





DATA LITERACY SERVICES IN THE CAF/DND

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JCSP 45

Solo Flight

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DATA LITERACY SERVICES IN THE CAF/DND

With the recent publication of the Canadian Armed Forces – Department of National Defence (CAF-DND) Data Strategy, many new concepts regarding the responsible use of data as a strategic asset are set out in the guiding principles and objectives, one of which is the improvement of data literacy in the department¹. This essay will help to inform and steer the institutional program in a manner that meets the needs of the most people as well as be of greatest benefit to the department. The analysis will first define data literacy and why it is a desirable organizational attribute, and then outline data literacy program requirements, which encompasses multiple perspectives from a diverse end-user point of view. Next, three program delivery streams will be presented to meet the requirements through a variety of service offerings. This analysis is essential in understanding the data literacy challenges that exist within CAF-DND and which service offerings are required to support the attainment of the strategic objective.

Defining data literacy includes more than a prescribed set of skills, but includes enablers, attributes and awareness to benefit from the use of data as a strategic asset². What remains relevant to CAF-DND is that the organisation will benefit from a spectrum of capabilities where, within each group, a few will need advanced and concrete skills, but everyone has a need for awareness and more modern, evidence-based approaches to answering questions. Therein lies the attribute of a community, specifically, a data literate Defence Team, both military and civilians. The enablement of a Defence Team to

¹ Government of Canada, "The Department of National Defence and Canadian Armed Forces Data Strategy," 2019.

² Mark Frank and Johanna Walker, "Some Key Challenges for Data Literacy," *The Journal of Community Informatics*, 2016, p.223.

take advantage of data sets also points to a need for people who can play different roles in different groups, and therefore the ability to fully utilise data and contextualize it is also relevant³. Thus, data literacy is a desirable attribute of the Defence Team which enables a spectrum of data usage and consumption skills, awareness, and contextual application to answer questions and benefit the organization.

To begin to describe the reasons why data literacy is needed, at a conceptual level, one of the primary benefits of this attribute is to support and exercise principles of democracy⁴. In their study of data literacy as it applies to open government data, Boychuk et. al. found that that accessibility is an essential factor in the use of open government data, however, if people have insufficient skills in analysis and critical thinking to comprehend and manipulate it, it remains ineffective and the democratic intent is not met⁵. This finding can be extended to CAF-DND to understand that data literacy is essential to fully utilize and benefit from available data. Further, as other government departments increase their data literacy, it is critical for CAF-DND to advance in order to align and ensure inter-operability with our federal partners, as well as participate in open government and democratic practices, specifically, engagement with industry and citizens. While one could argue that this need could be met with contractor support, that it would be costly and unnecessary to delivery a data literacy program, it is important to recognize that data literacy is also important in the warfare domain, to enable power, the ability to participate, and uphold alliances. Where open, big, or

³ Mark Frank and Johanna Walker, "Some Key Challenges...", p.234.

⁴ Michelle Boychuk et. al., "Do We Need Data Literacy? Public Perceptions Regarding Canada's Open Data Initiative," *Dalhousie Journal of Interdisciplinary Management*, 2016, p.4.

⁵ Ibid.

personal data increases in importance, power shifts to those who are capable of creating, controlling and understanding the data⁶. Retaining autonomy and remaining a desirable ally includes a measure of military power exercised through a data-literate officer and non-commissioned member cohort. Therefore, the need for data literacy in CAF-DND is a valid institutional requirement from both the business and warfare perspectives.

Given the need to meet the institutional requirement for data literacy, the Assistant Deputy Minister (Data, Innovation and Analytics) (ADM(DIA)) Training Team conducted a training needs assessment which identified the individual and collective performance characteristics needed to support an enhanced data and analytics capability in the CAF-DND⁷. This was necessary, to inform training options that should be considered over the next five to ten years to fill new performance, knowledge and experience gaps in both the CAF occupations and DND civilian job streams. Although the report focuses on mostly on business intelligence, it does acknowledge the need for a similar analysis for areas such as artificial intelligence and advanced analytics, as well as other topics in support of military operations⁸.

Relevant strategic findings of the research include the need for ADM(DIA), as the departmental functional authority, to continue with direct engagement with all Level 1 (L1) Executives, provide professional development opportunities, as well as promote and sustain data & analytics transformation⁹. While the executive cadre is instrumental as leaders of change, to promote the awareness and adoption of data literacy skills as an

⁶ Mark Frank and Johanna Walker, "Some Key Challenges...", p.234.

⁷ Government of Canada, "DND/CAF Data & Analytics Needs Assessment Report," 2019.

⁸ *Ibid.*, p.7.

⁹ *Ibid.*, p.16-17.

organizational attribute, they do not always have the time to retrain or experiential background with the depth of knowledge in this new topic, and therefore require more curated training and analytics products.

At the working levels, there was an additional onus to be able to collaborate with Government of Canada (GC) partners, industry and academia¹⁰. Where some of the foundational knowledge around analytics tools and business analysis needs to be established in both cohorts, the return on investment is perhaps better substantiated in this cohort as they have potentially more time in their careers to use the training. Integrating CAF-DND's data literacy framework with those of the broader GC framework¹¹ will be of particular importance to this level of personnel to facilitate interoperability and employability, since many at this level may come to DND from other government departments. This is also the level that would see the broadest spectrum of data literacy needs, including expert data scientists, advanced authors, basic authors, and consumers. This cultural shift leads to a need for a variety of training products such as data stewardship qualifications, post-graduate education, certificate programs, IT tool support, expert advice, job aids, best practices and micro-learning. Finally, this group of people would also need mentorship and support, the approach of which could differ from conventional methods of facilitation. Consequently, the needs of this group are diverse and varied, but also have the most opportunity to benefit over time, thereby increasing the return on investment.

¹⁰ Government of Canada, "DND/CAF Data & Analytics Needs...", p.16-17.

¹¹ Ibid.

Therefore, the training needs of the CAF-DND cover a wide range of specialists and generalists, from low-skilled to highly-skilled, from highly curated, executive support, to full-spectrum, hands-on, working-level analysts, and also differs in group attributes versus individual competencies, as well as general awareness and communication. The following sections will conceptually describe three service delivery areas that are required in order to meet these data literacy training needs.

The first training service would deliver activities to guide the individual through a path that can be customized, modular, self-paced, scalable and also vector into specific areas if desired. This line of service is expected to be part of CAF-DND steady state business operations and provides ongoing offerings to the broader and more general, working level cadre, targeting both individual and group competencies. The content would provide both internal and external, short and focused courses that would deliver end-users training courses from introductory to intermediate content. Key recommendations from Jones' research on satisfaction of distance learning experiences for CAF members include:

- Increasing and/or improving opportunities for peers and instructors to interact, to prevent feeling isolated;
- Improving the accessibility and user experience in the technologies used for both education delivery and learning management;
- Mandated time allocated in a work week for effective learning to take place; and
- Flexibility designed into course delivery and assignment deadlines, to ensure that members have options to help them work around work and life circumstances¹². Incorporating these important recommendations would lead to an optimized and enhanced training experience, where people can learn in a

¹² Kimberly Jones, "Satisfaction of Canadian Armed Forces Regular Force Members with Their Distance Learning Experiences," *Athabasca University*, 2020, p.209-212.

more customized, flexible, and user-friendly manner. Thus, the format of this program would be mostly self-paced, flexible and online, but would also have social and human interaction elements to include information on live, local engagements, chats, micro seminars, such as ADM(DIA)'s Lunch and Learn program, and registration for conferences.

Tracking qualifications within this stream is important to measure progress on data literacy as a group attribute. To that end, each course or learning activity would be designated an ADM(DIA) MITE code, which would then accumulate to CAF-DND qualifications for further employment in key analytics roles, such as a Data Steward, or even count towards military sub-occupation qualifications. In the future, should allied or operational doctrine require the CAF to provide qualified personnel to a support element to meet operational data analytics needs, these qualification codes could be used to help personnel coordination centre managers meet these requirements. Jones proposes that that a CAF-DND Distance Learning (DL) course quality rubric be created which could incorporate preferred DL practices and inform the design and development of courses and learning activities¹³. This would be a significant institutional program management piece to add for the purpose of adding analytics content to the Developmental Period (DP) education program¹⁴, such as CAFJODs, JCSP and NSP, in a modern and user-friendly manner. This approach would increase the likelihood of success of completion of the analytics portions of the DP courses. In this manner, the tracking qualifications and a CAF-DND DL course quality rubric will better enable measuring data literacy as a group attribute.

¹³ Kimberly Jones, "Satisfaction of Canadian Armed Forces...", p. 211.

¹⁴ Government of Canada, "Defence Administrative Order and Directive 5031-8, Canadian Forces Professional Development," 2017.

Another major component of this first training service would be the Community of Practice (CoP), a trusted and accessible online forum which would be used to communicate relevant, timely and usable information directly applicable to real work problems in specific business lines. Although some research suggests that the definition of a CoP is still vague¹⁵, Jones' results indicate that including CoPs in new and innovative ways to facilitate sharing and receiving peer feedback could decrease the individual feelings of isolation and distancing¹⁶. Up-to-date, content rich and an accessible e-forum is needed to connect users from all L1s to peers, mentors, and subject matter experts for support in applying new data and analytics practices¹⁷. While this would primarily be an online forum where news could be shared, people would also be able to showcase their products, conduct course registration and link to other learning portals such as the Defence Learning Network, the Canadian School of Public Service Digital Academy¹⁸, the Royal Military Colleges, the Canadian Forces College, and any other external partnerships. This CoP would also facilitate mentorship, celebrate accomplishments, and be the means through which people could map their qualifications in pursuit of training goals, view their data literacy journey over time, and document their training achievements should they wish to pursue a prior learning assessment for higher education or civilian equivalency. Finally, an analytics virtual sandbox would also be provided so that they could practice their skills, try new analytics products, and beta-test

¹⁵ Mark Frank and Johanna Walker, "Some Key Challenges...", p.234.

¹⁶ Kimberly Jones, "Satisfaction of Canadian Armed Forces...", p. 210.

¹⁷ Government of Canada, "DND/CAF Data & Analytics Needs...", p.16-17.

¹⁸ Government of Canada, "Canadian School of Public Service Digital Academy," 2020.

higher risk activities such data integration in support of exercising their roles and responsibilities such as data stewardship.

Therefore, this first training service centers around the CoP to meet the needs of the largest cohort of DND, both from an individual basis as well as from a group attributes perspective.

The second training service would be designed to meet the needs of the executive cadre, who are consumers of highly-curated products, delivered by analysts and program experts who have done the interpretation¹⁹, for the purpose of broad CAF-DND business analytics. This is an alternative to training, specifically for a cadre who does not necessarily require hands-on expertise in how to produce these reports, nor do they require the skills to handle raw data, combine data sources, or use analytics tools. They do, however, need to understand the potential uses of the data, the sources, the methods of collections, the quality, and their roles in governing data. Specifically, they need to be data sharing champions, and will be responsible for deciding to safely and securely release and share data from their own lines of business to the other L1s who need it.

One could argue that the leaders of the organization should have a higher bar of data literacy set for them and more should be expected. However, from a program delivery perspective, re-training and adding to their already highly developed skillsets are poor investments as this cohort has the least amount of time left in their careers and they are also usually past the post-graduate education level. Research also indicates that data literacy should begin with elementary programs, including standardization across grades

¹⁹ Michelle Boychuk et. al., "Do We Need Data Literacy...", p.19.

within existing, well-defined curricula²⁰. At the post-graduate level, data literacy is still non-standardized, very discipline-specific rather than a general skill-set, and only affects a small number of students²¹. Importantly, it is also more difficult to instill foundational knowledge at the post-graduate level, and a lack of background knowledge makes data literacy jargon and exercises difficult to master²². "The effort institutions are making to include data into the curriculum is in the right direction, but the mark is too far. Students must be educated in a meaningful way, not simply to fill a void"²³. Hence, catering to training needs at this level is impractical, would likely conflict with personal and professional willingness to undertake significant efforts to relearn at a high school and undergraduate level first, and the delivery of a program to do so would be fiscally irresponsible. Therefore, the focus for this cadre should be on alternate, curated and analyst-supported services.

To further articulate, this is intended to be a temporary, transition service, is deliberately more of a customized, part-time, additional, remotely supported, call-up service primarily for senior executives. It is expected that it will eventually decrease as the CAF-DND population in general becomes more data literate given the program delivery at earlier career stages for the working level cohort, as previously described. As such, one of the major components of this would be the provision an analytics operator service, who would have certain aspects in common with the what is commonly known as a call centre. In this manner, an individual who qualifies would be designated as an

²⁰ Chantel Risdale, et. al., "Strategies and Best Practices for Data Literacy Education Knowledge Synthesis Report," *Dalhousie University*, 2015, p.20.

²¹ *Ibid*.

²² *Ibid*.

²³ Ibid.

operator who would access, optimize data, and be the in-between person connecting the expert analytics authors and the client. This service would also be used to provide oneon-one coaching if desired. One of the major factors to consider in this service would be trust, as the analytics operator would need to potentially share their information or have access to high-level context in order to render assistance. This service would be delivered remotely over the telephone, online via chat or video conferencing, or if necessary, inperson, and would therefore require all of the supporting technology in place. The type of individual best suited for this role would be someone who could easily navigate and keep up to date on the analytics tools available and relevant folder structures, as well as possess strong interpersonal skills and manners. This person would also be able to leverage the first training service offering and CoP described above. In reality, executives already seek out these people in their organizations to do this work for them, and this service would just deliver a similar capability in a deliberate and planned manner, with better support for the individual instead of getting pulled into extra duties because of their accidental, data literacy attributes.

The third service would support more rigorous specialization and expertise to feed an employment structure for those who will eventually be institutional analytics leaders or expert advisors to either technical, operational or business clients. This line of service would be primarily expected to deliver steady-state activities and funding to support individual, formal, academic education, which would require undergraduate and postgraduate academic qualifications, as well as validation of experiential qualifications and competencies on standards and best practices. To that end, the development of this stream's group attributes would also need to be supported with a professional accreditation program similar to the models found at Professional Engineers Canada, Project Management Professionals, or Chartered Professional Accountants, but with a focus on data and analytics.

This third stream would also feed into the military occupations and employment structure²⁴. As technology and worldwide data literacy increases, it would be reasonable to anticipate the need for military data analysts in theatres of operation. Thus, establishment of a NATO standard or doctrine to include a data analytics support element would lead to the associated requirements to be included in certain occupation specialty qualifications and thereby trigger the CAF training and education system's output to meet these needs²⁵. Ideally, the various tiers of both data analytics education and professional certifications to align with the CAF DPs²⁶, as well as to align with a career path for specific military employment structure requirements. This sub-occupation specialty would be purple and not necessarily tied to an element or occupation, in a somewhat similar fashion as environmental or ammunition qualifications. Just as all lines of business can leverage data as a strategic asset, so too would all occupations be able to leverage this specialization for their purposes as an occupational sub-specialty.

Logically, this offering would be strongly supported by the Canadian Defence Academy (CDA), to deliver formal academic education as well as CAF DP training. However, additional effort would need to be made to realize the vision of this stream, as the competencies and best practices would need ongoing research projects, mentorship

²⁴ Government of Canada, "Defence Administrative Order and Directive 5070-1, Military Employment Structure Framework," 2017.

²⁵ Government of Canada, "Defence Administrative Order and Directive 5070-1, 5031-0, Learning and Professional Development," 2017.

²⁶ Government of Canada, "DAOD 5031-8, Canadian Forces Professional Development," 2017.

and a professional accreditation. This would be best achieved through the establishment of a dedicated and long-term analytics and innovation institution, for which the Royal Military Colleges and Canadian Forces College would be perfectly suited, as they are also best placed to collaborate with other academic institutions and have a view on education from all the DPs and disciplines. This perspective on disciplines is particularly important because foundational knowledge and skills can be enhanced and cumulative from one DP to the next, it can be of great utility in interdisciplinary teams, and relevance in military operations provides valuable context for project work. While the CDA would be an ideal fit for the delivery of this concept, there should be some flexibility in acceptable academic programs to include other universities and delivery models, such as distance learning, hybrid distance learning and in residence, prior learning assessments and modularized coursing. This would make it more accessible and achievable for people to attain expert levels of data literacy.

In closing, while the data and analytics transformations are significant and are a shared challenge across government, the data literacy outcome remains a key enabler to upholding a democratic society and position of power for Canada. For the CAF-DND, embarking on this modernization effort must include alignment to the GC and allied partners, which means embracing a collaborative approach to share best practices, leverage resources and align standards to achieve strategic advantage and operational efficiency. There is no question that the pursuit of the CAF-DND Data Strategy's strategic objective of increased data literacy is institutionally critical, and the program streams above outline a conceptual service delivery model to achieve those goals.

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