National Defence Défense nationale

Canadian Forces College

Collège des Forces Canadiennes

DCGS CAN't: Prioritizing Interoperability in Canadian ISR

Major Carolyn Hincke

JCSP 49 DL

Exercise Solo Flight

Disclaimer

Opinions expressed remain those of the author and do not represent Department of National Defence or Canadian Forces policy. This paper may not be used without written permission.

PCEMI n° 49 AD

Exercice Solo Flight

Avertissement

Les opinons exprimées n'engagent que leurs auteurs et ne reflètent aucunement des politiques du Ministère de la Défense nationale ou des Forces canadiennes. Ce papier ne peut être reproduit sans autorisation écrite.

Canada

CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES

JCSP 49 DL - PCEMI n° 49 AD
2022 - 2024

Exercise Solo Flight – Exercice Solo Flight

DCGS CAN't: Prioritizing Interoperability in Canadian ISR

Major Carolyn Hincke

DCGS-CAN't: Prioritizing Interoperability in Canadian ISR

Introduction

The technologies and capabilities available to the intelligence community have dramatically increased over the past several decades. The idea 'drowning in data,' captures the reality of data being available at such a magnitude the current intelligence enterprise and analytical processes are unable to match pace.[1] Modern intelligence enterprises, even well-funded and prioritized, are unable to expand their analytical cadre at the same of rate of 'big data.' Simultaneously decision makers are demanding more intelligence and increasing sensors and collection assets.[2] Intelligence Surveillance and Reconnaissance (ISR) capability is a core function for the Royal Canadian Air Force (RCAF) and in order to support equipment being purchased in the near future, the need for a robust intelligence enterprise capable of exploiting a plethora of data is critical.[3]

Canada is part of the 'Five Eyes' (FYES) defence intelligence community, a long-standing and most enduring intelligence sharing agreements[4] between the United States (US), Canada, the United Kingdom (UK), Australia, and New Zealand.[5] As FYES allies have developed airborne ISR collection and exploitation capabilities, Canada has not matched pace with procurement of collection platforms or development of an intelligence architecture capable of supporting analysis that is comprehensive or interoperable with our allies. Any Canadian ISR expertise has been developed through individual training or experience in operational setting but has done little to advance a Canadian policy. The US has historically lead the ISR capability with the development of Distributed Common Ground Systems (DCGS) where ISR data is collected and analyzed, and ISR is one of the five USAF core functions.[6] Both Australia and the UK bought into the model and created their own DCGS capabilities, based on and supported by the US, to create a fully interoperable capability controlled by unique national requirements and priorities. Conversely, Canada has not done so and as a result, and at the time of writing, its ISR capability remains underdeveloped in relation to emerging demands and to ensure effective collaboration with our allies. The US recently released the ISR Strategic Vision 2032 outlining the evolution of ISR collection and exploitation between now and 2032 and discussing a new methodology for intelligence exploitation.[7]

---

[1] Kevjn Lim, "Big Data and Strategic Intelligence." *Intelligence and National Security*. 2015: 3.
[2] James L. Lawrence "Activity-Based Intelligence: Coping with the "Unknown Unknowns" in Complex and Chaotic Environments." *American Intelligence Journal* 2016, 17.
[3] RCAF, "1 Canadian Air Division (1 CAD) Airborne Intelligence, Surveillance and Reconnaissance (ISR) Directive – Spiral Three." 2019, 1.
[44] Caleigh A. Cartmell, "Long-Term Intelligence Sharing: the Five Eyes and the European Union." *Journal of Intelligence History* 22, no. 3 (2023): 417.
[5] Andrew Ziebell, "Between Five Eyes: 50 Years of Intelligence Sharing." *Parameters* 51, no. 4 (Winter 2021-2022): 1.
[6] USAF, "Air Force Future Operating Concept Executive Summary," 2023, 1.

[7] USAF, "ISR Strategic Vision 2032." 2024, foreword.

This paper will argue the Canadian Armed Forces (CAF) should join the FYES DCGS system, including the resourcing of the required intelligence analysis enterprise, in order to remain interoperable within FYES for domestic and international operations while developing a national ISR capability. Given the relative diversity of capabilities and platforms involved in a comprehensive ISR strategy, this paper will be scoped to consider only the intelligence enterprise part of a DCGS and not the collection platforms or data transfer and management systems. Though ISR is an inherently joint venture in an organization the size of the CAF, this paper will consider the RCAF as the main generator of an ISR capability. The CAF will never achieve the size of allies like the US, however ensuring a scalable and interoperable ISR capability will act as a force multiplier when integrated with partners.

Canadian ISR

CAF's ISR capability is often described as nascent. By definition, 'nascent' describes something that is "beginning to exist; not yet fully developed"[8] which has unfortunately been the state of Canadian ISR for well over a decade. An article published in 2001 outlined an ISR vision with a phased approach to building a robust ISR capability, by 2010.[9] Unlike both the UK and Australia, our allies within the FYES community, Canada has yet to establish a national version of the existing US-based ISR weapons system of a Distributed Common Ground System (DCGS). Canada has made ISR contributions to past coalition conflicts, however the Canadian execution of ISR does not match with the output from a DCGS, which is the expectation our FYES and other coalition and allied partners have of ISR products. Currently the CP-140 Aurora represents the main Canadian ISR platform, and it was used to collect over Libya (2011) and Iraq (2014-2017). Though the CP-140 does have an MX-20 electro-optical and infrared (EO/IR) collection sensor, there have been significant challenges with data transfer in near-real time (NRT) to the intelligence analysts in location. Without the ability to analyse in NRT the CP-140 has very little utility contributing to dynamic targeting efforts. As a result, the CP-140 is only partially effective because as a collection platform it was unable to fully integrate into the joint fight and can be used only for specific missions sets.[10] Integration into a joint, coalition environment requires a backbone of common processes which must apply equally to the rigour with which intelligence analysis is conducted. This is especially true when kinetic or lethal targeting decisions are made based on intelligence since even perception of law of armed conflict (LOAC) violations can significantly impact operations.[11]

Canada's recently published "Our North, Strong and Free: A Renewed Vision for Canada's Defence" includes the commitment to explore options for acquiring a

---

[8] Oxford Learner's Dictionaries. oxfordlearnersdictionaries.com. (accessed 14 May 2024).
[9] Josh Barber, "An Intelligence, Surveillance and Reconnaissance (ISR) Vision for the Canadian Forces," *Canadian Military Journal* 2, no. 4 (Winter 2001-2002): 45.
[10] Alan Lockerby, "SCAR-C Over Libya – To War in an Aurora." *Canadian Military Journal* 12, no. 3 (July 2012): 65-66.
[11] Paul A.L. Ducheine, "Non-kinetic Capabilities: Complementingthe Kinetic Prevalence to Targeting (Chapter 10)," in *Targeting: The Challenges of Modern* Warfare, edited by Ducheine, Paul A.L., Michael N. Schmitt and Frans P.B. Osinga. 1st 2016 ed. (The Hague: T.M.C. Asser Press, 2015), 217.

suite of surveillance and strike drones.[12] Surveillance and strike drones describe ISR collection platforms with an integrated kinetic targeting capability. Similarly, the DND/CAF Artificial Intelligence Strategy notes that Joint Intelligence, Surveillance and Reconnaissance is a defence priority area for the CAF.[13] Neither publication includes the need for an intelligence enterprise to support these platforms with analysis, an unfortunate but common shortcoming in the Canadian planning for ISR capabilities. Without an intelligence enterprise to inform decision-makers there are significant legal challenges to making targeting decisions.

The 1 Canadian Air Division Airborne ISR Directive – Spiral Three is the most recent, approved ISR Directive. Published in 2019, the directive focuses more on the groupings and tasks of how a new capability could be managed in theory rather than how it will be achieved in practice. Spiral Three addresses the issue of interoperability briefly, identifying "niche capabilities, lack of common data standards, restrictions to information sharing, potential cyber threats to systems and communications"[14] as factors which must be continually addressed to reduce challenges of interoperability. The directive also states the objective of the ongoing RPAS PED project is that it will be integrated into the US DCGS system, but makes no reference to DCGS policy or directives.[15]

Canada's guiding documents for ISR are currently more aspirational than practical. Though interoperability is mentioned, it is often in the context of when a future capability is online. Additionally, there is no differentiation made between collection capability and the actual intelligence analysis portion of ISR. Purchasing a collection platform is only one part of an ISR construct; the RCAF clearly understands the personnel and infrastructure needed to support an airborne platform but is less prepared to staff an intelligence exploitation capability. The DCGS is intended to be a weapons system, an integral part of which is the intelligence personnel tasked to produce actionable intelligence.[16] It is also not enough to just create intelligence positions and expect success. Intelligence analysis is a skill requiring qualifications and training as well as experience. Though Canada has employed intelligence imagery analysts in previous operations it has been in an ad hoc fashion and only partially applicable to an existing construct like a DCGS.

At this point the CAF has a dated ISR Directive with an aspirational vision but no action, and policy statements that focus on the need for ISR platforms without mentioning the intelligence enterprise needed to create the actionable intelligence output expected of an ISR platform. Canada is not in sync with the FYES partners, specifically the US. A DCGS is not the only ISR construct available to Canada, but it is a solution that ensures the ability to operate with and contribute to the collective intelligence and defence needs of our closest allies and partners. The CAF rarely operates in isolation, at least partially because of size, which should make the ability

---

[12] Canada, "Our North, Strong and Free: A Renewed Vision for Canada's Defence," 2024, 28.
[13] DND, "Department of National Defence and Canadian Armed Forces Artificial Intelligence Strategy," 2024, 2.
[14] RCAF, "1 CAD ISR Directive – Spiral Three," 2019, 1.
[15] RCAF, "1 CAD ISR Directive – Spiral Three," 2019, 2.
[16] USAF, "Air Force Distributed Common Ground System" (accessed 30 April 2024).

to easily operate with our allies and coalition partners for both routine and extraordinary requirements a fundamental requirement when conducting future capability planning.

Allied ISR

The US is recognized as Canada's most important ally.[17] Coincidently, the US is also the global leader in ISR having years of experience and robust ISR capabilities in a multiple DCGS construct. Other FYES partners have based their own scaled ISR enterprises directly off the USAF model, and the ability to integrate and share tasks has a force multiplying effect. The 1 CAD ISR Directive has the stated objective of being integrated into the US DCGS as a means of enabling access to the global coalition ground stations and infrastructure.[18] Though the DCGS model will remain, the USAF is currently undergoing a shift in the approach to ISR, which has yet to be captured in a CAF directive.

Historically the US has used a product-centric approach to conducting the intelligence analysis related to ISR collection.[19] Processing, Exploitation, and Dissemination (PED) can be used to describe the analysis and represents an integral part of any ISR weapons system. A problem centric approach focuses on delivering an output, or product created to answer an intelligence question.[20] This methodology focuses on prioritizing and optimizing collection to collect against as many of these questions as possible. This works when the collection assets can be adequately matched with analytical assets. As technology has enabled more robust and capable sensors, there is often far more collection data than available analysts. The product-centric approach falsely creates collection asset scarcity because it creates a competition for assets and does not consider incidental data collected.

The USAF has started shifting from the product-centric 'industrial age PED' to a problem-centric 'digital age PED' in 2018.[21] A problem-centric approach involves defining the operational problems and what intelligence is needed to enable decisions, then using the most relevant streams of sensor data to provide the relevant data.[22] The output of ISR is not just the collection, or the analysis, but the integration of all parts into something that can be shared to enable decision-making.[23] By using massive amounts of collected data as an enabler, embracing a digital infrastructure and advancing technologies, all collected data can be harnessed and applied to solve existing operational issues.[24] Effectively using data will necessitate leveraging Artificial Intelligence (AI) and Machine Learning (ML) and incorporate data scientists and data analysts into the ISR process.[25] The USAF has effectively found a

---

[17] Canada, "Our North, Strong and Free: A Renewed Vision for Canada's Defence," 2024, 30.
[18] RCAF, "1 CAD ISR Directive – Spiral Three," 2019, 2.
[19] USAF, "ISR Strategic Vision 2032," 2023, 3.
[20] USAF, "ISR Strategic Vision 2032," 2023, 2.
[21] USAF, "ISR Strategic Vision 2032," 2023, 2-3.
[22] USAF, "ISR Strategic Vision 2032," 2023, 3.

[23] Department of Defense, "Summary of the Joint All-Domain Command and Control (JADC2) Strategy," 2022, 4.
[24] USAF, "ISR Strategic Vision 2032," 2023, 5.
[25] USAF, "ISR Strategic Vision 2032," 2023, 11.

method to turn the problem of big data into an opportunity for innovation. The CAF's recently published DND/CAF AI Strategy identifies that leveraging AI is paramount to success of DND/CAF as well as our allies recognizing the potential of using AI and ML to augment current intelligence analysis capacity.[26]

The US is generally accepted as the lead nation for ISR within the FYES. Though Canada should have no ambitions for the scope of the US or USAF ISR capability, being unable to operate effectively at scale in the enterprise reduces Canada's contributions overall and challenges future integration during coalition operations. Intelligence sharing within the FYES must remain a priority for Canada as the nature of the intelligence sharing is so beneficial to the CAF and Canada as a whole.[27] FYES partnerships provide access to systems, technology and intelligence that the CAF would be unable to fund independently.[28]

The US may lead modern ISR, but allies and partners outside of the FYES must also be considered for Canada's development of a functional ISR enterprise. Other partners like North Atlantic Treaty Organization (NATO) countries, often participate in coalition operations and NATO also be considered important to Canada. The CAF rarely operates in isolation, and many NATO countries operate at a similar size to the CAF and have experienced the challenges of integrating into larger coalitions. Not only do Canadian allies provide the opportunity avoid mistakes or adapt tested efficiencies, but given the size of an ISR enterprise, allies will be critical to meeting the future operational challenges of the RCAF and CAF.

Future for the RCAF

Canada can and should develop a robust, modern, and interoperable ISR capability in order to say relevant within the FYES. Immediately, there is a requirement for an updated ISR Directive. Though historically published by the RCAF, the joint nature of intelligence collection and production in an organization the size of the CAF should have more than just one L1 organization supporting. The creation of Canadian Forces Intelligence Command (CFINTCOM) enables an intelligence lead or supported approach to the development of an ISR plan. ISR is not small parts working in isolation. Considering the collection platform to be intrinsically separate from the intelligence analysis will not enable a wholistic ISR enterprise but rather duplicate the necessary resources amid smaller units and groups.

A published directive does not constitute a success. A directive is simply a plan with expected steps to reach an ISR outcome and needs to be funded and resourced adequately to lead to a capability. For all intents and purposes, a DCGS is a weapons system, it is the people in that system that are a decisive advantage when employing the ISR weapon.[29] Historically Canada has only contributed to ISR on an ad hoc basis creating individual subject matter experts through deployment as part of a coalition or postings on exchange to units like the USAF 480th ISR Wing. Without a

[26] DND, "Department of National Defence and Canadian Armed Forces Artificial Intelligence Strategy," 2024, 2.
[27] Cartmell, "Long-Term Intelligence Sharing: the Five Eyes and the European Union," 418.
[28] Cartmell, "Long-Term Intelligence Sharing: the Five Eyes and the European Union," 420.
[29] 408th Unit Mission Brief, slide 4.

dedicated collection platform for domestic or non-operational use there has been no resources to build a functional intelligence analysis enterprise. The reality is that ISR is an inherently human endeavor and an intelligence analysis capability that is fully integrated within the DCGS network would enable CAF intelligence teams to contribute to collected lines of task nearly seamlessly.[30] Waiting for the CAF to procure a national collection platform (discounting the CP-140 which is not dedicated as an ISR platform for domestic operations and does not have integrated intelligence analysis for its sensor data while deployed) has already taken years and meant that outside of select individuals there has been very little expertise built and maintained in a Canadian ISR capability. The ability to take on Allied lines of task as part of a DCGS now would not only develop that expertise but also contribute to the FYES intelligence sharing agreements in a significant way. The USAF recognizes the importance of ISR integration with allies and partners in the great power competitions of the future. "AF ISR intentional integration with our Allies and Partners will be a force multiplier in competition, crisis, and conflict."[31] Capitalizing on this clear partnered approach to operational capabilities has many advantages for countries like Canada who exist on a much smaller scale but maintain a high level of professional expertise.

One commonality within the US and USAF doctrine is the focus on mission command. Mission command "is a philosophy of leadership that empowers Airmen to operate in uncertain, complex, and rapidly changing environments through trust, shared awareness, and understanding of the commander's intent."[32] Enabling every member to make decisions by understanding the intent of the mission is something CAF members are known to do very well. CAF intelligence analysts and operators are likely to be well-suited to operate within the construct of a DCGS, the current challenge being the infrastructure and equipment. Decisions about technology and methodology must be made today to bring essential capability for the conflict of tomorrow.[33] Canada and the CAF be decisive now to ensure a robust and functional ISR capability in the near future. The DCGS represents an available, operationally tested, and supported solution to developing a standing Canadian ISR capability.

Conclusion

Increases in collection capabilities and collection platforms and advances in available technology have significantly changed the way modern militaries conduct intelligence analysis. From an industrial age product-centric approach, the USAF and other Canadian FYES partners are evolving to embrace digitization, AI, and ML and the implications those have on ensuring actionable intelligence is available to decision makers. Realistically, Canada never fully developed an industrial ISR capability, instead participating in the ISR process in an ad hoc way during named operations, and with limited interoperability with allies and partners. RCAF directives on ISR and PED are out of date and at best, aspirational. RCAF ISR has not been resourced and

[30] USAF, "ISR Strategic Vision 2032," 2023, 11.
[31] USAF, "ISR Strategic Vision 2032," 2023, 11.
[32] USAF, "Air Force Future Operating Concept Executive Summary," 2023, 2.

[33] USAF, "ISR Strategic Vision 2032," 2023, 11.

the intelligence enterprise is being considered separately from the collection platforms resulting in dislocated capabilities. Canadian allies, specifically within the FYES community have developed ISR capabilities and continue to evolve and develop methodologies in an interoperable fashion, still representing national interests.

Canada and the CAF benefit significantly from the FYES intelligence sharing relationship. Continuing to contribute in a meaningful, thought scaled, way to these relationships is imperative. ISR is very difficult to accomplish in an ad hoc manner, specifically when there is an expectation to contribute during operations as part of a coalition. Similarly, ISR provides unique and critical intelligence to decision makers that Canada and the CAF do not currently have the capacity to provide. Prioritizing interoperability with allies in developing this capability will ensure Canada's continued relevance within the FYES ISR domain and enable participation in targeting operations without allied support for collection or execution.

Establishing a Canadian DCGS (DCGS-CAN based on allied nomenclature) is a solution to several CAF problems. Not only does it enable access to allied training and experience, it also ensures that Canada is not left behind as our allies evolve from product to problem-centric ISR. The DCGS enterprise allows for sharing of collection lines of task and analytical teams, meaning no single partner is required to collect or analyze on every target, thus burden sharing a large problem set. The DCGS promotes national flexibility with allied redundancy. Though a DCGS may not be the only available solution to the Canadian ISR problem, it is one that could be implemented quickly if resourced adequately. Additionally, a DCGS provides far more access to intelligence and data from partners and allies, while continuing to ensure a capable and controllable national capability, than an ad hoc or unique Canadian capability ever could.

BIBLIOGRAPHY

Barber, Josh (Commander). "An Intelligence, Surveillance and Reconnaissance (ISR) Vision for the Canadian Forces," *Canadian Military Journal* 2, no. 4 (Winter 2001-2002): 41-46.

Canada. "Our North, Strong and Free: A Renewed Vision for Canada's Defence," 2024: 1-30.

Cartmell, Carleigh A. "Long Term Intelligence Sharing: The Five Eyes and the European Union." *Journal of Intelligence History* 22, no. 3 (2023): 417-434.

Department of National Defence. "The Department of National Defence and Canadian Armed Forces Artificial Intelligence Strategy." 2024.

Department of Defense. "Summary of the Joint All-Domain Command and Control (JADC2) Strategy." March 2022.

Ducheine, Paul A.L., Michael N. Schmitt, and Frans P.B. Osinga. *Targeting: The Challenges of Modern Warfare,* edited by Ducheine, Paul A.L., Michael N. Schmitt and Frans P.B. Osinga 1st 2016 ed. The Hague: T.M.C. Asser Press, 2015.

Headquarters Air Combat Command. "Operational Deep Dive: Nexus." 13 December 2023.

Lawrence, James L. "Activity-Based Intelligence: Coping with the "Unknown Unknowns" in Complex and Chaotic Environments." *American Intelligence Journal* 2016, 17.

Kevjn Lim, "Big Data and Strategic Intelligence." *Intelligence and National Security*. 2015: 3.

Lockerby, Alan. "SCAR-C Over Libya – to War in an Aurora," *Canadian Military Journal (Ottawa)* 12, no. 3 (2012): 63-67.

Royal Canadian Air Force (RCAF). "1 Canadian Air Division (1 CAD) Airborne Intelligence, Surveillance and Reconnaissance (ISR) Directive – Spiral Three," 2019: 1-11.

United States Air Force. "Air Force Future Operating Concept Executive Summary," 6 March 2023: 1-2.

United States Air Force. "ISR Strategic Vision 2032," 7 March 2023.

United States Air Force. "Air Force Distributed Common Ground System." (accessed 30 April 2024). https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104525/air-force-distributed-common-ground-system/

Zeibell, Andrew. “Between Five Eyes: 50 Years of Intelligence Sharing.” *Parameters* 51, no. 4 (2021-2022): 138-139.

480th ISR Wing. “Unit Mission Brief.” n.d.