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...you tend to do the things you are organized to do; at least, you are constrained in choices by what you are organized to do.

– William Odom, *C^3I and Telecommunications at the Policy Level*

RCAF COMMUNICATIONS: A DELIBERATE APPROACH TO ORGANIZATION AND RESOURCING

AIM

1. The aim of this paper is to restore theoretical and doctrinal understanding of the communications function within a military context and to propose a deliberate approach to organizing Royal Canadian Air Force (RCAF) Communications and Electronics (C&E) resources. A revolutionary change to how communications as a function is understood and organized is needed by the RCAF today in order to prepare it for the demands of the future. This change is also desperately required to solve resource versus responsibility challenges currently facing the RCAF. These challenges exist because the current function and organization of communication resources are distorted, inefficient, and often ineffective at achieving their fundamental purpose: to enable and force multiply other RCAF capabilities. This paper is presented with the following two questions in mind. First, how can the RCAF more effectively approach communications as a military function to enable and force multiply RCAF capabilities? Second, what is the optimal organizational structure for C&E resources within the RCAF to foster exploitation of communications technology?

INTRODUCTION

2. "Ops or Log?" This question, referring to how RCAF Wings should organize their C&E resources, has been debated by the RCAF C&E community for years. Although each Wing is organized slightly differently from one another due to size and mission set, the loose standard

across most Wings consists of at least three core units: Wing Operations (WOps), Wing Logistics and Engineering (WLE), and Wing Administration (WAdmin). These three core units support whatever mix of aviation units that are allocated to the Wing and are a hold-over from Industrial Age organizational thinking as shall be discussed later. The Wing Telecommunications and Information Services (WTIS) organization, which also varies in size and responsibility from Wing to Wing, is usually a sub-unit within WLE. The debate is whether the WTIS organization should stay within WLE or be reallocated under WOps.[1]

3. To date this discussion has assumed WOps and WLE are the only options, and therefore the question has always been "Ops or Log?" This question tends to be emotionally charged, especially for the RCAF C&E occupations. However, discussion on this topic tends to be driven by personal or occupational fiefdom interests rather than objective analysis leading to an optimal course of action for the institution. Very little intellectual rigour has been applied to the discussion surrounding the RCAF C&E fundamental purpose which would, in turn, lead to a logical conclusion about its organizational structure. This paper approaches the debate by returning to first principles available from academic theory and military doctrine. It then builds on the theory and doctrine to propose a new perspective for the function of RCAF C&E resources and a corresponding organizational structure to support this function.

DISCUSSION

4. Two principal factors have given rise to the question about the organization of RCAF C&E resources. The first factor can only be described as dissatisfaction from *within* the RCAF C&E community about its perceived relevance and importance to the RCAF. Due to its position within WLE, WTIS organizations are perceived as base-centric (or garrison in army parlance)

[1]Of the three existing core units, WLE and WOps are the best suited; an unspoken consensus appears to exist that the WTIS organization should not fall within the WAdmin unit.

service entities. Traditionally, the WTIS sub-unit has provided one or both categories of IT capabilities required for static Wing activities: corporate IT infrastructure and services, such as network and telephony support, or the navigational and landing aids on the airfield. This perception of WTIS providing only base-centric services constrains attitudes both internal and external to the C&E community about the relevance of WTIS in relation to the primary RCAF assets: the fixed and rotary wing platforms. This dissatisfaction has been amplified by the advent of Shared Services Canada (SSC) and the perception that SSC has amputated one of those two traditional WTIS responsibilities, the corporate IT infrastructure and services. In general, this narrow-viewed and constrained understanding of how C&E resources can be employed within the RCAF has disenfranchised many bright and talented individuals within the C&E community.

5. The second factor leading to the question surrounding the organization of RCAF C&E resources can be described as dissatisfaction from *outside* the RCAF C&E community about the level of service provided by that community. A wide range of issues contribute to this dissatisfaction, and WTIS is even viewed by some as a disabler rather than an enabler. This paper suggests that this perception is driven by just two main issues plaguing WTIS organizations. The first issue is an ever decreasing ratio of resources to responsibilities (troops to task to use army parlance again). This decreasing ratio is not only the result of decreasing fiscal and personnel resources, as experienced by all occupations across the RCAF and, indeed, the Canadian Armed Forces (CAF). It is also the result of poor technology and capability management at the operational and strategic level. This has led to WTIS at the tactical level absorbing responsibility for every new electronic capability employed on the Wing. Electronic devices have grown exponentially over the past several decades leading to an explosion of IT-based capabilities in the RCAF. Yet a coherent and viable strategy for managing this growth,

including the allocation of appropriate resources, does not exist. As a direct consequence, WTIS resources are diluted and stretched beyond capacity. Hence service to the RCAF mission set suffers accordingly. The second issue of perceived poor service stems from the overly complicated, cumbersome, and untimely services controlled from the centre. Many of the responsibilities held by a WTIS organization are subject to policy and regulations promulgated from central organizations at the strategic level such as the Assistant Deputy Minister (Information Management) (ADM(IM)). These centralized policies and regulations can, when poorly applied or understood, hinder rather than foster the RCAF's agility and flexibility. Unfortunately WTIS is often perceived to be the source of this hindrance at the tactical level.

6. So, how should the RCAF approach the question concerning how to best organize the available C&E resources in order to achieve maximum effect? The answer should not be an impulsive decision to integrate WTIS units into WOps simply because of the two factors discussed above. Such a decision would merely be a trial-and-error approach and would not necessarily address the root-cause problems which led to this debate in the first place. Instead, the RCAF must take a step back to evaluate how it perceives the core function of information and communications as they apply to the mission. This evaluation must not be constrained by today's organizational structure or thinking, and must also consider the future security environment within which the RCAF can expect to operate.

Command, Control, and the Function of Communications

7. Thomas Coakley's Command and Control (C2) analogy of the human body is quite useful in understanding the essential function of communications within a military context. Coakley describes the Command function as analogous to the central nervous system, to include the brain, which receives sensory inputs, processes information, makes decisions, and transmits orders

throughout the body.[2] His analogy further describes the Control function as analogous to the body's motor nerves, and intelligence as analogous to the sensory organs. One could extrapolate Coakley's body analogy to think of operations being carried out by the muscular system (initiating physical movement), logistics being performed by the cardiovascular system (carrying nutrients and oxygen), and engineering or infrastructure support being provided by the skeletal system (providing the physical support base from which the muscles operate).

8. Coakley's model describes the communications function as comprising all of the electrical changes (messages only) which convey information to and from the central nervous system. While this is a good representation for *what* is communicated, it lacks representation of *how* it is communicated. Therefore this paper suggests military communications involve both the chemical changes *and* the peripheral nervous system which carries information to and from the central nervous system (thus both messages and medium). Both aspects of communications are intimately linked to the Command and Sense functions. Though the message is arguably much more important than the medium used to convey it, the nature of modern conflict and technology demand expert attention to how the message is transmitted. This more inclusive analogy also better describes the integral role communications plays in support of the control function (motor nerves according to Coakley). Either way, without a properly functioning peripheral nervous system which transmits the electrical signals, the body cannot sense, move or even breathe. Similarly, a commander without the ability to sense the environment or transmit intent through communication mediums is powerless, regardless of the strength of arms commanded. This intimate relationship between Command, Control, and Communications (C3)[3] must be

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[2]Thomas P. Coakley, *Issues of Command and Contro*l (Washington: National Defense University Press, 1991), xvi.

[3]The author of this paper argues it is long past time to abandon discussion involving Command, Control, Communications, and Computers or 'C4'. The term 'Computers' no longer holds any special

acknowledged and factored into the discussion of how communication resources should be organized.

9. Canadian doctrine supports this intimate linkage between Command, Control, and Communications. Canadian Joint Publication 01 lists communications as a key capability within the command domain.[4] The Canadian Army (CA) arguably understands this concept better than the RCAF by virtue of its 'HQ and Sigs' organizations. Signals, for the CA, are an integral component of command and control and organized such that the commander has direct access to his signals elements. This is not the case for the RCAF with WTIS reporting to a WLog organization. Yet even RCAF doctrine states:

> command involves the integration of a system of systems–procedures, organizational structures, personnel, material, information, and communication–designed to enable any commander to exercise authority and direction across the spectrum of conflict.[5]

This integration of a 'systems of systems' is only possible in today's environment through appropriate organization and application of C&E resources.

10. In addition to being a critical enabler for Command, the communications function also supports nearly every aspect of C2. Aerospace doctrine portrays C2 as performing five activities: monitoring, assessing, planning, directing, and coordinating.[6] In the 21st century battlespace, appropriate communications capabilities are vital to each of these activities. Indeed, the concept

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significance or function because of the ubiquitous nature of computing technology across all aspects of our lives today. In the Information Age, all modern communications involve computing technology and thus nearly all military communication mediums also involve computing technology less those mediums retained for last resort emergency purposes only. Further, this paper uses 'C3' to describe the *function* of Command, Control, and Communications whereas Computers are not so much a function as they are a *tool* which enables those functions.

[4]Department of National Defence, CFJP-01, *Canadian Military Doctrine* (Ottawa, ON: Joint Doctrine Branch, 2011-09), Table 2-1.

[5]Department of National Defence, B-GA-400-000/FP-000, *Canadian Forces Aerospace Doctrine* (Ottawa: Chief of the Air Staff, December 2010), 37.

[6]*Ibid*.

of "modern C2 systems" assumes highly advanced communications and electronics capabilities.

Considerations for a Future RCAF C&E Organization

11. Understanding communications and its relationship to both Command as a function as well as C2 is the critical first step towards determining an organizational structure which maximizes the effectiveness of available resources. Although the current alignment of C&E resources within a logistics unit might make sense in terms of the Wing Commander's span of control, it is illogical from a theoretical or doctrinal standpoint. But does it really make any more sense for those C&E resources to be aligned within WOps? The three core units (WOps, WLE, and WAdmin) are reflective of an Industrial Age organizational construct optimized for a World War Two era conflict. This organizational construct, in addition to other challenges facing the RCAF such as common understanding of its cyber terrain and how to achieve optimization within that terrain, is evidence that the RCAF has not yet fully embraced operations in the Information Age. A more aggressive effort to move the RCAF into the Information Age, while remaining cognizant of the military implications discussed in the Future Security Environment (FSE) 2013-2014, will lead to a more appropriate organizational construct.

12. As early as 2006 Alberts and Hayes correctly pointed out that the context of modern conflict in the Information Age demands a shift in how we operate.[7] This shift must be away from the outdated and constrained Industrial Age concepts of organization, such as we have in the RCAF today, towards an ability to fully capitalize on all the advantages which information and communications technology bring to the battlespace. For instance, the concept of Network Centric Warfare (NCW) provides significant improvements in the commander's ability to sense, analyze and act leading to a shortened decision cycle. However the RCAF is still a long way

[7]David S. Alberts and Richard E. Hayes, *Understanding Command and Control* (Washington: CCRP Publications, 2006), vii.

from achieving NCW as it requires not only the technical integration of systems, but also a new approach to integrated operations. Alberts and Hayes also argue that Information Age militaries need improved methods of sharing information and collaborating as well as a new understanding of C2.[8] However, any change in how we think about C2, including steps towards a truly NCW model of operations, must consider the operating environment of the future.

13. The FSE 2013-2040 identifies seventy-two implications for the CAF over the next two and half decades, many of these requiring a strong communications capability.[9] The cyber domain alone is specifically discussed in eight of those implications and is relevant to many others. The FSE also suggests that Canada must: remain interoperable with the United States (US); continue to invest in joint enablers such as C3ISR; be able to exploit data and information to our advantage; develop "higher performance, more secure and more robust clouds than those possessed by opponents;" and foster "very high levels of technical knowledge and skills."[10] For the RCAF, integration of unmanned aerial systems (UAS) into aerospace command and control systems will almost certainly become a required task involving a wide range of communications expertise.[11] Air Force Vectors emphasizes this requirement to pursue better integration and networking in its 'Vector 2: Integrated.'[12] The RCAF C&E community as it exists today is simply not organized or resourced to meet these expectations for future operations.

14. Considering our current state of progress from the Industrial Age of resourcing the RCAF towards Information Age resourcing, and the likely military implications of the future

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[8] *Ibid.*, 86.

[9] Department of National Defence, *The Future Security Environment 2013-2040* (Ottawa: Chief of Force Development, 2014): 129-138.

[10] *Ibid.*

[11] Richard S. Stansbury, Manan A. Vyas, and Timothy A. Wilson, "A Survey of UAS Technologies for Command, Control and Communication (C3)," *Journal of Intelligent and Robotic Systems* 54, no. 1 (2009): 73.

[12] Department of National Defence, A-GA-007-000/AF-008, *Air Force Vectors* (Ottawa: Director General Air Force Development, 2014): 36.

battlespace, the RCAF must place a higher premium on improving C&E organization and resources. The ad hoc approach to planning and managing technological development must be replaced by a deliberate process to shift the RCAF away from Industrial Age thinking and into the Information Age. Moving WTIS from WLE to WOps will not fully achieve these objectives.

CONCLUSION

15. As discussed above, the communications function is inextricably linked to the Command (and Sense) functions and is an essential component of effective C2 in the modern battlespace. The RCAF is failing to leverage the full extent of its C&E resources due to an out-dated organizational construct which is neither optimum for the current Information Age nor prepared for the Future Security Environment. RCAF C&E resources should not be aligned with logistics because such an organizational construct constrains the full potential of those resources. Neither should C&E resources be moved wholesale to WOps because this does not solve the underlying problems. Therefore a new approach to RCAF C&E organization is necessary in order to solve the problems of both the future and present day.

16. In order to meet the challenges of the future, the RCAF must aggressively examine options to reorganize its C&E elements, from tactical through strategic, in such a way as to promote modern methods of operating in a technologically complex battlespace. For the RCAF, this battlespace obviously includes the air and space environments, therefore in order to achieve optimal effectiveness, the RCAF C&E organization and resources must be positioned to lead in *all* areas of information and communication technology: ground, air, and space.

17. In order to overcome the challenges of today, particularly the untenable ratio of resources to responsibilities, the RCAF must aggressively refocus the existing C&E resources to only those responsibilities which are core to air force operations and leverage the expertise of the C&E community. All other responsibilities must be shed to centralized organizations, DND civilian

personnel, contractors, or other RCAF entities.

RECOMMENDATION

18. This paper makes three recommendations. First, the RCAF should conduct a thorough analysis of the future requirements and develop an organizational construct which considers the core function of communications, the FSE, and emerging technological trends. Only then should the RCAF reorganize its C&E resources accordingly. Second, the RCAF should not blindly move WTIS from WLE to WOps at the tactical level until the preceding analysis is completed. Such an analysis might yield other options, one of which might be an 'HQ and Sigs' type construct. Third, the RCAF should focus C&E resources solely on those technical responsibilities which are integral to the RCAF and for which the C&E community possesses the requisite expertise. This would include information and communication technology on the ground, in the air, and in space. All other responsibilities, especially corporate and static responsibilities, should be divested mercilessly.

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