matured: the December 2014 update showed a 0.06 percent increase from the 2012 total program cost.<sup>70</sup>

The second report was the KPMG contracted report to develop a new lifecycle-cost framework that could be applied for future procurements. The outcome reflected the inherent differences between procurement in the defence sector to the rest of the public sector. One senior official felt that KPMG had little to no experience on how to “undertake proper long term costing in a defence environment” and relied heavily on DND’s experience to produce the report.<sup>71</sup> The consultancy interviewed foreign allied defence departments, to give some perspective, but these were frequently used to support its position. Consequently, the KPMG report did not provide any significant improvement in DND’s lifecycle practices; rather it largely provided greater detail. In many parts, it validated the department’s practices. For example it noted that several allies did not account for a total lifecycle, but also ended estimates at arbitrary timeframes, usually 30 years.<sup>72</sup>

Throughout 2013, the constituent parts of the NFPS worked towards their ends. Its analytical work was



influenced by departmental perspectives, which followed somewhat predictable trends. Public Works officials remained rooted in the NFPS being a preparatory activity towards a full competition. They worked assiduously to unpack all of the assumptions that underpinned each criterion of the SOR in order to remove ones they felt were included to bias unfairly the assessment towards the F-35. DND representatives worked with them, but they often clashed over points. Several of the members had worked on aspects of the original NGFC effort and keenly understood the basis of the original SOR's assessment.<sup>73</sup> This dynamic played out over the coming weeks and months.

To start its analysis, the NFPS started by identifying all of the potential missions the fighter force may be called upon to carry out. These included ones which the RCAF would typically expect in the fighter force would be called upon to carry out: combat air patrol, expeditionary operations, or northern operations. However, it also included other less critical roles such as search and rescue, fisheries/maritime surveillance, and airshow appearances. The initial assessment effort provided no priorities for these roles: so the requirement for airshow displays carried the same weight as continental defence. This approach was viewed as of little value for two reasons. First, any competitor could meet the vast majority of the roles. Second, such a list was not representative of the actual needs of the CAF. Consequently, the NFPS decided to identify which capabilities were important. After several months of work, these were focused on the core military tasks the CF-18s were called to carry out: expeditionary capabilities and continental defence.

One discussion focused on limiting an SOR to only continental defence missions. This line of reasoning followed that since continental defence entailed less intensive missions, running a competition strictly on their requirements would allow more aircraft to compete. Representatives within DND vehemently disagreed.<sup>74</sup> Limiting the competition criteria to only continental defence missions could result in Canada purchasing an aircraft that was inadequate for conducting expeditionary operations with allies. Several non-defence bureaucrats pushed back, even going as far as questioning whether Canada should even get involved in these kinds of missions. In response, DND representatives pointed out that the RCAF has been called to carry out such operations on a number of occasions over the past two decades, and it was unlikely this would stop.<sup>75</sup> “Contributing to International Peace and Security” was a core mission of the *Canada First Defence Strategy*, and could be reasonably expected to remain part of the CAF's mandate going forward.<sup>76</sup> Moreover they pointed out that such a radical shift was outside of the bureaucracy's purview: it would require a political decision to be made.

DND could count on one particularly compelling piece of evidence. Between 2012 and 2014, qualified individuals within DND, the NFPS, Public Works and other related departments were given the opportunity to be read into the special access program and view the classified documentation.<sup>77</sup> This vastly



broadened the number of people with in-depth knowledge of the program, which was a legitimate criticism of the OAG report. For many individuals, exposure to the classified briefing radically altered their views on the F-35, and by extension the process to acquire the aircraft. It would undermine a prevailing view that the various options were roughly equivalent in capability and they could be compared through a competition format.

The classified briefing placed into stark relief the emerging threats to allied aerospace operations which few of these newly read-in individuals, if any, had any view on before this point. The report also detailed how the F-35 was designed to meet these challenges, and how other fighters were not able to operate against them. Anecdotally, almost every individual who was given the brief emerged with a much stronger commitment to obtain the F-35 and its capabilities. Many were surprised by the intelligence and technical assessments, and how even moderate threat environments in the future would severely curtail the effectiveness of existing tactical fighter designs. In light of the extensive consultations, the options analysis, and the broader awareness of threat environment, individual views shifted on the F-35's capabilities' necessity for Canada's future tactical fighter capabilities.

### **Quiet Before the Storm**

2014 was the year that everything should have turned around for the Canadian JSF program. Events abroad were looking extremely encouraging. The overall program seemed to be stabilizing. Cost control efforts were showing fruit as the contract lots were now under fixed cost contracts, meaning any overruns would be the responsibility of the contractors.

The NFPS efforts were also drawing to a close. The various parties that were involved in the Seven-Point Plan were wrapping up their work. In the spring a meeting was held with all of the various members of the NFPS efforts and representatives of the involved departments. This included the independent assessors, the Chief of the Defence Staff, Deputy Ministers from involved departments, and a retinue of staff. The meeting was held in a large conference room in a government building in Gatineau, Quebec, and chaired by the now Deputy Minister of Public Works, Michelle D'Auray. The meeting had each representative present their findings, followed by a group discussion.

Through the course of the presentations and discussion it became apparent that, despite the inclination to run a competition, the nature of the situation precluded such an approach. First, it was quite evident that the operational justification for recommending a sole-source acquisition in 2010 remained correct. The requirement for a high level of capabilities was validated by the NFPS, despite the earlier controversy. The second, and perhaps the most important consideration, related to cost. By 2014 DND and the NFPS had fleshed out their estimates for the F-35 and the other options. Although they had greater fidelity than



the figures used in the 2010 recommendation, officials found little appreciable difference. Once again the F-35 was found to be the lowest cost to acquire and operate for the aircraft's full-lifecycle. Finally, as before, Canadian industry bureaucrats discovered that JSF program offered superior offsets to all the other options, though government requirements concerning IRBs (now renamed Industrial and Technical Benefits), meant that this did not provide additional advantage to the program.

The confirmation of the 2010 assessment resulted in a near unanimous opinion to recommend the sole-source selection of the F-35.<sup>78</sup> Many individuals at the meeting expressed an even more strident view: running a competition was actually a legal liability. With the Options' Analysis unequivocal about the F-35's superiority in all assessment categories, including cost, the government could now knowingly enter into a competition where the outcome was clear. Competitors could then sue Canada for running a competition where it knew the outcome already. Consequently, the meeting participants agreed that the NFPS should recommend that the government proceed with a sole-source selection of the F-35. This was passed to the government in early spring.

The Conservative leadership decided to accept the recommendation and move forward on the sole-source acquisition of the F-35. Like before, they planned an announcement sometime in late July, which would explain their decision. One of the first steps occurred on 12 June 2014, when the independent view panel released a statement endorsing the process that the NFPS had undertaken as being fair and impartial. The event seemed to presage a much larger announcement about what the government's decision on the file.

Unfortunately, events intervened: the 23 June engine fire of an USAF F-35, detailed at the beginning of this study. The aircraft itself was a total loss; it was studied then later broken up for parts. The cause was not immediately known: it occurred in a position that was not monitored by onboard sensors. Due to the F-35's developmental status, a fleet-wide grounding was immediately issued. Within a few weeks a potential cause was determined and a fix designed, which was retrofitted into existing aircraft.

The political damage was mostly felt outside of the United States. The F-35B was set to make its international debut in Farnborough Air Show, which would be a major showcase of the aircraft. Its appearance was cancelled at the last minute. This was a major embarrassment to the program, yet it had little lasting effect on most partners. They had already committed to the aircraft and there was no uncertainty on the selection. The lone exception was Canada, where the fire could not have come at a worse time. It undermined the months of work and preparation made by the NFPS that would justify the sole-source selection by playing into broader public fears about the fighter. Perhaps the most evident aspect of this was the reliability of a single engine, especially considering the Arctic operations.



A week before the fire, Michael Byers – a professor at the University of British Columbia – penned a *Globe and Mail* op-ed based on a longer report he had written on this very particular topic.<sup>79</sup> It argued that engine failures were common among modern aircraft and that flying a single engine fighter was unsafe. Their analysis contained a number of flaws. Byers based his argument on data from the civilian aviation sector and directly applied it to military aerospace. In doing so, he failed to account for several issues, including the orders of magnitude difference in number of aircraft and flight hours per year and in total as well as different performance requirements. The author identified the eleven instances of a modern civil airliner (the Boeing 777) had an engine shutdown over a single year. However, the report failed to realize that the entire 777 fleet flies roughly 285 times more hours per year than Canada's CF-18 fleet (4,500,000 hours versus 14,000 hours).<sup>80</sup> Nevertheless their arguments played into two established storylines about the JSF. The first was that the plane's development was troubled. The second was that it was less suited for domestic needs given its single-engine design.

The incident immediately forced a halt to the announcement, but it did not change the decision. Rather the PMO desired a way to present the decision fait-accompli. Through high-level channels with the US Defense Department, the Government of Canada obtained a verbal agreement with the USAF to trade four F-35s currently on the production line with four F-35s Canada were to purchase several years later.<sup>81</sup> This was unprecedented. For almost every foreign procurement (particularly through the US Foreign Military Sales process), Canada could expect delivery approximately 24 months after an order was made. This agreement would result in Canada obtaining F-35s currently undergoing assembly in Fort Worth, Texas; the RCAF would have its first four aircraft within six to eight months. Moreover, at the conclusion of negotiations with the Joint Program Office, expected in mid-November 2014, Canadian pilots could be sent to Luke Air Force Base in Arizona where the international training center was located. They would become an initial cadre of instructors that would train the first operational RCAF F-35 pilots. The decision would accelerate the introduction of the F-35 by at least two years.

On 27 October 2014, the US Secretary of the Air Force was given a briefing on the overall status of the F-35 program by Lieutenant-General Charles Bogdan. It included a reference on the agreement with Canada. Four days later the briefing deck was leaked in the United States. A few days later, members of the Canadian press discovered the slide and questioned the government.<sup>82</sup> A number of government representatives immediately denied that a selection was made. The PMO decided to shelve negotiations with the USAF and the JSF Program office, and hopefully revisit the issue after the Fall 2015 election. Canada would continue to pay its JSF program dues and attend board meetings, but for all intents and purposes, was no longer an active participant in the program until then.



## Conclusion

On 23 May 2016, two F-35s touched down on a slightly overcast morning in Leeuwarden Netherlands. The airbase hosted several thousand invited guests, while over 100,000 individuals watched the events through a live stream. AN-1 and AN-2 were the Royal Netherlands' Air Force first F-35s, and their arrival was the first international debut of the fighter. The Dutch procurement was not without its own controversy. Political parties raised concerns over the increasing costs after the 2010 Nunn-McCurdy breach, and discussions swirled around competing aircraft. Despite this, the coalition government accepted the advice of their military staff, and continued the procurement of the fighter. In September 2013 the government made a firm decision to purchase 37 aircraft, and would consider future purchases if the budgetary environment allowed for it in the future.

The difference between the Dutch and Canada's replacement programs is that Canadian political parties and the public have largely failed to grasp the underlying facts, and created a discourse that bore little resemblance to reality. The response to the OAG report typifies this problem; despite its irrevocable flaws and incorrect conclusions, it was left unassailed and completely undermined years of expert work undertaken by the military and government to support the selection decision. The Conservative government's response is somewhat surprising considering the concern a number of caucus members expressed about the cost of the program. Given their view, one would assume more preparation would have occurred to communicate the program's features. At every stage however, the government failed to achieve that basic task. Moreover their centralized message control interfered with the bureaucracy's ability to communicate its message. This was not a phenomenon limited to the Armed Forces, as many scientists across government complained about being "muzzled." The irony here was that message control actually hindered the political leadership's own policy goals.

The entire situation has had direct consequences for the CAF and the security of the country. The delay in ordering a replacement fighter from 2010 to 2015 basically means the CF-18 will need to soldier on an additional five years. This will result in increasing vulnerability to pilots and a diminishing level of capability, at a time of growing global uncertainty and challenges to the Western political order. This is already evident today. The current government has reaffirmed its commitment to defend NATO allies on the alliance's eastern border, including the deployment of 450 soldiers to Latvia.<sup>83</sup> For the policy to have any deterrent effect whatsoever, the CAF requires capability commensurate to the threat it faces. In the recent series of deployments to Eastern Europe, the CF-18 was viewed as extremely vulnerable to modern anti-aircraft systems fielded by the Russian Federation.<sup>84</sup> Furthermore, Canada's primary partner for continental aerospace defence, USAF, is transitioning to a force largely comprised of the F-35 and the F-22. Canada will face an interoperability gap well into the 2020s even if the F-35 was procured



today, and much longer if another aircraft is selected.

The failed procurement process also sets a poor precedent for the public service, at a time when it is desperate to renew itself, both in terms of personnel and policies. The outcome of the replacement program illustrates the disincentives towards policy innovation for members of the bureaucracy. The officials involved clearly understood their requirement towards accountability, and duty towards ensuring the country and the military obtained the best outcome possible. They applied due diligence in their actions, but in the end watched their work be discredited on some of the flimsiest of grounds and for questionable political motivation. Furthermore, the false assertion of improprieties in the process leveled by the OAG only discredited the public's view of the bureaucracy and reduce morale in the department. These come at a time when the bureaucracy is facing a massive turnover in the coming years, as the baby boomer generation exit the workforce and require replacement. These sorts of events do not inspire individuals to join or stay in the public service.

Beyond the immediate consequences of the inaction is possibility for wider damage to Canada's international standing. The CAF has undergone a major drawdown since the end of the Cold War, which saw their effective strength fall by over a third. The Martin and Harper governments promised a much-needed recapitalization and modernization of the military, but much of the new funding was diverted towards the operational demands of the war in Afghanistan. Although many western militaries have faced the same issue, this has been exacerbated by Canada's relatively low defence spending, which was highlighted by allies at the 2014 Wales NATO Summit.<sup>85</sup> Thus the outcome of the JSF program cannot inspire confidence among close allies who are partnership members. The governments of these states are privy to the cost, capability, and industrial benefits data. Canada's constant indecision on this topic has been incomprehensible to them, and it comes with consequences for their own policies. In his October 2015 testimony to Congress, Lieutenant-General Christopher Bogdan, the project executive officer, estimated a potential cancellation will cost the remaining partners \$1 million dollars per each aircraft they purchase.<sup>86</sup> The situation helps undermine allies' confidence in Canada's leadership handling of basic defence matters. The failed 2014 deal with the United States for four F-35s was a particularly sharp rebuke, having significant consequences for the USAF efforts to manage a difficult budgetary situation related to sequestration.

The indecision was not without repercussions, some of which are already evident. Prior to 2012, Canada planned to be a partner with Australia and the UK to operate a reprogramming laboratory for their F-35 fleets. Known as the Australia-Canada-United Kingdom Reprogramming Laboratory (ACURL), it would ensure that the countries could quickly respond to new threats and situations. As a result of Canada's indecision, the UK and Australia moved ahead with the United States to set up their own laboratory, which was codified in an addendum to the MOU in 2014. ACURL is a relatively small example, but it



illustrates how indecision can have consequences for Canada's defence relations.

Observing the sweep of the CF-18 replacement program's history it is difficult to imagine an area of government policy that has been more misunderstood or suffered under more political manipulation. There were issues with how DND undertook the initial evaluation: it was under-resourced, some of the risks could have been better communicated, and the department could have attempted to involve Public Works earlier in the process. Nevertheless, these were by no means fatal flaws and they certainly did not live up to the hyperbole of mismanagement and bias later leveled on the program. The main sources of those accusations, the PBO and the OAG, both produced highly imperfect reports. Their conclusions were heavily criticized within government at the time, but were accepted widely by the public and have undermined the entire process since.

Rather, six years in hindsight, the original assessment's conclusions remain valid. The F-35 provides the country superior cost, capability and industrial benefits. While many felt there to be significant risk that the price of the fighter may fluctuate, those concerns receded by 2014. This was largely confirmed when the Conservative government implemented the Seven-Point Plan, and launched a completely new assessment process. Although there was an expectation that this would result in a competition being launched, the approach basically reaffirmed the work of the NGFC and recommended a sole-source selection. These fundamental realities continue to persist, while the fallacious political debate continues unabated. Failing to heed that lesson, will only ensure a continued incoherence in policy today and growing irrelevance of the Canadian Armed Forces in the future.

## ABOUT THE AUTHOR

**Richard Shimooka** is a Research Fellow at the Conference of Defence Associations Institute. He was a fellow at the Defence Management Studies Programme at Queen's University from 2007–2012. Richard has written several works that cover a diverse array of topics, including Canadian defence and foreign policy, procurement policy and organizational culture. This includes several articles for the Canadian Military Journal, and a book, *Let Sleeping Dogs Lie: The Influence of External Studies and Reports on National Defence Policy – 2000 to 2006 (Queens' School of Policy Studies)* with Douglas Bland. Richard holds a Masters in Strategic Studies from the University of Wales Aberystwyth and a Bachelors with Honors in Political Studies from Queen's University.



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151 Slater Street, suite 412A , Ottawa, Ontario K1P 5H3  
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