Evaluation of Air and Space Force Development

November 2021 – 1258-3-044 ADM(RS)

Canada

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Photo: OP Impact, DND
GX2014-0067-014

Acronyms

ADM(DRDC)	Assistant Deputy Minister (Defence Research and Development Canada)
ADM(IE)	Assistant Deputy Minister (Infrastructure and Environment)
ADM(IM)	Assistant Deputy Minister (Information Management)
ADM(Mat)	Assistant Deputy Minister (Materiel)
ADM(RS)	Assistant Deputy Minister (Review Services)
AFDC	Air Force Development Committee
ARA	Accountabilities, Responsibilities and Authorities
ASFD	Air and Space Force Development
CAF	Canadian Armed Forces
CDBM	Conceive, Design, Build, Manage
CFD	Chief of Force Development
Comd	Commander
DG	Director General
DG Air & Space FD	Director General Air & Space Force Development
DND	Department of National Defence
FD	Force Development
FY	Fiscal Year
GBA Plus	Gender-based Analysis Plus
HLMR	High-level Mandatory Requirements
HQ	Headquarters
ID/OA	Identification and Options Analysis
IM	Information Management
ISA	Integrated Strategic Analysis
IT	Information Technology
L1	Level 1
MCP	Major Capital Project
OPI	Office of Primary Interest
PAD	Project Approval Directive
PAP	Project Approval Process
PRICIEG	Personnel, Research/Development, Infrastructure, Concepts, IM/IT, Equipment, Gender-based Analysis Plus
RCAF AWC	Royal Canadian Air Force Aerospace Warfare Centre
RCAF	Royal Canadian Air Force
SOCD	Statement of Capability Deficiency
SSC	Space Steering Committee
SSE	*Strong, Secure, Engaged*
VCDS	Vice Chief of the Defence Staff

Executive Summary

This report presents the results of the evaluation of the Air and Space Force Development (ASFD) Program conducted during Fiscal Year (FY) 2020/21 by the Assistant Deputy Minister (Review Services) (ADM(RS)) in compliance with the 2016 Treasury Board *Policy on Results*. The evaluation examines the relevance and performance of the ASFD Program within the Department of National Defence (DND) as part of the Canadian Armed Forces (CAF) over a five-year period FY 2015/16 to FY 2019/20.

Program Description

The ASFD Program consists of Defence Program Inventory Program 4.4 Air and Space Force Development; for the purposes of this evaluation, it will be referred to as ASFD. The responsibility for the ASFD Program is under the authority of the Commander of the Royal Canadian Air Force (RCAF) through which the Director General Air and Space Force Development (DG Air & Space FD) is responsible. The ASFD Program is guided by the Chief of Force Development (CFD) Force Development (FD) system.

Scope

The scope focused on the achievement of initial outcomes of the ASFD Program, identifying impacting issues of relevance and performance. While the evaluation examined results related to the FD pillars of Conceive, Design, Build and Manage (CDBM), Space FD was limited to an assessment of the transfer of space responsibilities from the Vice Chief of the Defence Staff (VCDS) to the RCAF. Space FD is scheduled to be evaluated in a future evaluation of Joint Force Development.

Results

Findings were aligned according to the ability of the ASFD Program to influence the finding. Some findings can be managed internally by the RCAF. Other findings are external to the ASFD and need to be referred for Departmental considerations. This was done in an Integrated Strategic Analysis (ISA) of the evaluations of the FD programs of the Navy, Army and Air Force. Key findings of this evaluation centred around the following areas:

Air and Space Force

- Communication challenges and Accountabilities, Responsibilities and Authorities (ARA) across the RCAF
- Prioritization processes and alignment with Canada's defence policy: *Strong, Secure, Engaged (*SSE)
- The Air Force Development Committee (AFDC) and integration of Space FD within the RCAF

ISA

The external findings were referred to the ISA: FD for further analysis.

- Advancing technology and technical integration
- Resource challenges and training
- FD enablers and tools.

Overall Conclusions

The ASFD Program is impacted by factors internal and external to the RCAF's sphere of control, which leads to extended timelines of projects and challenges in satisfying capability gaps. Factors within their sphere of control can be remedied, but those beyond it will require departmental and interdepartmental collaboration to resolve.

- Departmental capability development mechanisms, as well as those tied to whole-of government processes, although rigorous, are slow.
- Project timelines are extended due to the reallocation of resources within organizations, lack of funding in the early stages of a project, and lengthened timelines for security clearances.
- Space FD has effectively integrated into the ASFD Program, though interoperability must be a priority to ensure that Canada can continue to collaborate with its partners.

Evaluation Scope

Coverage and Responsibilities

The evaluation examined the effectiveness of the Defence Program Inventory Program 4.4 over the FYs 2015/16 to 2019/20. The focus was on the immediate outcomes of the Program, which were "New RCAF capabilities align with identified deficiencies" and "Existing RCAF capabilities are maintained, modified or upgraded." Additionally, the integration of Space FD into the RCAF and DND/CAF was examined. In line with departmental initiatives and policies, the evaluation assessed the integration of Gender-based Analysis Plus (GBA Plus) into all phases of projects and assessed the extent to which SSE priorities are addressed by the RCAF.

Photo: Corporal Tony Chand, Formation Imaging Services
RP17-2018-0028-15575

Key findings fall into two groups:

Findings within the control of the RCAF (Internal)

Findings outside the control of the RCAF (External)

This evaluation is one of three concurrent FD evaluations conducted in FY 2020/21. Findings from this evaluation containing elements outside the control of the RCAF, alongside findings from the Navy FD evaluation and Land FD evaluation, are further discussed in the ISA: FD.

ISA

All findings referring to the ISA will be associated with this icon.

DG Space 101 Presentation

Out of Scope

The evaluation did not assess the Future Fighter Capability Project, materiel management, real property, and the departmental procurement process, except for its impact on the ASFD Program.

Program Profile

Program Objectives

The ASFD Program develops and manages the execution of activities that introduce new or modified capabilities for the RCAF.

Governance of the ASFD Program is led by the AFDC, which provides oversight across all RCAF capability development and ensures coordination with joint processes.

Program Stakeholders

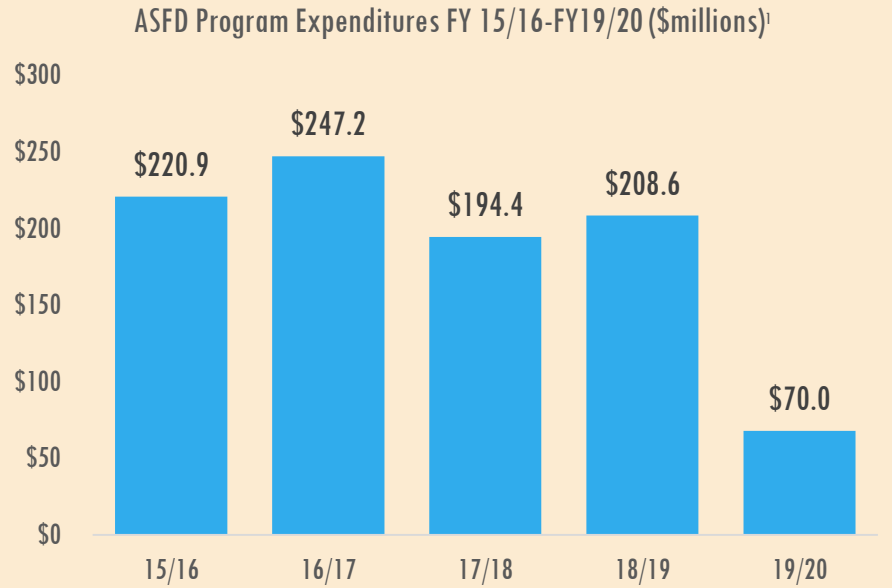
DG Air & Space FD is the lead for the ASFD Program on behalf of the RCAF. The stakeholders of the ASFD Program can be grouped into the following categories:

- **Internal to RCAF:** DG Air and Space FD, Fighter Capability Office, and the RCAF Aerospace Warfare Centre (RCAF AWC) are integral to the ASFD Program. All other organizations within the RCAF are considered stakeholders and/or clients.

- **Internal to DND/CAF, but external to RCAF:** Royal Canadian Navy, Canadian Army, Canadian Joint Operations Command, Canadian Special Operations Forces Command, Canadian Forces Intelligence Command, CFD, Assistant Deputy Minister (Materiel) (ADM(Mat)), Assistant Deputy Minister (Information Management) (ADM(IM)), Assistant Deputy Minister (Infrastructure and Environment) (ADM(IE)), Assistant Deputy Minister (Policy), Military Personnel Command, and Assistant Deputy Minister (Defence Research and Development Canada) (ADM(DRDC)) including Director Science and Technology (Air).

- **External to DND/CAF:** Five Eye partners, North Atlantic Treaty Organization partners, the defence industry, and other government departments including the Canadian Space Agency, Public Services and Procurement Canada, and Innovation, Science and Economic Development Canada.

Program Resources



Program expenditures for the period include the restated figures for FY 2015/16 to FY 2018/19 and actual expenditures for FY 2019/20. The decrease in expenditures between FY 2018/19 and FY 2019/20 have been attributed to the remapping of organizational expenditure reporting in the Departmental Results Framework, whereby in FY 2019/20, expenditures for the ASFD Program were primarily captured by the Air Staff.

In FY 2019/20, the ASFD Program was supported by 122 military FD positions and 37 full-time equivalent civilian positions.[2]

Source: 1. GC InfoBase [last accessed: June 23, 2021]
2. Data provided by Program

Varying costs, departmental processes and timelines have an impact on the delivery of capabilities.

FINDING 1: Although not all capability gaps are addressed or completely satisfied, rigorous processes are followed to monitor, identify, prioritize and deliver the high-priority capabilities. (Internal)

Capability gaps are identified through several means, some flowing through the RCAF AWC and others through Statements of Operational Capability Deficiency (SOCD). These are reviewed and prioritized at the operational level, then selected Major Capital Projects (MCP) are forwarded to CFD and Minor Capital projects are addressed by the RCAF.

The role of CFD is to review MCPs holistically from all Force Developers and assess them while considering departmental strategic priorities and guidance, affordability, and other key criteria. Final direction on MCPs is issued in the Capability Investment Program Plan Review. The ASFD Program plays an important role developing CFD's understanding of RCAF capability gaps.

Once an MCP is commenced, the capability gap is translated into high-level mandatory requirements (HLMR), which become the criteria against which capability assessments are made. HLMRs are developed during the Design phase and form the structure of conditions to which a capability solution must conform.

Senior program management noted there is always going to be a challenge balancing known gaps against available resources. The CAF FD system and the ASFD Program need to ensure a compromise is occurring in the right place and not accept more operational risk than necessary.

There are numerous pressures which challenge the full achievement of HLMRs

Cost	Estimated costs climb due to project delays, price increases, exchange-rate fluctuations and unanticipated technical challenges. The procurement process ensures that cost increases are identified, reported and considered by senior departmental or governmental review. This may result in the use of contingency funds, the de-scoping/re-scoping of projects or asking for additional funds. These processes are well documented when they occur.
Functional Authorities vs Responsibilities	The ASFD Program has the responsibility to deliver capabilities but does not own the responsibility of procurement. The procurement process goes through ADM(Mat), which turns requirements to contract specifications, and then to external agencies. This makes it difficult to keep the original requirement intact. Other agencies have their own criteria to be satisfied, which may influence the HLMRs.
Time	The procurement process is lengthy as it contains all the checks, balances and challenge functions which limit agility, but aims to ensure that the best possible value for Canadians is achieved. However, technological development proceeds at a much faster pace, leaving projects significantly challenged to close capability gaps and, on occasion, delivering obsolete capabilities. This is further discussed in Finding 6.

The rigour of the procurement process ensures that HLMRs are clear, but it faces numerous challenges impacting delivery.

SSE provided policy guidance for future capabilities but not always the resources to implement them.

FINDING 2: The ASFD Program ensures that projects align with SSE; however, timelines for some initiatives have slid in the Identification (ID) and Options Analysis (OA) phases due to the extensive work required and resource limitations. (Internal)

Senior program managers have confirmed that SSE provides an excellent policy foundation for the ASFD Program. However, the detailed work and staff-level analysis to fully understand the SSE initiatives for their complete scope, resource implications and cost did not start until after SSE was promulgated. This work occurs during the early ID/OA phases to establish realistic and concrete timelines which may differ from the SSE policy.

Although SSE provided an excellent policy foundation, interviewees felt that it was not accompanied with the necessary amount of Vote 1 (operating expenditures) resources to support the ID/OA phases of new capabilities identified. The level of effort required for the ID/OA phases was not foreseen and has been an ongoing challenge to meet. This is discussed further in Finding 11.

All projects are inherently aligned to SSE, because it is difficult to initiate projects that are not linked to SSE. Conversely, minor capital projects, that may not be linked to SSE, have been shown to be easier to develop and deliver because they do not surpass the thresholds that require them to go through the Project Approval Directive (PAD) process.

Photo: LS Erica Seymour, 4 Wing Imaging, RP26-2020-0046-003

The Aircraft Capability Project-Tactical spent an additional 17 months in the ID/OA phase than originally anticipated due to contract amendments requiring additional V1/V5 funding.

Interviewees stated that as a department, DND does not do a good job of assessing its FD plans as a whole and acknowledged that the RCAF struggles as well in this regard, in spite of SSE policy direction. Interviewees believe that if DND/CAF and the RCAF had better oversight and planning of FD, they would be much better placed to determine which projects should proceed as part of a cohesive planning effort. In March 2021, DND/CAF created a new strategic advisor position to the Chief of the Defence Staff on Future Capabilities which may position the department to improve FD planning.

Projects become less relevant the longer they are delayed because of the way technology changes and capabilities evolve, as discussed in Finding 6. Furthermore, delays can trigger additional complications, such as the need to extend the life expectancy of current capabilities or equipment to fill the gap, as well as putting Canada's credibility at risk with Allies.

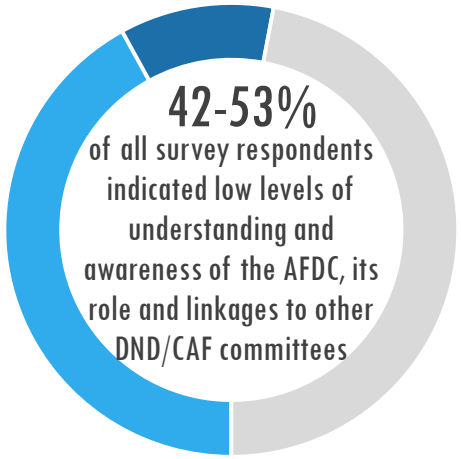
Within the RCAF, communication could improve the awareness of FD activities.

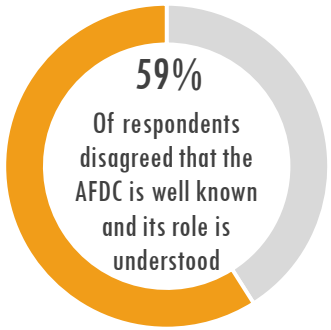
FINDING 3: Communication challenges have resulted in a lack of understanding of RCAF Force Development processes and committees, as well as associated ARAs at operational and tactical levels. (Internal)

Communication Challenges

- Stakeholders at operational levels indicated that they felt largely unheard by the strategic community at Headquarters (HQ).
  - They indicated that the majority of their requirements were not being effectively captured, or that capabilities delivered from the strategic level did not always match capability requests sent from the operational level.
- The lack of understanding and clarity of prioritization processes and methodology across these communities have contributed to the sentiment that their capability requests are unconsidered.
- Conversely, senior program managers at the strategic level revealed that they have captured their requirements; however, they have not been able to address them all due to limited resources, feasibility and departmental prioritization of capability requirements. As a result, not all identified capability requests can be turned into capability development projects.

Senior program managers have acknowledged the sentiments from the operational and tactical communities and stated that the strategic level has not always clearly articulated why they cannot action every requirement that comes up the Chain of Command.





Unclear ARAs

The lack of clarity in ARAs, particularly in the Conceive pillar, impedes the ability to ascertain responsibilities of organizations that operate within this phase of ASFD capability development. This results in the development of short-sighted capabilities as opposed to those with a greater strategic impact for future Horizons.

- The RCAF AWC, for example, has a role in the Conceive pillar related to doctrine as well as research and development, but it is not clear to what extent their role is concerning SOCDs or the articulation of other capability requirements.
- Senior program managers acknowledge this challenge. There is a misalignment between concepts developed by the RCAF AWC and the strategic direction of the ASFD Program at RCAF FD HQ. To improve alignment, stronger collaboration is needed, as well as with the Joint Warfare Centre and implementers such as ADM(IM), ADM(IE) and ADM(Mat).

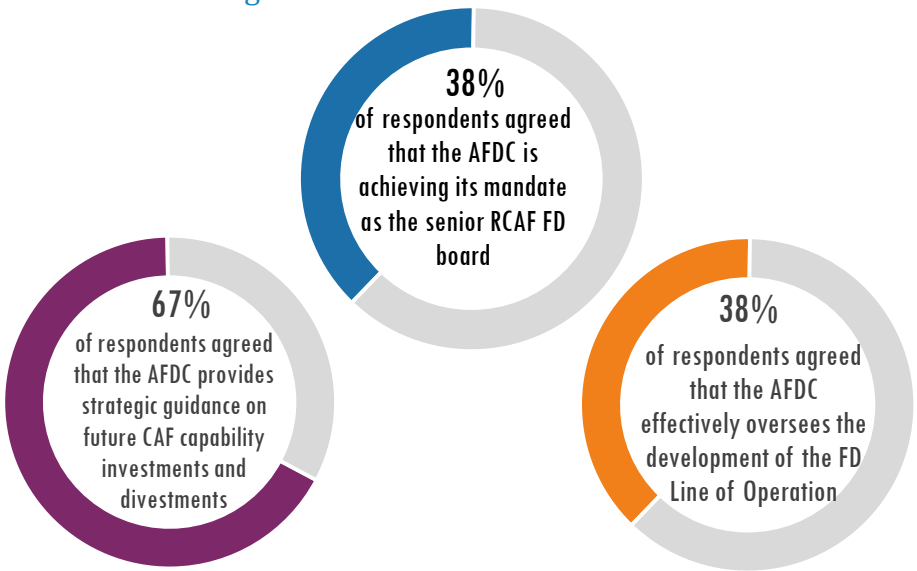
The Canadian Multi-Mission Aircraft project is an example of improved RCAF AWC alignment in FD. This realignment enabled DG Air & Space FD to work with the RCAF AWC to produce a strategic context document which quickened the project's progress through initial project approval gates one month earlier than anticipated.

R[1] In order to strengthen governance and oversight of the ASFD Program, the RCAF should review, clarify and communicate ARAs and governance processes.

Although the AFDC falls short of its mandate, a transformation is underway which indicates signs of improvement.

FINDING 4: The Air Force Development Committee has not fulfilled its mandate and is perceived as largely an information-sharing body; however, evidence indicates that there are improvements and a revitalization underway. (Internal)

Air Force Order 1000-10-1 outlines the roles and responsibilities of the AFDC as the monitoring and oversight board of Air FD. However, results from the survey indicated that senior managers, who received separate survey questions from the program staff and stakeholders, believed that not all of its roles were being fulfilled.



- Interviews with program managers confirmed these results and stated that the AFDC has primarily been an information-sharing body rather than a decision-making body. However, interviewees also noted that the AFDC has recently been adjusting to have a more significant role in overseeing RCAF FD.
- Senior program managers reemphasized that the AFDC was undergoing a revitalization, enabling it to transform from an information-sharing body into a decision-making body capable of providing guidance proactively.

Photo: Cpl. Manuela Berger, 4 Wing Imaging CK01-2016-1124-051

Signs of Improvement

A review of AFDC minutes over a period of two years (2018-2020) has validated these transformational claims. While earlier meetings focused on presentations on the progress of capabilities, more recent meetings incorporated feedback, recommendations and more fulsome discussions on capabilities and decision making. This may be an indication of approaching the true intent of its mandate.

Suggestion for follow-up: Review the effectiveness of the AFDC and the fulfilment of responsibilities according to its mandate.

The transition of space effects from VCDS to the RCAF was a positive move for DG Space in the context of FD.

FINDING 5: Space is well-positioned within the RCAF and well-connected within DND/CAF and international partners. (Internal)

RCAF Integration

- Interviewees stated that moving to an established military service allowed space FD to be better placed to leverage space capabilities and opportunities at senior boards in the Department with the support of the Commander of the RCAF, who has Functional Authority of space.
- Interviewees noted that while baseline funds for space activities were accounted for, additional incremental funding was not included following the move. However, there has not been an indication that RCAF and space capabilities are in competition for resources.
- A senior program manager stated that the move has allowed for the space domain to effectively operationalize and mature as an organization by strengthening DG Space and having space missions integrated across the RCAF. DG Space plans to further operationalize and become a space Divisional construct within the RCAF similar to its first and second Air Divisions.
- Space stakeholders indicated that they felt that space FD has been wholly integrated into ASFD, which has allowed them to benefit from already established processes within the RCAF.

External Integration

As a joint capability, interviews with senior managers highlighted the importance of space integration within DND/CAF as well as with international partners.

- Senior program managers are pleased with the current level of integration within DND/CAF and noted that the Army, Navy and other stakeholders are equally aware of how important space capabilities are for FD.
- Under SSE, the space domain was allocated 120 new positions to be filled over the next ten years, and these positions will be spread across DND/CAF to build capacity and expertise in the Department.
- Integration with Allied partners is vital for the space domain. For example, the Intelligence, Surveillance and Reconnaissance data collection is managed by the United States, and Canada must work closely with them. Challenges linked to interoperability may negatively impact international relationships, which is discussed in Finding 9.

Lack of a Space Forum

The lack of a forum to discuss space FD may result in communication challenges due to limited personnel available to engage with joint space stakeholders. However, while senior program managers agree that space could be included in the AFDC, space FD is not currently within the scope of its activities.

- There is a risk of a decline in communication between DG Space and stakeholders if personnel availability to liaise with stakeholder falters. This is supported by survey results and interview commentary.
- Low oversight ratings may be linked to a lack of communication concerning space capabilities with respective Level 1s (L1). Senior program managers concurred that this may be due to communication challenges as discussed in Finding 3.

The majority of respondents don't know if the ASFD Program has clear oversight over the development of space capabilities.

86%

In order to clarify the governance framework for Space Force Development, the ASFD should investigate options for governance bodies such as:

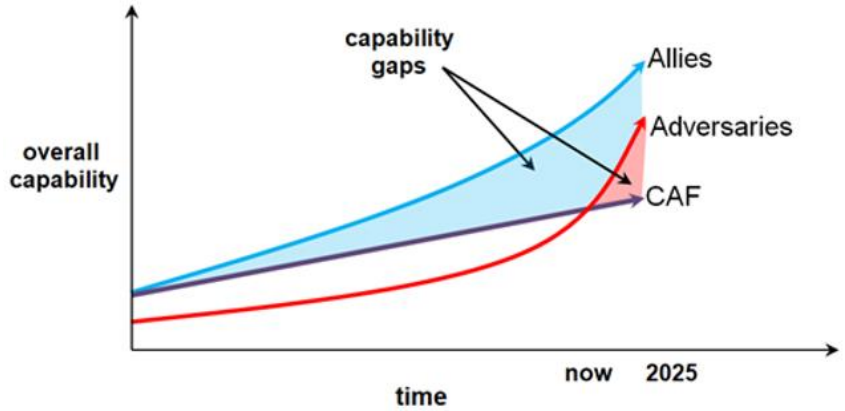
a. **Air Force Development Committee**
b. **another existing Force Development governance body**
c. **an independent Space FD governance body**

The rate of changing technology is faster than that with which DND/CAF can keep up, leaving capabilities technologically obsolete when operationally active.

FINDING 6: Rapidly changing technology combined with government and department project processes put the ASFD Program at risk of delivering technologically obsolete capabilities. (External)

ISA

Due to the prolonged and cumbersome procurement process, Allies and adversaries are advancing faster technologically. The technology they are incorporating into their capabilities now, may not be possible for the CAF to incorporate for years. The CDBM FD model may not be sufficiently agile to compensate for this growing gap, as departmental and government processes further hinder the model.



Source: SSE Combat Systems Study Update, Feb 2, 2021

"If we can't get the equipment that our peers are using…[it] leave[s] us wanting and begging for help rather than being able to provide support."

"In order to leverage [science and technology] trends, speedier, more agile and flexible military procurement strategies and programs will be required to ensure defence is able to maximize the benefits of technological change."
– Future Security Environment 2013-2040

- The majority of case studies identified challenges with technology evolution, especially since all were MCPs, thus less agile than minor capital projects. Projects requiring system integration and/or advanced electronic warfare components were noted as particularly difficult.
- While minor capital projects are useful for leveraging quicker processes, integration with the CAF and Allies may not have the same oversight, resulting in capabilities being developed in isolation.
- Projects cannot keep pace with technology throughout a project's lifecycle, because HLMR changes are difficult to enact due to the requirements of the procurement and PAD processes. This results in capabilities delivered with technology that is obsolete and non-interoperable. For example, a capability to be launched in the next decade will be using technology 24 years old by the time operators exploit it.
- Small realignments during the project are sometimes not implemented to avoid the risk of returning to previous phases, which results in delays.
- The ASFD Program, as part of the CAF FD System does not have agile mechanisms to adapt when the threat environment changes. Current processes are insufficient for technologically-enabled capabilities.

The Cyclone project was delivered (Initial Operational Capability 2018) with Link 11 network capabilities, which is now in sundown for decommissioning. Therefore, it will soon be unable to integrate with modern CAF networks.

"In some areas, we're working really hard to build yesterday's capabilities today, for tomorrow."

Increased awareness and consistency of implementation of PRICIEG* could strengthen the capability development process.

FINDING 7: PRICIEG analysis is potentially a valuable tool, but there are inconsistencies in its understanding and its application, risking delays and shortfalls in meeting capabilities. (External)

ISA

- The case studies showed that PRICIEG analyses are conducted initially, but survey and interview results showed they were done inconsistently and not always implemented or updated/maintained extensively throughout the lifecycle of a capability project. As a result, projects risk delays that could have been foreseen, particularly in personnel, Information Technology (IT), and infrastructure, as noted by PDs and Project Managers.
- The majority of survey respondents state that components of PRICIEG are considered.

There were differing opinions on the value of PRICIEG.

- Many Program Managers felt that PRICIEG provides a good framework and context for identifying risk areas and for engagement with other L1s.
- It is difficult to identify some PRICIEG components until the final platform selection has been made.
- Senior program management and some Project Directors feel there is a growing recognition within the RCAF and the broader CAF that PRICIEG might not be the best tool to force the analysis required. It may be worthwhile considering the inclusion of a validation of PRICIEG as a tool and whether there are other tools that do this better, for example, those used by Allies.

"There is no real development and continuity of PRICIEG."

- Interviewees noted difficulties obtaining timely and complete input from other L1s, such as ADM(IM) and ADM(Mat), at the beginning of a project. Therefore, the capability needs may be underestimated, which could result in delays and funding challenges.
- Although the PAD contains an extensive guide and context, a lack of training in PRICIEG was widely reported by Project Directors and Project Managers.
- GBA Plus direction has been incorporated into relevant documentation. However, the extent to which consideration of GBA Plus flows through the lifecycle of a project cannot yet be determined. To note, GBA Plus is not a significant consideration when purchasing "off-the-shelf." PMs state that GBA Plus knowledge is low and that GBA Plus analysis is occasionally conducted after the fact.
- Projects conceived since PRICIEG became a mandatory component of the FD process have not yet reached later stages in capability development or delivery; therefore, the full extent of its effectiveness cannot yet be stated.

The Medium Heavy Lift Helicopter (MHLH – Chinook CH147F) Initial Operational Capability documentation indicated that only half of the maintenance capacity was trained, reducing the sustained deployability of the capability. This should have been identified by the "P" in PRICIEG.

Suggestion for follow-up: In a future review, examine the effectiveness of PRICIEG on capability projects since its mandatory enactment in the PAD.

*Personnel, Research/Development, Infrastructure, Concepts, IM/IT, Equipment, Gender-based Analysis Plus

Collaboration with FD enablers is essential for the delivery of capabilities.

FINDING 8: The quality of support for ASFD Program activities from other L1s is usually high, but there are delays leading to prolonged delivery of a capability. (External)

- Although interviews with program managers stated that the quality of support from other L1s was high, several concerns were noted:
    - The ASFD Program requires significant support from other L1s, such as, ADM(IM), ADM(IE), ADM(Mat), and ADM(DRDC) to conduct essential work for ASFD projects. Projects may be delayed while they await returns from other L1s. At times, the returns come with new Requests For Information, which spur further delays.
    - The inability to provide RCAF funds to provide funds for other L1s has also contributed to delays. Vote 1 funding availability for other L1s to do work in support of the ASFD Program can be unpredictable and erratic, even for a multi-billion-dollar project. This is discussed further in Finding 11.

The Griffon Limited Life Extension Project Management Office in ADM(Mat) was experiencing resource challenges. Thus, a deputy Project Director had to work with the Project Management Office full-time as a result of staffing shortfalls.

"When Information Management (IM) can dedicate resources it's great, but they are equally resource constrained."

- Project Managers observed that an incomplete understanding by L1s of the importance of RCAF capability requirements can lead to requests to descope rather than fix a problem.
    - Both the RCAF and other L1s have noted that the RCAF could assist by better articulating problems and their importance. An example being system integration, in which ADM(IM) has expressed an interest in earlier project involvement to help mitigate this issue.
- ADM(IM) acknowledges the problems and stated that fixes are underway, hopefully moving from service centric to an IM/IT holistic approach. This is part of a follow-up to the Evaluation of the Defence IM/IT Programme (pub. 2020) [last accessed: June 23, 2021].

- If deliverables by L1s did not meet the originally intended requirements as anticipated by the FD program, this may result in capability deficiencies and trigger downstream Urgent Capability Requirements and SOCDs.
- Other L1s are challenged by personnel resource levels and competing priorities, including staff to provide financial analysis. The ability of staff to be complete and timely when given project responsibilities has not always been achievable at the point in a project schedule where it often needs to be, according to interviews with RCAF staff. Thus, projects are delayed because there is an insufficient number of personnel to address programmatic details.

The Medium Heavy Lift Helicopter (MHLH – Chinook CH147F) experienced project delays due to insufficient early engagement with ADM(IE), resulting in lacking sufficient resources to build infrastructure necessary for the storage of the helicopters.

FD enablers are critical to the delivery of capabilities and may drastically impact the schedule and overall quality of capability development if they do not have appropriate support.

While there are some successes with interoperability, it is viewed as an ongoing challenge that the department faces.

FINDING 9: Maximum interoperability within the CAF and with international partners is crucial for the ASFD Program to be able to support and contribute to coalition operations. (External)

Only **53%** of survey respondents believed the ASFD Program produces capabilities that are fully interoperable within the CAF and with Allied partners.

- Complete interoperability between Canadian air and space effects with international partners has a possibility of diminishing over time, according to program staff and senior managers. Canada's own extended procurement approaches result in delayed capability delivery (see Finding 6) and technological deficiencies, which may result in decreased interoperability with more technologically advanced partners. Regarding the space domain, collaboration with international partners is vital due to the inability of a single country to produce all possible capabilities for that domain.
    - In order to maintain collaboration, Canada must be an active contributor and have capabilities interoperable with its space partners.
    - The Sapphire satellite is an interoperability success story due to its ability to integrate with Allies.

"As national and allied space systems will face greater risks, the CAF may need to seek more mitigation strategies and collaborative approaches to space capabilities to gain robustness and redundancy and, therefore, resilience." – *Future Operating Environment, 2013-2040*

Internally, the CAF faces the same interoperability problems.

- More modernized L1s, such as Canadian Special Operations Forces Command, surge ahead technologically, resulting in the RCAF not being able to operate effectively.
- Conversely, in the absence of CAF-wide tools, the RCAF has developed their own mechanisms which the other services are now trying to integrate into their environments (e.g., Datalinks).

The Medium Heavy Lift Helicopter (MHLH – Chinook CH147F) selection, purchase and integration of defensive systems that have yet to be integrated to Consolidated Secret Network Infrastructure networks delayed full operational capability by 36 months.

An increased focus on digital enablers, such as networks, communications systems and software applications, is essential for the success of individual services and joint capabilities, as well as interoperability within the CAF and with Allied and non-traditional partners.

- The current focus of capability development is on traditional platforms and sensors in-line with the existing CAF culture.
- In order to keep pace with international partners in the future, enablers need as much attention as conventional defence capabilities. Enablers are the backbones required for sensors on platforms to be successful.
- Project capability expenditures increase as the ability to exploit the collected data is not often thoroughly considered in the original scope.
- Program representatives and stakeholders felt that establishing and agreeing to standards across DND/CAF and an increased focus on digital-age capabilities may improve interoperability.

"We need to build the joint operational fabric before we deploy. We need to start putting the pieces together so that environments are better prepared to fight together."

Several factors contribute to decreased participation rates in RCAF and DND/CAF force development engagements.

FINDING 10: Human resource challenges within the ASFD Program have impacted its ability to effectively engage in force development activities for the RCAF. (External)

ISA

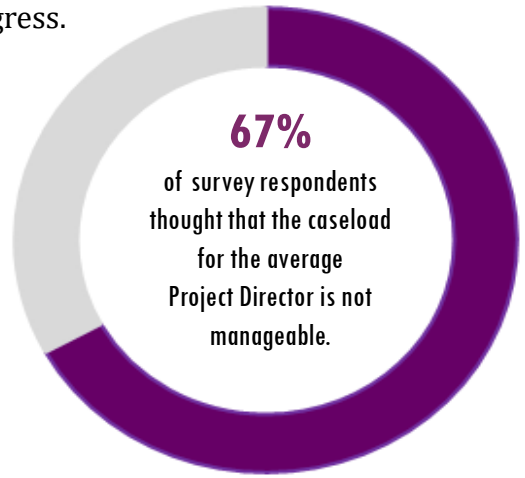
Perceived moderate to low staffing levels and elevated workloads contribute to missed deadlines and decreased participation in DND/CAF FD activities. Consequently, less emphasis is placed on strategic planning for the future.

- Staffing resources at the operational and strategic levels are reportedly prioritized to the tactical level, leading to critical FD activities being suspended.
- Time restraints result in a lack of investment in proactive long-term ancillary work, and the inability of the RCAF to fully share information and gain situational awareness of other FD work. The knowledge potentially lost from this lack of capacity could impact future capability development.
- Governance mechanisms imposed on projects and staff consumes substantial amounts of time. While necessary for accountability and due diligence, attending the same review boards several times over the lifespan of the project is a challenge.
- People are overworked in order to deliver the capabilities; for example, one individual has 29 ongoing projects, and their three staff are only able to work on eight of those projects, with only three making genuine progress.
- Trending data for vacancy rates was not available.

"Project quantities remained the same, quantity of staff decreased because the operational community felt it was more important to have people at the squadrons versus the headquarters."

27%

ASFD Staffing Vacancy Rate for FY 2020/21.



All questionnaire respondents and most interviewees agreed.

Security Clearance Delays

Security clearance delays have had an impact on all stages of project development, risking individuals' and organizations' ability to progress a capability through the CDBM pillars.

- All interviewees and questionnaire respondents concurred that security challenges have impacted project delivery, and 60% of cases studied also noted this issue.
- Civilian contractors were a particular challenge. The staff required to work on projects with Top Secret clearance or above require both the expertise and security clearance, which increases the cost, especially within Space FD organizations, which is discussed in Finding 11.
- Section heads and directors may wait up to two years for their security clearance, effectively hindering them from fully engaging with their projects.
- Timelines for requesting a security clearance leave a wide gap in capacity for FD organizations. Individuals rarely have the necessary security clearance upon hiring. This causes delays in employing them as intended until clearances are processed. Data was not available to conduct further analysis on the impact.

Several factors contribute to a less than ideal participation rate in RCAF and DND/CAF force development engagements.

FINDING 10: (Continued)

ISA

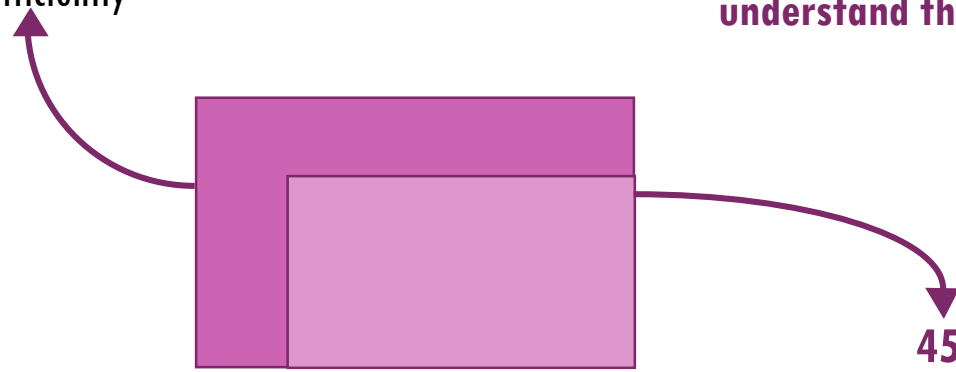
Project Director Training

Project Directors are challenged to understand their complex role with limited formal training, leading to delays in project timelines.

- The high turnover rate leaves the ASFD Program a reactive organization. One organization reported eight Colonels over eight years in one position.
  - As project Directors become familiar with their new roles, delays were noted in capability timelines and potentially missing requirements.
- Reportedly within Space FD, the time it takes to become well-versed in the realm is even longer due to the additional requirements and complexity of space capabilities.
- Increased hiring of civilians to provide project knowledge continuity, extending the postings of project directors for military members, or strengthened FD training may possibly mitigate some of the risks to the project and has been noted by other DND organizations as a possible mitigation measure.

One project was delayed because it took eight months for the Project Director to understand their role and how to do their job.

67% of survey respondents disagreed that Project Directors are certified within sufficient timelines to complete their tasks efficiently



45% disagreed that the training enables Project Directors to complete their tasks effectively.

"There's very little formal training that exists for a project director. It's a problem for us, our Project Directors struggle to understand their role."

Challenges with the timing of funds for projects hinders capability development.

FINDING 11: Increased ability to access adequate, predictable funding in the critical early stages of major capital projects could compress the timelines and impact the resultant capability. (External)

ISA

The reliance on V1 funds (operating expenses) and inability to access V5 funds (project-specific funds) during the ID/OA pillars delay project timelines. It also leads to a loss of limited time trying to access adequate funding and risk manage the project. If V5 project funds were accessible earlier, it would allow for more resources to be dedicated to the front end of the project, including planning, research and experimentation, consultation with partners and stakeholders, and hiring Subject Matter Experts. Noted impacts of insufficient funding are:

Less effective early development. Funding for vital activities at the beginning of a project, such as studies, research and concept development, are required to maximize the ultimate outcome of the resultant capability. Without these activities in the early stages of a project, possible additions to optimize the output of the capability would be afterthoughts, increasing both the costs and timelines.

Challenges hiring contractors. The lack and timing of funding to hire contractors in the ID/OA phases can leave a gap in obtaining the experience required, and limited time in which to carry out the contracted work. V1 funds often only become available mid-year, are only available until the end of the fiscal year, and not guaranteed for the next fiscal year, leaving insufficient time to complete the work the V1 funds are used for.

Late access to FD enablers. The FD governance process and PAD requirements do not seem to be in consideration of the funding available throughout a project's lifecycle. Certain requirements are dependent on support from other L1s, which in turn, are dependent upon funding. Without those funds, projects are stalled. Access to V5 funds earlier in the project cycle could possibly condense timelines by facilitating an earlier and easier ability for Project Sponsors to reallocate funds to pay for support from other L1s.

- V1 funding was a challenge noted in 60% of the case study cases, resulting in extended timelines in the ID/OA phases. The results are further complicated in the context of space, as experts pivotal for the development of space capabilities cannot be accessed until V5 funding is secured.
- Integrating Space FD into the RCAF has gone well and came with baseline funding; any additional funding they received under VCDS was not accounted for in the transfer, the impact of which was not assessed in this evaluation. Additionally, Space components are reported to be two to three times more expensive for subject matter experts, contractors and studies.

Interviewees noted that delivered capabilities could be optimized with increased upfront investment.

Conclusions

The ASFD Program is impacted by factors internal and external to the RCAF's sphere of control, which leads to extended timelines of projects and challenges in satisfying capability gaps. Factors within their sphere of control can be remedied, but those beyond it will require departmental and interdepartmental collaboration to resolve.

Departmental capability development mechanisms, as well as those tied to whole-of-government processes, although rigorous, are slow. In spite of the rigor afforded by the PAD, the resulting delivery of capabilities is often years longer than estimated. This presents a challenge in maintaining pace with Allied partners and operational readiness. In particular, technology-based capabilities oftentimes are delivered obsolete, which puts CAF missions at risk of reduced interoperability, and employing ineffective equipment.

Space FD has effectively integrated into the ASFD Program, though interoperability must remain a priority to ensure that Canada can continue to collaborate with its partners. The FD elements of the space domain have been wholly and effectively integrated into the RCAF since its move from VCDS. As such, space is well integrated with DND/CAF and well connected to Allied partners. Continued success in the space domain relies on its ability to remain interoperable with Allied partners by maintaining the technological pace and delivery of space capabilities.

Project timelines can be extended due to reallocated resources within organizations, lack of funding in the early stages of a project, and lengthened timelines for security clearances. The lack of resources in these areas can severely impact a project in its most critical phases before it transitions to ADM(Mat) for procurement. This results in projects spending considerable amounts of time in the Definition phase, or projects with insufficient planning in the earlier phases which negatively impacts the delivery of the capability in scope, cost or schedule.

Communication challenges, limited resources, and a not completely realized AFDC have led to the majority of stakeholders within the Program to state that there was a lack of guidance from the strategic levels. As a result, most capabilities are developed in response to present capability deficiencies as opposed to looking outward to those with a greater strategic impact.

Annex A – Findings and Recommendations

Although not all capability gaps are addressed or completely satisfied, rigorous processes are followed to monitor, identify, prioritize and deliver the high-priority capabilities.	1	
The ASFD Program ensures that projects align with SSE; however, timelines for some initiatives have slid in the Identification (ID) and Operation Analysis (OA) phases due to the extensive work required and resource limitations.	2	
Communication challenges have resulted in a lack of understanding of RCAF Force Development processes and committees, as well as associated ARAs at operational and tactical levels.	3	1. In order to strengthen governance and oversight of the ASFD Program, the RCAF should review, clarify and communicate ARAs and governance processes.
The Air Force Development Committee has not fulfilled its mandate and is perceived as largely an information-sharing body; however, evidence indicates that there are improvements and a revitalization underway.	4	**Suggestion for follow-up:** Review the effectiveness of the AFDC and the fulfilment of responsibilities according to its mandate.
Space is well-positioned within the RCAF and well-connected within DND/CAF and international partners.	5	2. In order to clarify the governance framework for Space Force Development, the ASFD should investigate options for governance bodies such as: a. Air Force Development Committee b. another existing Force Development governance body c. an independent Space FD governance body

Annex A – Findings And Recommendations

Rapidly changing technology combined with government and department project processes put the ASFD Program at risk of delivering technologically obsolete capabilities.	6	**Please refer to the ISA for a related recommendation.**	ISA
PRICIEG analysis is potentially a valuable tool, but there are inconsistencies in its understanding and its application, risking delays and shortfalls in meeting capabilities.	7	**Please refer to the ISA for a related recommendation.**	ISA
The quality of support for ASFD Program activities from other L1s is usually high, but there are delays leading to prolonged delivery of a capability.	8	**Suggestion for follow-up:** Examine the effectiveness of PRICIEG on capability projects since its mandatory enactment in the PAD.	ISA
Maximum interoperability within the CAF and with international partners is crucial for the ASFD Program to be able to support and contribute to coalition operations.	9	**Please refer to the ISA for a related recommendation.**	ISA
Human resource challenges within the ASFD Program have impacted its ability to effectively engage in force development activities for the RCAF.	10	**Please refer to the ISA for a related recommendation.**	ISA
Increased ability to access adequate, predictable funding in the critical early stages of major capital projects could compress the timelines and impact the resultant capability.	11	**Please refer to the ISA for a related recommendation.**	ISA

Annex B – Management Action Plan

ADM(RS) Recommendation

1. In order to strengthen governance and oversight of the ASFD Program, the RCAF should review, clarify and communicate ARAs and governance processes.

Management Action 1.1

RCAF FD activities falls under LOO 4 of the RCAF Campaign Plan and draw strategic FD guidance from such cornerstone documents as SSE, RCAF Vectors, the RCAF Future Air Operating Concept and the RCAF Future Concepts Directive. RCAF Campaign Plan LOO 4 establishes various FD governance structures/bodies, many of which are well established and leveraged (e.g., AFDC, Air Force Science and Technology Oversight Committee). Likewise, complimentary FD governance bodies such as the Minor Capital Project Management Board, chaired by DG Air & Space FD and conducted quarterly, have greatly enhanced FD agility, oversight and accountability at the minor capital project level. That being said, it is recognized that not all RCAF LOO 4 FD governance initiatives have been fully realized.

To that end, an ***RCAF Strategy*** is currently under development and being led by Deputy Commander RCAF in collaboration with key RCAF FD stakeholders (DG Air & Space FD, RCAF AWC, DG Space, Fighter Capability Office, and DG Air Readiness). Among other governance objectives, this strategy is intended to enhance the coherence and foster a longer-term view of the RCAF FD program and reinforce ARAs associated therewith. It is anticipated that this strategy document will undergo Commander RCAF review at the Spring 2022 Air Board.

OPI: Deputy Commander RCAF
Target Date: May 31, 2022

ADM(RS) Recommendation

2. In order to clarify the governance framework for Space Force Development, the ASFD Program should investigate options for governance bodies such as:

a. Air Force Development Committee
b. another existing Force Development governance body
c. an independent Space FD governance body

Management Action 2.1

DG Space, as the delegated authority from Commander RCAF, is responsible for maintaining a holistic perspective on the DND/CAF Space Enterprise. To that end, DG Space is staffing a proposal to the VCDS that would direct the creation of a DND/CAF Space Steering Committee (SSC) – chaired by DG Space, and attended by the various departmental stakeholders (to include DG Air & Space FD, ADM(IM), Canadian Forces Intelligence Command, ADM(DRDC), CFD and Canadian Joint Operations Command). The SSC will create coherence across all space-related activities, including Space FD, Force Employment and Force Generation efforts – in order to ensure the organizations are not working in isolation, but rather that the collective efforts are complementary to the wider Space Enterprise. The SSC would not supplant current FD accountabilities or processes, but would compel coordination across the department to optimize communication, eliminate potential duplication of effort, and allow Force Employers to become more directly involved in the identification of capability requirements - endorsed by the SSC - for the consideration of the FD community. To enhance its effectiveness, the SSC would be synchronized with current CAF, RCAF and FD governance processes. This stand-up of the SCC committee is forecast to occur in December 2021.

OPI: DG Space
Target Date: December 31, 2021

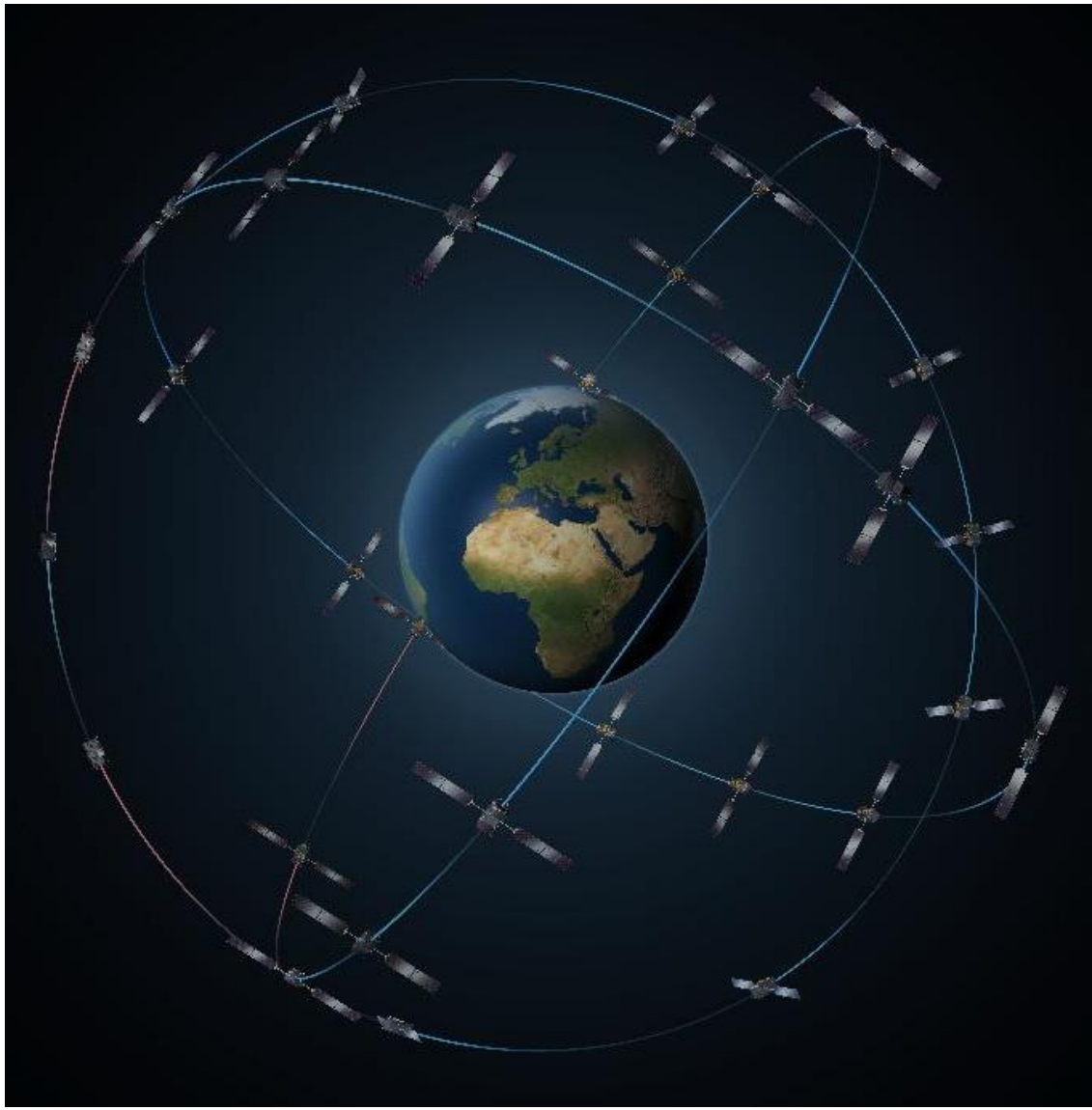
Annex C – Evaluation Context

This report presents the results of the evaluation of the Air and Space Force Development Program, conducted during FY 2020/21 by ADM(RS) in compliance with the 2016 Treasury Board *Policy on Results.* The evaluation examines the performance of the ASFD Program over a four-year period, FY 2015/16 to FY 2019/20 and was conducted in accordance with the ADM(RS) five-year Departmental Evaluation Plan. The findings and recommendations in this evaluation may be used to inform management decisions related to program design, delivery and resource allocation, as well as serve as a baseline for future evaluations.

Previous evaluations associated with the ASFD Program by ADM(RS) include:

- Evaluation of Defence Capability Development Program (pub. 2017)
- Evaluation of Air Force Readiness (pub. 2017)
- Evaluation of the DND/CAF Airworthiness Programme (pub. 2016)
- Evaluation of Maritime Air Capabilities (pub. 2014)
- Evaluation of Aerospace Equipment Maintenance (pub. 2013)
- Evaluation of Air Force Training and Readiness (pub. 2012)

In 2017, Space FD was transferred from VCDS under the authority of the Commander RCAF, and as such, has not been evaluated as part of the ASFD Program previously. Space is anticipated to be included as part of the Joint Force Development evaluation to be conducted in the future.



DG Space 101 Presentation

Annex C – Evaluation Context

Program Description

Capability gaps are identified through several means. Long range, conceptual capability gaps are identified and developed by the RCAF AWC in concert with research partners. When matured, they feed into the ASFD processes. Shorter range gaps are developed by several means with the primary means being SOCDs. These are reviewed and prioritized at the operational level and forwarded to the strategic level for further assessment and selection based on feasibility, affordability and strategic direction. Selected and funded Minor Capital Projects are managed by the RCAF and follow an expedited project approval process defined in the PAD which results in an accelerated progress to implementation. Selected MCPs are forwarded to CFD for further consideration. Remaining capability gaps continue to be monitored for future consideration.

The RCAF FD System is based on the CAF FD System and includes the same four key functions or pillars: Conceive, Design, Build and Manage. The VCDS Project Approval Process (PAP) roughly aligns with the Design and Build pillars. Each pillar of the CDBM model has a lead agency that is responsible to guide the capability through to force employment. PRICIEG is intended to be an evergreen document which considers the following components of a project: Personnel; Research and development; Infrastructure; Concepts of Operations and Doctrine; Information Technology; Equipment, Support and Sustainability; and Gender-based Analysis Plus.

Conceive is the stage wherein the linkages between RCAF military problems and CAF strategy/Government of Canada policies are solidified, and future capability requirements are defined. Part of Conceive is the conduct of a preliminary PRICIEG analysis and the setting of priorities for Concept Development and Experimentation.

Design is the stage wherein capability requirements are translated into designs, doctrine and structures for force employment, using the PRICIEG construct, and corresponds to the ID/OA stages of the VCDS PAP. This means early project scope definition, clarification of the strategic context, and development of HLMRs and Options. A Project Director within the RCAF is the responsible lead during this pillar, and the project is funded with Vote 1 money.

Build is the stage wherein capabilities are developed and synchronized through a detailed analysis of the PRICIEG functional components of capability and then implemented. The Build pillar corresponds to the Definition and Implementation stages of the VCDS PAP, to include refinement of the Statement of Operational Requirement, Options, Business Case and understanding of procurement strategy. A Project Management Office within ADM(Mat) becomes the functional lead for the project in this pillar, and the project gains access to Vote 5 funds from Treasury Board Secretariat.

Manage is the stage wherein the capability is managed through the "materiel management" and "capability management" functions. Materiel management relates to the sustainment of aerospace equipment under the auspice of Director General Aerospace Equipment Program Management while capability management refers to the continued monitoring of aerospace capabilities by the Air Staff, ensuring that it remains relevant and aligned with CAF strategic guidance. In both cases, the most common triggers to a planning cycle are SOCD, and Estimated Life Expectancy dates.

- Précis from the *RCAF Future Concepts Directive*, Director Air Programmes, 2016