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Fifth-Generation Ready: How Prepared Is Canada for the Integration of the F-35 Platform Capability?

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**FIFTH-GENERATION READY: HOW PREPARED IS CANADA FOR THE
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5TH GENERATION READY: HOW PREPARED IS CANADA FOR THE INTEGRATION OF THE F-35 PLATFORM CAPABILITY?

AIM

1. The aim of this paper is to identify to the RCAF HQ that despite Canada's recent announcement to procure the F-35 5th generation fighter aircraft platform, without investment and reorganisation across all function components, the CAF will be unable to expedite the combat platform integration to become a whole-force 5th generation capability. This paper will identify to the RCAF HQ how wider coordination across the various CAF Level-One (L1) organisations is required to successfully expedite the F-35 platform as a capability and to deliver upon the RCAF Strategy.¹

INTRODUCTION

2. In Jan 23 the Government of Canada officially announced its intent to invest \$119bn in the procurement of 88 F-35 aircraft, beginning delivery in 2026.² There is now a requirement for the CAF to make a rapid transition to integrate across the whole-force to transition from the F-18 Hornet platform to a 5th Generation F-35 platform capability. The CAF's Strong Secure and Engaged (SSE) policy directed the RCAF's Future Fighter Force to generate significant operational benefits for both Canada's sovereign defence and its expeditionary NATO force projection.³ However, its enablement presents significant risks for both the RCAF and for the wider CAF to solve. This paper will identify the key capability component factors impacting the F-35 platform integration development from a standalone aircraft into a 5th generation integrated platform. It will draw high level observations as to why the procurement cannot occur in isolation and why the RCAF's knowledge and integration into other CAF wide L1 organisations is the key to success.

3. **Limitations of service paper.** This paper accepts ADM(Material) (ADM(Mat)) is directing the F-35 platform procurement programme and is sponsored by the RCAF, specifically the Future Fighter Office. The points highlighted within this paper will not be unknown by the relevant offices and the intent is to highlight factors requiring consideration by personnel across the RCAF HQ, and other L1 organisations. It is specifically aimed at the operational level whereby planning decisions will be essential in determining the future of the RCAF's F-35 platform capability.

¹ Department of National Defence, "RCAF Strategy: Agile, Integrated and Inclusive," Royal Canadian Air Force publication (2023), <https://www.canada.ca/content/dam/rcaf-arc/documents/reports-publications/royal-canadian-air-force-strategy.pdf>.

² Government of Canada, "Canada Finalises Agreement to Purchase New Fight Jets for RCAF," Public Services and Procurement Canada, dated 9 Jan 23, Canada finalizes agreement to purchase new fighter jets for Royal Canadian Air Force - Canada.ca.

³ Department of National Defence, "Strong, Secured and Engaged," Government of Canada DND website, p38, (2017), Strong, Secure, Engaged. Canada's Defence Policy.

DISCUSSION

4. **F-35 platform as a capability.** A defence capability, although varying by national description, is defined as the ability to achieve a desired effect and result through the integration of functional components and resources.⁴ If components are misaligned, either through resource prioritisations or risk acceptance, there will be inefficiencies and the desired effect of the capability will be altered. The F-35 platform capability is designed to be “mission-ready, anytime and anywhere”⁵ but the aircraft itself is only one component of the overall 5th generation capability demands. The F-35 platform demands advanced integration, multi-role technology and sensors,⁶ designed to defeat its adversaries and will be at the forefront of delivery the CAF’s Pan-Domain Force Employment Concepts (PFEC).⁷ With the first RCAF F-35 platform aircraft expected in 2026, for IOC in 2032, the enabling functional components must be resourced now to be ready for RCAF acceptance. The RCAF, and the CAF, must adopt a 5th generation mindset across the whole force and the F-35 platform cannot be seen as simply a replacement of the F-18 Hornet; it will enable whole-force effects across all CAF domains and environments. The Strong, Secure and Engaged (SSE) approach to “Anticipate, Adapt and Act”⁸ can be exploited, and enabled, by the F-35 platform if prioritisation is provided beginning immediately.

5. **The CAF functional components of capability.** The CAF capability-based planning process identifies the following lines of consideration for capabilities: personnel; research, development and operational research, infrastructure and organisation, concept, doctrine and collective training, IT infrastructure, and equipment, supplies and services.⁹ This is collectively known as PRICIE and this paper will draw upon these functions to identify the wider RCAF and L1 organisation’s component considerations for the F-35 platform capability.

- a. **Personnel.** The F-35 platform capability will require consideration across all trades of the RCAF and other joint-CAF trades. The 5th generation advancements will place demands on different trades, such as increasing intelligence processing or aircraft cyber systems support, and will require a rebalance of personnel across the RCAF. This is an especially prevalent issue considering the ongoing challenges to the CAF’s recruitment and retention.¹⁰

⁴ Aaron Taliaferro et al, “A Guide to Capability-Based Planning (CBP),” Defense Governance and Management: Improving the Defence Management Capabilities of Foreign Defence Institutions, Ch2, p10, 1st February 2019, <https://www.jsor.org/stable/resrep22853.5>.

⁵ Lockheed Martin, “The Most Advanced Fighter Jet in the World,” Lockheed Martin website, last modified January 2023, About the F-35 (f35.com).

⁶ Lockheed Martin, “Unrivalled Capabilities,” Lockheed Martin website, last modified January 2023, 5th Gen Capabilities (f35.com).

Department of National Defence, “Pan-Domain Force Employment Concept: Prevailing in a Dangerous World,” Draft copy, Canadian Armed Forces publication (2022), Pan-Domain Force Employment Concept.pdf.

⁸ Department of National Defence, “Strong, Secured and Engaged,”

⁹ Aaron Taliaferro et al, “A Guide to Capability-Based Planning (CBP),” p7.

¹⁰ Lee Berthiaume, “Canadian Air Force’s F-35 Jet’s Plan Facing Personnel Shortage Challenge’s,” Canadian Press, last modified 13th February 2023, (1) Canadian Air Force’s F-35 jets plan facing personnel shortage challenges - National | Globalnews.ca.

Difficult RCAF L1 decisions will be required on RCAF capability choices, prioritising F-35 platform demands over likely legacy capabilities, and it will require careful RCAF and public messaging in order to not impact recruitment or retention further. Additionally, the RCAF should consider the Whole-Force concept used by many partner nations – whereby defence optimises the utilisation of military, reservists, public servants and industry to build resilient, knowledge and agility. This would allow the RCAF to best employ military professions in the operational readiness roles.¹¹ This, in turn will build enduring experience, and institutional agility¹² for support to the F-35 platform. Of note, the F-35 platform was selected for Canada on the premise of job growth within Canada¹³ and the RCAF personnel to industry relationship will be essential for the growth and exploitation of the F-35 platform capability. An F-35 platform personnel growth plan, led by Dir Air Pers with support from Dir Mil Careers for joint trades, is required for early identification of core skillsets and possible Whole-Force opportunities. In parallel, exchange posts with similar sized nations operating the F-35 platform, such as the UK or Belgium, should be explored for all trades. Liaison Officers (LOs) in operational level roles, such as the USMC mission support centre, to build the F-35 platform specific experience prior to the platform's arrival in Canada, should also be examined.

- b. **Infrastructure.** The F-35 platform infrastructure requirements present a plethora of challenges and requirements, such as buildings, security protection, and IT distributed infrastructure. These challenges must be addressed prior to the F-35 platform being authorised by partner nations to be physically located in Canada, while reassuring the F-35 platform core programme, especially the USA, of the RCAF's infrastructure integrity. Despite the USA first taking delivery of the F-35 platform in 2006, even as recently as 2019 the F-35 platform programme reported to the House of Representatives that their infrastructure continues to lag, and that it was delaying advancements in data fusion and readiness of the capability.¹⁴ With programme infrastructure risks notoriously spiralling, especially with novel technology, this functional component presents a high risk to enabling a timely 5th generation capability and has been identified by the RCAF Strategy

¹¹ John Gearson, Philip Berry, Joe Devanny and Nina Musgrave, "The Whole Force by Design: Optimising Defence to Meet Future Challenges," Serco Institute (October 2020), [whole-force-by-design-serco-institute-kcl-report-final-13.10.20.pdf](#).

¹² Department of National Defence, "RCAF Strategy: Agile, Integrated and Inclusive," p9.

¹³ Lockheed Martin, "F-35 – The Right Choice for Canada," Lockheed Martin website, last modified January 2023, [Canada \(f35.com\)](#).

¹⁴ John Garamenti and Donald Norcross, "F-35 Program Update: Sustainment, Production and Affordability Challenges," Joint Committee of the Committee of the Armed Services, 116th Congress First Session, 39-806, 13th November 2019, [CHRG-116hhrg39806.pdf \(congress.gov\)](#).

as requiring second and third order consideration in procurement.¹⁵ With the infrastructure elements led by ADM (Infrastructure Environment) (ADM(IE)) on behalf of RCAF and ADM(Mat), the RCAF should look to rapidly increase the number of RCAF specialist representatives to build corporate understanding, whilst holding contractors and delivery teams to account. Lessons learnt from implementation by similar sized nations operating the F-35 platform, should be consistently incorporated into the capability plan, particularly as the RCAF expands the F-35 platform across harsh Canadian environmental conditions.

- c. **Concept, doctrine and collective training.** Despite the recent public announcement of the platform procurement, developments of doctrinal concepts are often considered just as defence prepares to accept a capability, rather than using doctrine to inform procurement development. The RCAF has procured the F-35 platform for a dual-role; sovereignty defence and expeditionary force employment, emphasising a greater importance on doctrinal direction to inform the development of Control of the Air, ISR and Attack functions for the platform.¹⁶ Clear doctrinal decisions will also impact the evolution of support components, including logistics, personnel, and IT infrastructure, and focus on the doctrinal function will allow early decisions to be made in the procurement programme to enable a “mission ready, combat-capable force.”¹⁷ The RCAF Air-Warfare Centre (ROC) will be crucial for leading this activity and must ensure that all functional components are advised to directly inform the integration of the F-35 platform capability by the RCAF.

- d. **IT infrastructure.** The Communication and Information Systems (CIS) core challenges for the F-35 platform expand beyond the traditional realms of aircraft support networks. Instead, the plethora of data links, crypto security, data management and types of networks is extensive, demanding specialist architectural design, installation and understanding of RCAF operational priorities. The ADM (Information Management) (ADM(IM)) function will be required to be the lead element, not just embedded within other functional areas, such as core infrastructure or equipment. This is of particular importance for acting upon the RCAF Strategy to enhance its integration with the CAF Joint Force,¹⁸ whilst ensuring there are suitable military personnel embedded within ADM(IM) to influence the outputs.

¹⁵ Department of National Defence, “RCAF Strategy: Agile, Integrated and Inclusive,” p12.

¹⁶ Department of National Defence, “Royal Canadian Air Force Doctrine: Command and Control,” RCAF Doctrine, 2nd Edition, B-GA-402-001/FP-001 (July 2018), Highlighted - RCAF C2 Doctrine.pdf.

¹⁷ Department of National Defence, “RCAF Strategy: Agile, Integrated and Inclusive,” p8.

¹⁸ Department of National Defence, “RCAF Strategy: Agile, Integrated and Inclusive,” p5.

- e. **Equipment supplies and services.** This section will focus on the supplies function regarding the F-35 platform. Supplies, or logistics, presents a complex hurdle due to the integration of technology, skillset and the direct impact on airworthiness, which arguably has enough complexity to be a standalone functional component. The F-35 platform utilises the Autonomic Logistics Integration System (ALIS) for logistics management, which is integral in enabling the platform with data-centric logistic analysis and inventory supply chain management.¹⁹ It enables data exploitation, however the technology reliance can directly impact the airworthiness of the platform, with confirmed experiences of other nations grounding their F-35 fleets due to incorrect logistics accounting on ALIS.²⁰ ALIS is a fundamental delivery component of the F-35 platform and the RCAF will need to consider how to integrate with sovereign logistics systems, such as the Defence Resource Management Information System (DRMIS). This will be a step change for logistics management, requiring a technologically modernised, whole-system approach for integration, especially alongside industry partners, and the CAF Joint Force. This approach can be seen in the UK's adaption for the F-35 platform by establishing of their logistics operational support centres which are enabled by both defence and industry.²¹ Establishment of partnerships and accountability will be integral to achieving efficiencies and reducing the risks associated with delivery of the F-35 platform capability – from the logistics component perspective. Parallel consideration across ADM(Mat) existing logistics programmes will be key to ensuring coherency and preparedness of delivery.
6. **Additional functional components for consideration.** Although not included as standalone elements within the CAF functional component capability processes, other Five-Eye nations include intelligence and interoperability as overarching functional components.²² Due to the technological complexities and RCAF operating changes required for the F-35 platform, separate consideration should be given by RCAF and ADM(Mat).
- a. **Intelligence and exploitation.** The F-35 platform provides enhanced ISR capabilities for greater situational awareness and data intelligence collection,

¹⁹ Lockheed Martin, "ALIS – Autonomic Logistics Information System," Lockheed Martin website, last modified January 2023, Autonomic Logistics Information System (ALIS) | Lockheed Martin.

²⁰ Valerie Insinna, "Two F-35 Partners Threatened to Quit the Program. Here's Why They Didn't," Defense News – The Hidden Troubles of the F-35, Last modified 12th June 2019, Two F-35 partners threatened to quit the program. Here's why they didn't. (defensenews.com).

²¹ British Aerospace Engineering Systems, "F-35 Sustainment," BAE website, accessed 26th February 2023, UK | F-35 Sustainment | BAE Systems | International.

²² Aaron Taliaferro et al, "A Guide to Capability-Based Planning (CBP)," p10, 1st February 2019, <https://www.jsor.org/stable/resrep22853.5>.

exploitation and real time intelligence fusion.²³ Designed to excel in multi-domain operations, the F-35 platform will advance Canada's real-time intelligence cycle, but requires sufficient ground-based components to exploit, analyse and disseminate intelligence products, both for and generated by the F-35 platform. The CAF's Joint Force intelligence will require organisational design overview to keep pace with the F-35 platform advancements and to support Canada's alliance inputs for both NORAD and NATO. The inaugural Joint Intelligence Operations Centre (JIOC) offers an opportunity to learn and prepare for the integration of 5th generation products but will require direction from the RCAF doctrine advancements in order to ensure intelligence can be used to operational advantage with the F-35 platform.²⁴

- b. **Interoperability.** SSE identified the future RCAF Future Fighter as an essential programme which must be "interoperable with our allies and partners."²⁵ Interoperability must be considered as a core design component to ensure system architectures are considered with interoperability in mind. RCAF must ensure it influences ADM(Mat) acquisitions to ensure the programme keeps at a speed whereby the interoperability demands remain relevant to the operational demands for the RCAF and CAF Joint Force.²⁶ This will need to include training, C4ISR systems, cryptography and platform tactics, amongst other things. All of these demonstrate the interoperability challenges associated with delivering full-spectrum 5th generation effects across the CAF Joint environments as well as the NATO allies and Five Eye partners. This is a complex requirement with two contractors withdrawing from the future fighter programmes due to the interoperability complexities set by the CAF.²⁷ Moving forward, to counter the limited resources dedicated to interoperability, the RCAF should seek to draw upon CJOC operational specialist requirements to inform ADM(Mat) and ADM(IE) of current information flow and interoperability issues. The RCAF should also seek the incorporation of interoperability by design, in line with the RCAF strategy, to prioritise integration.²⁸ Further growth of CAF LOs with F-35 platform partner nations, across the spectrum of trades, would establish both knowledge

²³ Government of Canada, "Canada Finalises Agreement to Purchase New Fight Jets for RCAF," Public Services and Procurement Canada, dated 9 Jan 23, Canada finalizes agreement to purchase new fighter jets for Royal Canadian Air Force - Canada.ca.

²⁴ Department of National Defence, "RCAF Strategy: Agile, Integrated and Inclusive," p5.

²⁵ Department of National Defence, "Strong, Secured and Engaged," p16.

²⁶ Department of National Defence, "RCAF Strategy: Agile, Integrated and Inclusive," p10.

²⁷ The Canadian Press, "Ottawa Declines Boeings Bid to Replace Canada's Aging Fighter Jet Fleet," CBC News, last modified 25th November 2021, Ottawa declines Boeing's bid to replace Canada's aging fighter jet fleet | CBC News.

²⁸ Department of National Defence, "RCAF Strategy: Agile, Integrated and Inclusive," p9.

and early identification of interoperability lessons learnt, as documented by nations such as Australian Defence Force.²⁹

RECOMMENDATIONS

7. The RCAF HQ is **recommended** to consider the following in support of F-35 platform capability integration:

- a. RCAF Dir Air Pers, in conjunction with Dir Mil Careers, conducts a comprehensive assessment of the F-35 platform personnel component to prioritise skillset and trades against existing RCAF capabilities to generate a personnel resource growth plan.
- b. ADM(IE) for the F-35 platform is rapidly resourced with embedded RCAF personnel and resources to ensure complex infrastructure delivery plans do not delay the F-35 platform capability integration in Canada.
- c. ROC commence the development of the F-35 platform operating doctrine to inform early decisions in the F-35 platform procurement and aid prioritisation of functional component activity by ADM(Mat) and the RCAF.
- d. ADM(IM) is considered, with equal importance of ADM(Mat) and ADM(IE), and in allocation of resources and personnel to integrate the complex CIS requirements of the F-35 platform.
- e. RCAF HQ to consider logistics as a standalone functional component to enable identification of through-life logistics management and their impact on whole-force support requirements.
- f. CFIntCom, informed by the RCAF, identify the F-35 platform intelligence requirements to identify the impact and demand on the CAF Joint Force enablement of a 5th generation force.
- g. RCAF HQ and CJOC to identify Joint Force, NORAD and NATO interoperability requirements to influence the interoperability architecture of the F-35 platform capability.

CONCLUSION

8. This service paper has identified the importance of understanding and integrating the F-35 platform from a functional component perspective to ensure an F-35 platform capability is

²⁹ Adam Lockyer, "The logic of interoperability: Australia's acquisition of the F-35 Joint Strike Fighter," *International Journal*, 68(1), p71-91, (2013), <https://doi.org/10.1177/002070201306800106>.

delivered with the desired effects for both RCAF and the CAF Joint Force. Drawing upon the PRICIE functions, it has highlighted factors that require consideration across the RCAF HQ and CAF-wide L1 organisations, in turn identifying a whole-force capability development is required for the F-35 platform. With early consideration of these elements now, the RCAF can prepare for, and immediately exploit the operational advantages the F-35 platform will provide to the future RCAF force.

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