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CAF C4ISR: AN INTEGRATED APPROACH TO TACTICAL DATA LINK

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Exercise Solo Flight

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LINK**

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INTRODUCTION

The information age has revolutionized our societies with the means to receive and exchange information from the reach of our finger tips. Accordingly, the virtual access to a wide-range of mediatized updates and the interconnectedness have shaped the daily expectation of being able to rely upon immediate information and the ability to share it amongst interdepartmental agencies. In contrast, the technological realm is required to be synchronized within any institution policies in order to ensure an integrated and balanced approach between the procurement, training and employment concept of operations. Within the Canadian Armed Forces (CAF) context, the requirements to support domestic and international operations have been greatly enhanced by the ability for Tactical Data Link (TDL) peripherals to share with and fuse the dynamic information flow. While the TDL does not constitute a new concept to be introduced, the national joint integration policies across the Royal Canadian Air Force (RCAF), Royal Canadian Navy (RCN) and the Canadian Army (CA) environments for the procurement, training and employment of TDL reflect an area worthy of discussion.

The Vice-Chief of Defence Staff Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) strategy indicated the requirements for “all operational platform [to] establish a TDL capability interoperable with [...] joint and multinational command and control [C2]”.¹ Having said that, the current TDL construct within CAF does not benefit from a joint Operational Authority (OA) to oversee the management of TDL capabilities and training. The Staff Officer Data Link (SO DL) office was stood up in 2009 under the authority of 1 Canadian Air Division

¹ Canada, Department of National Defence, “The CAF C4ISR Strategic Vision, Goals and Objectives”, 2016, 5.

(1 CAD) to meet the increased needs of TDL. Since its inception, SO DL has been fulfilling the *de facto* duties of OA, Technical Authority (TA) and Operational Testing and Evaluation (OT&E) on behalf of the CAF, but without any foundational mandate or supporting supported command relationship with the RCN or CA. The February 2017 report on the TDL Front End Analysis (FEA) conducted within 1 CAD identified that “[the] adoption of multi-TDL systems [is] outpacing the ability to train operators, technicians and leaders on TDL theory and equipment”.²

In such context, the aim of this paper will be to highlight the requirements for the CAF to formalize the OA, TA and training authority, with the Canadian Joint Operations Command (CJOC) as a central Force Employment (FE) agency. Arguments will be provided to identify the governance matrix as the current weakest link within the CAF TDL realm, but with proposed solutions to enhance its construct. In order to conceptualize the joint approach, this paper will be divided into two main sections: Force Generation (FG) and FE. The FG will be comprised of two sub-categories: an overview of the FG baseline for the operators and technicians with respect to TDL theory and employment will be covered, followed by the present capability development surrounding the procurement of TDL equipment. The FE section will first present the current CAF TDL C2 construct, followed by the proposed command relationship construct between the CJOC as FE, 1 CAD as FG, along with the RCN and CA. Of note, the intent of this paper is not to diminish the work and on-going collaboration within the CAF concerning TDL, but instead to leverage the existing efforts to generate further

² Canada, Department of National Defence, “1 Canadian Air Division – Request for Tactical Data Link Front End Analysis”, Last accessed 9 May 2017, <http://17wing.winnipeg.mil.ca:1400/1cad/FilesO/DMCS25075.pdf>

momentum toward a joint, integrated and agile TDL within the CAF. Additionally, the research and facts presented would not have been made possible without the steadfast and unwavering cooperation of the SO DL, Ken Mahon.

FORCE GENERATION – PROBLEM AND TERMINOLOGIES DEFINITION

To articulate a proposed Course of Action (COA) for a joint integration approach to the CAF TDL, it is important to first define and differentiate the extent of the problem stemming from training oversight, and, the capability development management, or, procurement system. Due to the inherent relationship between TDL and C4ISR, such terms must first be defined to depict a clear and common framework of understanding. The CAF defined C4ISR as: “a system of systems composed of people, processes and technology required to effectively support command across the entire spectrum of CAF operations through the timely gathering, presentation and exploitation of trusted and relevant [...] information.”³ TDL is quantified by the Defence Administrative Orders and Directives (DAOD) as “key enablers for network-centric warfare that use continuous near-real time exchange of space, air, land, surface and subsurface track data, including information on friendly units and the status of weapons and engagements”.⁴ Additionally, the DAOD on Information and Technology (IT) defined OA as: “the person who has the authority to define requirements and operating principles, set standards and accept risk within their area of responsibility”.⁵ TA is further defined as: “the person who has the

³ The CAF C4ISR Strategic Vision . . . , 2.

⁴ Canada, Department of National Defence, “DAOD 6002-5 Tactical Data Links”, Last accessed 30 April 2017, <http://www.forces.gc.ca/en/about-policies-standards-defence-admin-orders-directives-6000/6002-5.page#ref>

⁵ Canada, Department of National Defence, “DAOD 6002-0 Information and Technology”, Last accessed 3 May 2017, <http://www.forces.gc.ca/en/about-policies-standards-defence-admin-orders-directives-6000/6002-0.page#def>

authority to set technical specifications and standards, manage configurations, provide technical advice and monitor compliance within their area of responsibility”.⁶ While the practical theory or architecture of TDL does not rest within the scope of the argument, a common understanding of the brief history that shaped today’s TDL training construct must first be underlined to appreciate the problem at hand.

Operators and Technicians Training Overview: A roadmap to defining the problem

By the late 1990s and early 2000s, the operational benefits of equipping RCAF platform with TDL equipment created a demand to ensure interoperability in domestic and international theatre of operations. To meet such demand, Phase II of the Engineering Proposal 583 fielded the CF-188 with a TDL system, and, Phase IV of the Aurora Incremental Modernization Project upgraded the CP-140M with Link-16 equipment.⁷ Tactical Control Radar (TCR) units and the CA 4th Regiment also followed suit by distinctly joining the TDL realm. In contrast, there existed an immediate requirement to FG operators and technicians for the sustainment and employment of an interoperable TDL architecture. Notwithstanding this FG requirement, the CAF also needed to ensure that a developed TDL joint curriculum would further meet the North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG), and, the North American Aerospace Defense Command (NORAD) military standards (Mil Std). Those interoperable standards are intrinsically linked to Canada First Defence Strategy’s enduring missions of defending Canada, defending North America, and making

⁶ *Ibid.*

⁷ Naval Review, “Changing with times: The Evolution of Canada’s CP-140”, Last accessed 29 April 2017, <http://www.navalreview.ca/wp-content/uploads/public/vol11num1/vol11num1art2.pdf>

meaningful contributions to international security.⁸ Until the SO DL office was stood up in 2009 as the lead agency within the RCAF, the CAF mainly relied upon the United States (US) joint TDL training to incrementally FG a few selectees, leveraging the US joint TDL concept that had been in effect and proven since 1993.⁹ Having said that, the continuous self-reliance upon the US along with a cost prohibitive environment did not provide a long-term sustainable solution.

Operators

Given this background and in coordination with the Environmental Command (EC) Data Link Advisory Panel (DLAP), the RCAF turned to 51 Aerospace Control and Warning Operational Training Unit Squadron (51 AC&W (OT)), located at the Canadian Air Defense Sector (CADS), North Bay, to provide the CAF TDL operators with a dedicated Operational Training Unit (OTU). Such decision was made due to two main factors: CADS was already a subordinate unit to 1 CAD, making the oversight and support concept seamless, and, 51 AC&W (OT) was manned by a cadre of instructors to undertake new Qualification Standards (QS), albeit in theory. In 2014, although without a joint CAF mandate, 51 AC&W (OT) was designated as the centre of excellence to teach a the TDL curriculum for the operators that would mirror the US joint TDL doctrine. The training broke the syllabus down in four distinct courses as stepping stone, which are still in effect today: TDL 100 is designed as an introduction to TDL, TDL 200 or multi-link Advanced Joint Interoperability Course (MAJIC) focuses on planning and employment,

⁸ Government of Canada, “Canada First Defence Strategy”, Last accessed 3 May 2017, <http://www.forces.gc.ca/en/about/canada-first-defence-strategy.page#ql6>

⁹ *Chairman of the Joint Chiefs of Staff Instruction*, Last accessed 29 April 2017, http://webapp1.dlib.indiana.edu/virtual_disk_library/index.cgi/4240529/FID378/PDFDOCS/JEL/CJCS/6240_01.PDF

TDL 300 or Link 16 planner provides training for personnel to fulfill the functions of a staff planner, and, TDL 400 is the advanced TDL Joint Interface Control Officer (JICO) course.¹⁰

While the TDL environment witnessed some successes and tangible progress since 2009, the governance authority with respect to training remains an outstanding action item. Due to the joint nexus surrounding the TDL 300-400 environment, the training environment remains a shared and joint efforts amongst the RCAF, RCN and CA in terms of instructors and expertise. As a result, a Service Level Agreement (SLA) was ratified between the respective Training Establishment (TE) of the RCN, RCAF, CA and Assistant Deputy Minister Information Management (ADM (IM)) in March 2016 to underline the individual training authority.¹¹ The SLA does highlight the sustained level of joint awareness amongst ECs in terms of required cooperation, however, such agreement was not nationally directed, and solely constituted an inter-departmental cooperation arrangement without carrying any environmental or national authority. Of further interest to highlight, the collaborative support between ECs without an overarching joint training governance constitutes a risk or weakness associated with the present construct. Such risk is due to the SO DL and 51 AC&W (OT) relying upon cooperative RCN, RCAF and CA leadership to provide the instructors, without any supporting or supported command relationship.

To further depict the complexity of the structure as it stands today, the RCN through Commander Naval Personnel and Training Group (CNPTG) remains the training

¹⁰ Canada, Department of National Defense, "1 Canadian Air Division/Canadian NORAD Region Data Links Concept of Employment", 25.

¹¹ Service Level Agreement between RCN, RCAF, CA and ADM (IM) to conduct Joint TDL training, 2016.

authority for all TDL training, albeit not joint. As such, the Military Individual Training and Education (MITE) code for the TDL syllabus remains within the control of the RCN because the EC was the first to get the TDL curriculum sanctioned. While a single EC can be responsible for designated QS on behalf of the other environments, this underlines another layer of cooperation amongst the EC to ensure that TDL training is responsive to the distinct operational demands and subsequent employment. The 1 CAD TDL FEA recognized such risk in February 2017 and requested for a Level 1 support toward a national governance; at the time this paper was written, no updates were available to quantify any progress.¹² To further strengthen the synergy amongst ECs, the joint DLAP was created to foster a TDL capability advisory group where common issues and operational capability gaps can be discussed, addressed and jointly validated.

The VCDS C4ISR guidance stated that “all CAF operational platforms will establish a TDL capability interoperable with the J-Series (Link 16) message format to enable joint and multinational command and control, including targeting and situational awareness”.¹³ As such, the primacy of governance and joint FG will only grow exponentially within the next decade and beyond, as the CC-130 Hercules, CC-150 Polaris and CH-148 become TDL equipped by 2022. This increase in operational platforms equipped with TDL peripherals will correlate to a surge of operators on each wing, naval and CA bases requiring the training to conduct missions throughout the full spectrum of warfare. To summarize, the above section showcased the level of complexity associated with delivering a joint capability in the absence of a national governance. While an increased awareness and cooperation between ECs led to agreements being

¹² 1 Canadian Air Division – Request for Tactical Data Link Front End Analysis . . . , 1.

¹³ The CAF C4ISR Strategic Vision. . . , 2.

ratified to create a TDL curriculum to FG operators, the findings did also emphasize the inherent risk and weaknesses of a C2 construct that is not nationally governmentally sanctioned. The FG of TDL technicians concept will be explored to present a broader depiction of the training.

Technicians

While the TDL 100-400 addressed the progresses made in support of FG operators, the training for first line maintenance supported by the technicians also lacks national delineation of authority and governance. The CAF currently possesses two distinct TDL hardware peripherals used to receive and transmit data link information: the Joint Range Extension (JRE) and the Air Defense System Integrator (ADSI) – the issues surrounding its procurement or project management will be addressed in the next section. On one hand, the CA procured the ADSI, while on the other, the Joint Information and Intelligence Fusion Capability (JIIFC) procured the JRE. As a result, the CA is the training authority for the ADSI technicians QS, and the RCAF possesses training management oversight of the JRE QS. To add to the complexity, 8 Air Communications and Control Squadron in Trenton, and, both RCAF TCRs located at 3 Wing Bagotville and 4 Wing Cold Lake were fielded with the ADSI. As a result, two foundational issues arise for discussion: the first problem can be characterized by the self-reliance from the RCAF upon the CA 4th Regiment, Gagetown, New Brunswick, to be responsive to the recurring cyclical FG requirements around the active posting season. This reemphasizes the benefit of a joint governance to address and empower ECs' TE with the freedom to be delegated the authority to teach and FG independently. The second issue is related to domestic and international interoperability. When an operation is stood up, the Table of

Organization and Equipment (TO&E) can be fielded by any TDL technicians across the CAF. Since the ADSI and JRE require very distinct training and proficiency level, the process fragments the professional competency and efficiency of the TDL equipment and personnel in relation to the mission objectives. The recent *Operation REASSURANCE* and *IMPACT* serve as foundational examples where a blend of TDL equipment were deployed with various technicians who were not trained on either the ADSI or the JRE. Another opinion could argue that pre-deployment or collective training venues could address the knowledge shortfalls, however theatre Lessons Learned (LL) and observations have identified a direct correlation between the level of proficiency and the combat readiness state of the TDL personnel.¹⁴

The key to joint effectiveness and interoperable mission command functions ought to reside within a national governance that addresses and delineates the key responsibilities. As indicated in the Future Air Operating Concept, “technology alone, however, is only part of a capability”, reflecting the need to not only procure the right technological equipment but also to ensure that our most valuable resources, our people, benefit from a joint effects-based approach in terms of training.¹⁵ As an example, *purple* occupations such as Intelligence Operators and Resource Management Support Clerk’s TE are jointly instructed, and, the training authority prerogatives are shared by each EC. As such, a joint TDL TE could be espoused by the CAF to bolster the future TDL capabilities.

¹⁴ Department of National Defence, “Air Task Force – Iraq Corrective and Preventative Action Plan”, Last accessed 8 May 2017, <http://kms.mil.ca/kms/CentrallInstance.aspx?Type=SupportMaterial&Id=7728>

¹⁵ Canada, Department of National Defence, “Future Concepts Directive Part 2: Future Air Operating Concept – 15 August 2016”, Last accessed 2 May 2017, http://www.rcf-arc.forces.gc.ca/assets/AIRFORCE_Internet/docs/en/cf-aerospace-warfare-centre/elibrary/future-concepts-directive-part-2-future-air-operating-concept.pdf

In summary, the endeavor of standing up an operational TDL responsibility was undertaken without any initial strategic vision or guidance. The arguments brought forth aimed at depicting how the FG of TDL operators and technicians would benefit from a joint governance authority, and, to describe the level of synergy required to stand up a new capability. The Defence Consultation Board Discussion held on 31 March 2016 on CAF C4ISR strategic vision addressed the misalignment of governance between the strategic and operational level by conveying the intent to consult with key stakeholders and produce national regulations to better support the TDL and C4ISR requirements.¹⁶ The capability development and procurement architecture will now be explored to further understand the relationship between FG and the TDL equipment.

TDL Procurement – An Operational Strategy without Initial Strategic Guidance

The alignment between strategic and operational goals must be synchronized to support the CAF's fundamental roles. To the same extent as the FG of TDL personnel, there exists a linear correlation between training and equipment in terms of strategic objectives and problem definition. Without a well-defined strategic vision concerning a capability, ECs become at the risk of independently procuring distinct equipment that may not be interoperable. To corroborate, the VCDS C4ISR strategic guidance stated that even in 2015, "there were approximately 180 projects with C4ISR nexus, [...] initiatives developing capabilities involving billions of dollars, and notwithstanding detailed

¹⁶ Canada, Department of National Defence, "DCB Discussion on C4ISR Strategic Vision, Objectives and Roadmaps", Last accessed 9 May 2017, <http://collaboration-airforce.forces.mil.ca/sites/AirStaff/1CdnAirDiv/DComd-1CAD/A3-Op-Sp-Rdns/A3-AR/A3-DL/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2Fsites%2FAirStaff%2F1CdnAirDiv%2FDComd%2D1CAD%2FA3%2DOp%2DSp%2DRdns%2FA3%2DAR%2FA3%2DDL%2FShared%20Documents%2FC4ISR&FolderCTID=0x01200009AD91F8B50E0E42891464680EF4EBA2&View={70CB3ECF-B0B0-4BA5-A1DB-124E219BE0ED}>

capability-based guidance, there were no strategic objectives to guide C4ISR portfolio.”¹⁷ In such context, the RCN, RCAF and CA have not benefited from an integrated TDL project management strategy to this date. With respect to the CAF joint force development (FD), the VCDS has direct oversight, with Chief Force Development (CFD) as the overall joint capability lead and integrator.¹⁸ An overview of the current TDL capability development, broken down by environment will be presented, followed by the consequences and recommended solutions for future considerations.

The 4th Regiment is the sole organization with the CA benefiting from TDL equipment. The Director Land Command System Program Manager (DLCSPM) is responsible for the project management and is responsive to the TDL needs identified by the 4th Regiment. Nonetheless, there is no command structure node that links DLCSPM with neither SO DL nor a national overarching OA entity to align the EC’s needs with the CAF.

Within the RCAF, the Director Air Domain Development (DADD) and Director Air Requirements (DAR) organizations are responsive to the platform specific needs. Having said that, two main drawbacks must be highlighted. Notwithstanding DADD and DAR’s commitment and distinct experience of their personnel, they unfortunately do not benefit from an in-depth TDL knowledge in terms of operators or technicians. As a result, it does not position the RCAF for a synergetic approach between the procurement and the operators’ needs. The second disadvantage, to the same extent as the DLCSPM situation, no supporting or supported command relationship ties the capability development with

¹⁷ The CAF C4ISR Strategic Vision. . . , 10.

¹⁸ Canada, Department of National Defence, VCDS Initiating Directive – Transfer of Leadership for VCDS Related Capability Development Responsibilities to ADM (IM), the Canadian Army and CFINTCOM, 13 December 2016.

SO DL. Consequently, SO DL does not have a lawful prerogative oversight over how TDL projects are identified, analyzed or prioritized.

The RCN is perhaps structured as the most functional EC in terms of environmental TDL integration. The RCN has a dedicated OT&E establishment, Multi-Link Support Cells (MLSC) on both east and west coasts, as opposed to the RCAF and CA who normally conduct an *ad hoc* performance measurement at the tactical unit level. Having said that, the RCN does share the common FD and command structure deficiencies with respect to joint development and linkage to SO DL. The procurements and project management functions fall under the Director General Naval Force Development, an organization that rests outside CFD's command structure, leading to potential RCN specific TDL projects rather than a joint capability-based approach. As a result of the respective ECs' FD construct stated above, a proposed COA could be to fuse the TFL FD with the CFD organization however, recent VCDS initiating directives on transfer of responsibilities have demonstrated a tendency for an EC to be identified to champion a set joint capability, as opposed to be jointly managed.¹⁹ The overall consequences of the absence of joint TDL guidance in terms of procurement can be summarized by asynchronous peripherals and lack of life cycle material manager (LCMM).

Peripherals Interoperability at Stake

As highlighted, each environment, albeit not recommended, can currently plan for and procure TDL equipment to meet respective platform requirements, but not joint

¹⁹ VCDS Initiating Directive – Transfer of Leadership. . . , 2.

needs. More recently, DLCSPM procured a newer virtual version of the ADSI, but it unfortunately was neither certified by NATO nor NORAD regulations. Additionally, such new procurement is not interoperable amongst other CAF ECs TDL architecture, as witnessed during the 2017 Exercise MAPLE RESOLVE in Wainwright.²⁰ The intent is not to portray the CA as a less capable entity but rather to highlight the consequences and ramifications of a capability that is not jointly centralized by governance.

The high level visibility on the requirement to address the joint management is not a new concept for the CAF. Following the 2010 Olympics in Vancouver - *Operation PODIUM* -, Rear-Admiral Pile, Commander Joint Task Force Games captured the following LL: “It is hoped that that this [OP PODIUM] experience will stimulate dialogue on the requirements for a national TDL policy and the mechanisms through which to best manage this important joint capability”.²¹ With a near seven years that have passed since this observation, the CAF TDL realm has grown, but without having addressed the key national policy implementation. This could arguably emphasize the complexity of changing the status quo, when, the CAF has been successful at delivering TDL in domestic and international theatre of operations under the current construct. Such argument is further supported by Maj Beauchamp’s debate in *What barriers exist to the implementation of unique JTDL capability within the CF*, “key stakeholder groups within each ECs are also very protective by nature of their established procedures and reluctant to bring changes to structures already in-place”.²²

²⁰ Mahon Ken, telephone conversation with author, 8 May 2017

²¹ Beauchamp, Patrice. “What Barriers Exist to the Implementation of a Unique Capability within the CF.” Canadian Forces College, 2011, 1.

²² *Ibid.*, 49.

Inherent Risks of Procurement without a LCMM

In parallel, the RCAF and the RCN's TDL procurements have too shown the inherent risk of a decentralized project management. TDL equipment has been procured in the past to meet environmental needs under Miscellaneous Requirement (MR) funding envelop. The premise of the MR is to provide financial allocation to support Formation Commanders for requirements resting outside conventional business planning cycle, however the procurement is never accompanied with a LCMM option. Consequently, the TDL capability becomes in peril when technical faults arise, leading to a risk that cannot be fully mitigated. To address such deficiencies, the C4ISR Strategic vision stated that: "By 2017, CFD will institutionalize a high-level C4ISR requirements framework to enable the verification and validation of all project requirements in support CAF C4ISR force development".²³ This statement acknowledges the strategic desire and vision to support and validate that projects deliver the operational capability in coordination with the key stakeholders.

In contrast, the Australian Defence Force (ADF) possesses and employs a national governance with respect to the joint procurement of all TDL peripherals. The ADF fulfills the national responsibilities of TA (ADFTA) for TDL, and, conducts the technical validation capability (OT&E). The ADFTA's primary role is identified as: "to ensure correct TDL functionality at the platform level to achieve service, joint and combined interoperability".²⁴ The United Kingdom (UK) is another member of the Five Eyes community with a proven joint TDL policy integration. Joint Data Link Management

²³ The CAF C4ISR Strategic Vision. . . , 40.

²⁴ Australia New Zealand International Data Links Society, "The Australian TDL Interoperability Summit – 7 November 2016", Last accessed 3 May 2017, [http://www.anzidlsoc.com.au/1515_Tactical_Data_Link_Capability_Assurance\(BDA\).pdf](http://www.anzidlsoc.com.au/1515_Tactical_Data_Link_Capability_Assurance(BDA).pdf)

(JDLMO) has been established since 2005 with the mission to write TDL CONOPS, act as liaison with civilian agencies, and, conduct the management of DL within the UK and abroad.²⁵ Both the UK and ADF's joint force structure approaches appear to be functional and interoperable in terms of requirements, procurement and integration.

This section captured the key risks associated with a TDL FD structure that is not nationally governed. Interoperability and sustained operations rely upon a centralized policy that integrate the joint needs for ease of management. Examples from the ADF and UK's current joint approach to TDL were used as mean to evaluate how Canada's allies envision and force employ. A focus on FE will be studied to rationalize the appointment of a TDL OA.

FORCE EMPLOYMENT – FROM SILOS TO INTEGRATED OPERATIONS

The previous section identified the complexity of the TDL FG apparatus, with a focus on training authority governance and absence of joint overarching FD structure. The remaining topic to be discussed will be divided in two sub-sections: the operating environment will first be defined, followed by the current TDL FE construct prior to concluding with the proposed COA. A joint and synergetic approach to FE is also vital to the future success of TDL. The *Integrated Capstone Concept* stated that: "In order to resolve the issues of developing, generating, and employing military forces in support of

²⁵ International Data Links Society, "Joint Data Link Management Organisation", Last accessed 3 May 2017, https://www.idlsoc.com/Documents/Chapters/UK/11_07_2006_R-JDLMO_Brief.pdf

national policy, DND/CF must integrate as force developers and force generators so that the CF can succeed as force employer”.²⁶

Description of the Military Problem – The Environment

Today’s environment is often referred to as more complex and fluid, requiring a flexibility and specialized technological approaches tailored to meet the challenges of state, non-state actors across transnational conflicts. The *Integrated Capstone Concept* stated that the challenges posed by the future operating environment “demand approaches that are comprehensive, integrated, adaptive, and networked. These attributes must become the tenets that govern the nature of the future force and the requirements for being strategically relevant [and] operationally responsive [...]”.²⁷ For integrated operations to succeed at fulfilling expeditionary missions, low-intensity conflict, conventional conflict and military operations other than war (MOOTW), the FE conceptual structure must be emphasized by a balanced approach.

CAF TDL FE Structure – Proposed

As previously stated, the CAF does not currently benefit from a joint TDL OA or TA. Instead, the TDL FE C2 construct is fragmented across entities ranging from 1 CAD SO DL, ADM (IM), respective ECs via the DLAP, to the RCAF, RCN and Level 3. To better appreciate the construct, a delineation of FE responsibilities amongst those key organizations will be summarized to identify the most troublesome areas pertinent to the discussion.

²⁶ Canada. Canadian Armed Forces. Chief of Force Development and Canada. Canadian Armed Forces. Wing, 17. *Integrated Capstone Concept*. Ottawa, Ont: Chief of Force Development, National Defence Headquarters, 2010, 13.

²⁷ *Ibid.*, 53.

Within ADM (IM), the Joint Tactical Data Link Management (JTDLM) section is, per DAOD 6002-5, responsible for but not limited to the development of policies, setting guidelines for training and interoperability, and, supporting operational commands with expertise and coordination advice.²⁸ Notwithstanding the stated responsibilities, JTDLM has unfortunately not been in the position to fulfill the key policies responsibilities pertaining to training and interoperability. Such discrepancy is due to a limited number of TDL staff personnel across the CAF, resulting in JTDLM not having benefitted from the ability to employ key personnel to complement their mandate. In the interim, the onus of TA has been upon the SO DL to manage at the operational level.

With respect to joint OA, SO DL and the DLAP had identified CJOC as the logical organization to fulfill the mandate, and further drafted a Joint Data Link Force Employment (JDLFE) CONOPS in 2012.²⁹ Initial progress was made when CJOC stood up the Joint Operations Data Link Coordinator (JODLC) section in order to provide some overarching Subject Matter Expert (SME) to Comd CJOC, and, to collaborate with JTDLMC in support of deployed operations. Nevertheless, CJOC has still not officially taken ownership of OA to this date. The lingering gap pertaining to TDL OA remains problematic due to the inherent FE coordination that is left to the SO DL and the ECs' representatives. This is even more crucial for domestic and international deployments, where CJOC is the HHQ responsible for managing and overseeing the TO&E. As such,

²⁸ DAOD 6002-5

²⁹ Canada, Department of National Defence, "Joint Data Link Force Employment Concept of Operations – Draft", Last accessed 9 May 2017, <http://collaboration-airforce.forces.mil.ca/sites/AirStaff/1CdnAirDiv/DComd-1CAD/A3-Op-Sp-Rdns/A3-AR/A3-DL/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2Fsites%2FAirStaff%2F1CdnAirDiv%2FDComd%2D1CAD%2FA3%2DOp%2DSp%2DRdns%2FA3%2DAR%2FA3%2DDL%2FShared%20Documents%2FCJOC&FolderCTID=0x01200009AD91F8B50E0E42891464680EF4EBA2&View={70CB3ECF-B0B0-4BA5-A1DB-124E219BE0ED}>

the current FE C2 construct is reflective of synergetic collaboration between SO DL and the ECs, however the absence of a ratified Level 1 (CJOC) mandate will continue to pose a risk for the joint TDL employment.

In conclusion, the draft JDLFE document reflects the optimal structure required to integrate and employ joint CAF TDL by identifying and mandating the following organizations as OA and TA. JTDLM would be appointed TA and be resourced with the TDL SMEs to promulgate policies, coordinate with ECs, and, ensure TDL equipment interoperability throughout the procurement stage. CJOC would be the OA and hold the authority to liaise with the ECs and direct FE to meet the CAF TDL requirements. Additionally, the expertise of the Canadian Forces Air Warfare Centre (CFAWC) is another solution that was identified by the RCAF TDL FEA findings. It was the opinion of the FEA board members that CFAWC could be valuable by leveraging their existing active network with the RCAF communities to enhance the TDL operational momentum.³⁰ With the active role and successes witnessed toward the LL programs and respective doctrines, CFAWC's role could prove to be a valued addition to provide the TDL structure with some added flexibility.

CONCLUSION

This paper has demonstrated the extent of the challenges associated with standing-up, integrating and employing new capabilities. The joint integration and ability to sustain the equipment and the FG of TDL personnel requirements become even more complex when the operational demand must steadfastly maintain interoperability with our allies and NORAD Mil Stds. The continuous and fast rising technological advancements

³⁰ 1 Canadian Air Division – Tactical Data Link Front End Analysis . . . , Annex E.

must be operationally balanced to synchronize the operational demands with the strategic vision and mission for the CAF TDL. Consequently, a clearly stated strategic definition of a sought-out joint capability constitutes a cornerstone of the synchronization process to ensure the operational and tactical employers are aligned with the CAF's intent.

Additionally, joint governances must distinctly translate into a centralized process that delineates and underpin the primacy of OA, TA and training authority. In contrast, operational requirements may, at times, require an implementation to occur ahead of a ratified joint governance. The joint TDL capability represents an example of the additional challenges that must be overcome when limited TDL personnel and competing priorities amongst environmental leadership are not managed by a governance matrix. All those factors combined unequivocally represent the definition of an institutional wicked problem.

This paper divided the CAF TDL governance issues by providing an evidence-based approach that quantified the complex consequences and risk associated with the FG and FE. The arguments put forth found that the FG of TDL personnel requires a joint approach by the RCN, CA and RCAF however, the CAF remains without a *purple* TE to represent the specific needs of each environment. As a direct result of the absence of a joint mandate, a SLA and the DLAP initiative became the sole interim collaborative venue to address key TDL issues, without carrying any legal authorities. With respect to the TDL procurement construct, findings showed that in the absence of an OA and TA, each environment is individually responsive to platform specific needs, which, have resulted in asymmetric TDL peripherals in terms of interoperability. The proposed COA highlighted how ADM (IM) would be better positioned to oversee the procurement cycle

due to its linear command structure relationship with the RCAF, RCN and CA. In parallel, the TDL FE has gained some momentum with the creation of the JTDLMC and JODLC within ADMI (IM) and CJOC, but without a nationally appointed OA or TA. The draft JDLFE exemplified the required benefits for CJOC to take on those responsibilities in order for the SO DL to be commensurately supported by a flexible structure.

Lastly, the balanced TDL expertise with the proposed OA, TA and training authority will continue to rely upon the optimal blend of operator and technicians expertise alike. Today's and future theatres of operations will be equipped with an exponential increase of TDL platforms. As such, to maintain an agile and interoperable CAF TDL capability, synergy must be created and maintained to bridge the strategic with the operational goals. Canada's allied nations with an established joint TDL construct will also remain a most valuable example for the CAF to emulate and collaborate with. Future research on the CAF's ability to bolster the FG and FE command structure will provide the measure of effectiveness to evaluate how the VCDS C4ISR strategic vision and guidance was able to infuse the TDL realm with the overarching governance.

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