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LEARNING TO SWIM IN A SEA OF INFORMATION: IMPROVING INFORMATION MANAGEMENT IN THE DEPARTMENT OF NATIONAL DEFENCE

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JCSP 45

Exercise Solo Flight

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MANAGEMENT IN THE DEPARTMENT OF NATIONAL DEFENCE**

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LEARNING TO SWIM IN A SEA OF INFORMATION: IMPROVING INFORMATION MANAGEMENT IN THE DEPARTMENT OF NATIONAL DEFENCE

INTRODUCTION

In 1597, English philosopher Francis Bacon wrote “scientia potential est” meaning Knowledge is Power, a viewpoint widely adopted today.¹ Thus it follows that, if information is considered a derivative of knowledge, then an organization’s ability to harness a vast array of information engenders the conditions by which it can attain great power. Effective information management (IM) is commonly linked to increased productivity, improved decision-making, and optimized operations. Yet, since the dawn of the digital age and the rise of internet, many organizations are fraught with the task of corralling the sheer volume of information in order to realize the promises of the digital age.

Such is the case within the Department of National Defence (DND) and the Canadian Armed Forces (CAF). As stated in *Strong Secure and Engaged: Canada’s Defence Policy*, “Much of what gives Western forces their technological and tactical advantage stems from ... agile information management and technology tools to aggregate and manipulate large quantities of data.”² However, in an era where the amount and various types of information being generated or collected is increasing exponentially, the DND/CAF struggles to establish an Information Management program suitable to meet their own operational needs and to comply with its obligations to Government of Canada statute and policies.

¹ “Scientia potential est,” *Wikipedia*, last modified September 10th, 2018, https://en.wikipedia.org/wiki/Scientia_potentia_est.

² Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy*, (Ottawa: Department of National Defence, 2017), 55.

Since the early 1990s, the DND/CAF has invested heavily in building an elaborate information environment. Today this environment provides the means for all employees to create, secure, store, share and collaborate on information vital to the business of defence. However, the most elaborate Information Technology (IT) system is little more than overhead and holds little value without first considerations to make IM more effective.³ Indeed, DND has made a concerted effort in instituting effective IM solutions for critical components of its business. For example, it possesses enterprise-wide IM systems such as the *Defence Resource Management Information System (DRMIS)* for managing material and financial resources as well the recently rolled out *Guardian* system for managing its human resources.⁴ These systems have regimented governance, user training and well-defined processes in order to provide structure to the data contained within them. Other areas of the information environment are much less controlled. Electronic tools such as common networked shared drives, websites, SharePoint instances, mail servers and document repositories hold large quantities of unstructured and haphazardly organized content in various formats, making it difficult to extract information from them. This problem, not unique to the DND/CAF, normally stems from either inadequate investment in tools and process or investment in the wrong tools and process to meet the needs of the organization.⁵ The result is an information environment which is untrustworthy, inefficient; that frustrates users and limits the value

³ Paul Strassmann, "The Value Of Computers, Information and Knowledge," January 30, 1996, last accessed April 17, 2019, <http://www.strassmann.com/pubs/cik/cik-value.shtml#RTFToC8>.

⁴ Jes Ellacott, "A Single Solution For Tracking the Military's Material," Vanguard Magazine, Aug/Sep 2012 issue, September 1, 2012, last accessed April 17, 2019, <https://vanguardcanada.com/2012/09/01/single-solution-tracking-militarys-materiel/>; "Welcome to Guardian – the Next Generation HR!," The Maple Leaf, last modified June 15, 2018, <https://ml-fd.caf-fac.ca/en/2018/06/14577>.

⁵ David Schubmehl and Dan Vesset, "The Knowledge Quotient: Unlocking the Hidden Value of Information Using Search and Content Analytics," (Framingham, MA: International Data Corporation, June 2014), 1.

the DND/CAF can glean from its own information. More severely, it puts the organization's operational effectiveness and reputation within the Government of Canada (GC) and the Canadian public at risk.⁶

The recently published *Defence Information Management Plan 2019-2022* establishes a goal "to embed the discipline of IM as an enabler for DND business and CAF operations by ensuring relevant and accurate information is accessible at the right time and by the right personnel to support timely decision-making."⁷ This paper will demonstrate that the DND/CAF must treat IM as a strategic imperative that requires synchronized investments in leadership and resources across IM enabling components of people, process and technology in order to meet its planned intent. Doing so will create a healthy IM culture, help the organization to realize internal operational efficiencies, and maintain external legitimacy with Government and Canadian society. The paper will first review IM definitions and background before identifying imperatives for an effective IM program within the DND/CAF. It will then explore linkages between people, process and technology to show how IM breaks down without balance, drawing on examples internal to the DND/CAF. Next, change management principles will be applied to evaluate DND's efforts to comply with the recent Treasury Board Secretariat (TBS) *Directive on Recordkeeping*. Finally, recommendations will be made on possible ways the organization can move to ameliorate its ability to leverage the power within its information.

⁶ Andrew Lipchak and John McDonald, "Case for Action For an Information Management Strategy For the Government of Canada," D. Scott Campbell & Associates Inc. (Ottawa: Library and Archives Canada, May 10, 2002), 3-4.

⁷ Department of National Defence, *Defence Information Management Plan 2019-2022*, (Ottawa: Assistant Deputy Minister (Information Management), January 14, 2019), 1.

IM DEFINITIONS AND BACKGROUND

Despite seeming straight forward, many textbooks and online articles have varied definitions on what IM really is. Related concepts and buzz terms such as Data Management (DM), Content Management (CM), Records Management (RM), Knowledge Management (KM) and Information Governance (IG) commonly appear on Google searches for IM. Differentiating these terms is made easier through the comprehension of organizational theorist Russell Ackoff's Data, Information, Knowledge, Wisdom (DIKW) hierarchy depicted in Figure 1.⁸

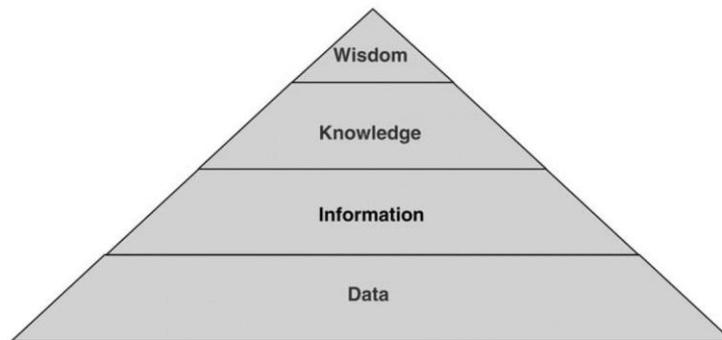


Figure 1: DIKW Hierarchy
Source: "From Data to Wisdom," 3-9.

The basic concept is that one level of the pyramid builds on the previous from bottom to top. *Data* is simply a symbol or value that constitutes the properties of an observable object. *Information* is meaning inferred from the evaluation of data to make it useable. *Knowledge* is cognition derived from relevant information to produce actions or reasoning. Whereas the first three levels are generally a *science*, *Wisdom* is the addition of human judgement onto knowledge and thus is more of an *art*.⁹ The CAF DIKW model

⁸ Russell L. Ackoff, "From Data to Wisdom," *Journal of Applied Systems Analysis*, Volume 16, (1989), 3-9.

⁹ Martin Frické, "The Knowledge Pyramid: the DIKW Hierarchy," *Knowledge Organization*, Volume 46, Issue 1 (2019), 33; "From Data to Wisdom," 3-9.

replaces *Wisdom* with *Understanding* which is created by coupling knowledge about the environment with tacit knowledge or experience.¹⁰

The GC *Policy on Information Management* defines IM as “a discipline that directs and supports effective and efficient management of *information* and *data* [emphasis added] in an organization, from planning and systems development to disposal or long-term preservation.”¹¹ The GC policy clearly articulates that IM includes management of records, documents and data; also identifying them valuable assets.¹² Blending these concepts, the DND/CAF defines IM as “the discipline that directs and supports effective and efficient management of information as a strategic resource of value to the DND/CF in order to ensure that the value of that information is identified and fully exploited.”¹³ Neither definition mentions KM. However, explicit knowledge can be externalized to create vital information for training, innovation, or improvement of processes and thus its management is also critical.¹⁴ For the purposes of this paper, IM encapsulates the management of all information types given it is exploited or has value to the organization. It also should be noted that, although cyber security is important to ensure the availability and validity of information, this paper will not deal systems security. Rather it will focus on the use of IM tools and processes that everyday employees use on a daily basis.

¹⁰ John Girard, “Canadian Defence Knowledge Management,” Chapter 8 in *Public Management of Defence in Canada*, edited by C. Stone, (Toronto: Breakout Education, 2009), 196.

¹¹ Treasury Board Secretariat (TBS), *Government of Canada Policy on Information Management*, (Ottawa: TBS, 2007), last modified March 29, 2018, <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12742#appA>, Appendix A.

¹² *Ibid*, section 3.

¹³ Department of National Defence, *Information Management in the DND/CF*, (Ottawa: Assistant Deputy Minister (Information Management), n.d.), 1.

¹⁴ Anthony Liew, “DIKIW: Data, Information, Knowledge, Intelligence, Wisdom and their Interrelationships,” *Business Management Dynamics*, Volume 2, No. 10 (April 2013), 60.

The Association for Intelligent Information Management (AIIM) offers a more functional explanation for IM activity. It states that “the focus of IM is the ability of organizations to capture, manage, preserve, store and deliver the right information to the right people at the right time.”¹⁵ Although AIIM omits disposal as a key requirement in this description, it closely resembles the DND/CAF information lifecycle model depicted in Figure 2.¹⁶



Figure 2: The Information Life Cycle
Source: *Information Management in the DND/CF*, 4.

At first glance, the *Information Life Cycle* appears to be a simple foundational framework which employees can incorporate into their work routines. However, implementation of such an altruistic concept across a nation-wide, multi-faceted organization is inherently problematic. Sub-organizations and units have different workflows and IM processes that require integration. Further hampering the cycle’s

¹⁵ The Association for Intelligent Information Management, “What is Information Management?,” last accessed April 17, 2019, <https://www.aiim.org/What-is-Information-Management#>.

¹⁶ *Information Management in the DND/CF*, 4.

implementation is a disparate set of software applications and isolated document repositories across the enterprise as well as years of neglect for sound records management.

Like other large departments, the DND/CAF struggled to implement the traditional recordkeeping processes since the beginning of the electronic age.¹⁷ Before this time, it had maintained disciplined standards of writing and administration complete with a highly effective paper-based recordkeeping system. Each document contained a file number taken from a centralized list. These numbers allowed for categorization and corresponded to various defence subjects and instructions for document retention and disposal instructions.¹⁸ Although this system is still in use today as the *Defence Subject Classification and Disposition System (DSCDS)*¹⁹, commonly used tools for informal communication such as email and instant messaging and new digital media types such as video and photo imagery are not easily captured within a system designed for paper based records without processes to do so.²⁰

With nearly all employees now contributing valuable information into the system at an exponentially increasing rate, the DND/CAF largely left behind its best practices. These circumstances put the organization's reputation and effectiveness in jeopardy. In order to better contextualize this risk, it is necessary to explore why IM is critical to the DND/CAF's core business.

¹⁷ Treasury Board Secretariat (TBS), *Horizontal Internal Audit of Electronic Recordkeeping in Large Departments and Agencies*, (Ottawa: TBS, December 2011), 2.

¹⁸ "Canadian Defence Knowledge Management," 200.

¹⁹ Department of National Defence, *Defence Administration Orders and Directives 6001-1, Recordkeeping* (Ottawa: National Defence, March 14, 2013), last modified June 5, 2017, <https://www.canada.ca/en/department-national-defence/corporate/policies-standards/defence-administrative-orders-directives/6000-series/6001/6001-1-recordkeeping.html>.

²⁰ "Canadian Defence Knowledge Management," 201.

IM STRATEGIC IMPERATIVES

Large-scale organizations, which generate and store excessive amounts of data without regard for rational information governance, expose themselves to high levels of legal, financial and reputational risk.²¹ In a 2002 report prepared for Library and Archives Canada (LAC), the critical nature of IM for the GC and its departments is evident. It stated:

Poor information management threatens all business processes and public programs including... service delivery activities, economic development initiatives, health care programs, environmental projects, citizenship development and heritage programs and efforts to protect the safety and security of Canadians in a post-September 11 world.²²

The report also indicated that the government was “wasting over \$800 Million annually because of inadequate IM” and that “IM practices [were] and [would] continue to undermine and erode citizens’ trust in government.”²³ Although dated, the alarming findings of the report highlight the need for the GC to maintain healthy IM practices. Within the DND/CAF, strategic imperatives for IM can be boiled down to legal obligations, internal and external accountabilities and operational effectiveness.

There are three principle statutes within Canadian law that necessitate positive stewardship of information and ensure transparency of the government for the Canadian public. The *Access to Information Act* establishes a framework for Canadian citizens to request any government document(s) or other information types subject to classification

²¹ Tara Combs, “The Need for Sustainable Information Governance,” *Big Data Quarterly*, Volume 4, No. 4(Winter 2018): 21.

²² “Case for Action For an Information Management Strategy For the Government of Canada,” 4.

²³ *Ibid.*

restrictions.²⁴ The *Library and Archives Canada Act* establishes strict controls on the management and archival of government corporate records and mandates archival of historical GC records.²⁵ Lastly, the *Privacy Act* ensures the protection of personal information and dictates parameters by which departments hold and secure personal information.²⁶ To maintain accountability within the GC, Treasury Board Secretariat (TBS) establishes policy and monitors compliance of IM through the *Management Accountability Framework (MAF)*.²⁷ It produces a public report annually with the objective to communicate status of ongoing initiatives and promote effectiveness and efficiency within the departments.

Given the DND/CAF's size and unique role within the government, there is constant interest from the media and public on its activities. In 2017/18 the DND/CAF received 2,055 Access to Information (ATI) requests and 7,393 requests under the *Privacy Act*.²⁸ Not only do improper recordkeeping practices in the DND/CAF cause delays in providing the requested information, they make information requests highly resource intensive and prone to incomplete responses. Poor results could significantly injure the DND/CAF's reputation and erode the trust of Canadians. The media reports surrounding the recent legal proceedings against Admiral Mark Norman, former Vice Chief of Defence Staff whom is accused of sharing cabinet secrets surrounding the National Shipbuilding Strategy, provides a poignant illustration.

²⁴ Access to Information Act, R.S.C., 1985, c. A-1.

²⁵ Library and Archives Canada Act, S.C. 2004, c. 11.

²⁶ Privacy Act, R.S.C., 1985, c. P-21.

²⁷ Treasury Board Secretariat (TBS), "Management Accountability Framework," TBS website, last accessed May 1, 2019, <https://www.canada.ca/en/treasury-board-secretariat/services/management-accountability-framework.html>.

²⁸ Treasury Board Secretariat, *Access to Information and Privacy Statistical Report for the 2017 to 2018 Fiscal Year*, last accessed May 1, 2019, <https://www.canada.ca/en/treasury-board-secretariat/services/access-information-privacy/statistics-atip/access-information-privacy-statistical-report-2017-2018-fiscal-year.html>.

Norman's lawyers allege that the military and government obscured his name in emails with codenames to evade information requests.²⁹ Department of Justice paralegal Patsy Bradley also hinted at the difficulty DND was experiencing difficulty locating relevant records, noting that they were spread across numerous databases and government filing cabinets.³⁰ Whether allegations of obstruction are true or not, the inability to retrieve information critical to the investigation and defence, in consideration of the nearly \$1 Billion spent by the DND/CAF annually on IM/IT, has tarnished the DND/CAF's image and resulted in significant political challenges for the current government.³¹

Mismanagement of records can also have severe implications for CAF personnel. Many compensation and benefits procedures are dependent on personnel records managed in the CAF HR system. There is potential for members to be denied access to services and benefits if records are not maintained. This was the case for many injured Afghanistan Veterans.³² An Auditor General report "found that the two departmental databases contained inconsistent data about the same Forces member in 9 cases (18

²⁹ Amanda Connolly, "Code Name 'Kraken': How Mark Norman's Lawyers Allege Military Used Pseudonyms to Hide Records," Global News, January 29, 2019, last accessed May 1, 2019, <https://globalnews.ca/news/4901599/mark-norman-code-names-alleged-military-information-block/>

³⁰ Lee Berthiaume, "Court Hears Departments, Officials Collecting Own Files in Norman Case," National Observer, December 13, 2018, last accessed May 1, 2019, <https://www.nationalobserver.com/2018/12/13/news/court-hears-departments-officials-collecting-own-files-norman-case>.

³¹ Department of National Defence, *Evaluation of the Information Systems Lifecycle Program*, (Ottawa: Assistant Deputy Minister (Review Services), October 2017), Table 6, last accessed May 1, 2019, <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/audit-evaluation/evaluation-information-systems-lifecycle-program.html>.

³² CBC News, "Injured ex-soldiers often unfairly denied benefits, AG finds," October 23, 2012, last accessed May 1, 2019, <https://www.cbc.ca/news/politics/injured-ex-soldiers-often-unfairly-denied-benefits-ag-finds-1.1195658>.

percent). The data concerned release dates, release items, or service in special duty areas...”³³

When it comes to military operations where lives are at stake, the requirement for information management is highly amplified. Rapid availability of exploitable battlespace information for decision-makers, and in the future data analytics and artificial intelligence tools, produces heightened situational awareness and enables freedom of action. Within a coalition environment, participating nations have moved away from a *need to know* to a *need to share* in order to meet mission objectives in a collaborative manner. As IT tools evolve to permit federation of partner networks into a holistic mission network, the need for effective information management governance ensures information is standardized, available and quickly consumed across the coalition.³⁴ Though technology is a critical component to hastily establish coalition information interoperability, processes and a healthy IM culture amongst the users of the system facilitates quick transformation of information into actionable knowledge on the battlefield. Establishing governance and procedures for information sharing was a significant challenge on NATO’s *Afghanistan Mission Network (AMN)* which was comprised of 40 plus nations, some of which were non-NATO partners.³⁵ In such environments, rigid adherence to IM policies is essential for the effectiveness of the system as well as maintaining trust within the coalition. For example, meta-data attached to media types such as GPS data require standardization to allow for various software

³³ Auditor General of Canada, *2012 Fall Report of the Auditor General of Canada*, (Ottawa: Office of the Auditor General, 2012), Chapter 4.

³⁴ North Atlantic Treaty Organization (NATO). “Federated Mission Networking,” Allied Command Transformation, NATO website, last modified February 26, 2015, <https://www.act.nato.int/fmn>.

³⁵ Chad C. Serena *et al*, *Lessons Learned From the Afghan Mission Network: Developing a Coalition Contingency Network*, (n.p.: RAND Corporation, 2014), 5.

tools to display the information. Another case is the need for proper security classification of information which ensures certain content can be restricted from the view of unauthorized partners.

In its *IM/IT Campaign Plan*, DND/CAF recognized this requirement to share, listing “improving efficiency and sharing of information” and “ensuring interoperability with allies” as key strategic imperatives.³⁶ Yet, without an adaptable deployable network solution that can be federated in accordance with NATO or United States standards, the CAF takes risk in physically transferring information from its own system and onto the mission network, and worse is unable to communicate or share information in a timely and efficient manner with mission partners.³⁷

Beyond the need to share information with joint and coalition partners on military operations, the capture and preservation of operational records is equally important. Increasingly complex operations and advances in IT have led to a significant growth in the velocity and the amount of records produced.³⁸ Notwithstanding the priority given to achievement of operational objectives, the comparatively mundane task of documenting and retaining records of decisions taken by military commanders, as well as the the activities taking place at lower levels, allows a military force to demonstrate adherence to the *Law of Armed Conflict*. Doing so can also allow media to cover facts concerning the operation as a means to counter adversary information operations.

³⁶ Department of National Defence, “DND/CF IM/IT Campaign Plan,” February 8, 2012, last accessed on the Defence Wide Area Network April 29, 2019, http://admm-smagi.mil.ca/assets/IM_Intranet/docs/en/about/governance/presentation-pmb.ppt, slide 6. This is a PowerPoint Presentation that was endorsed by the DND Program Management Board.

³⁷ CAF possesses systems capable of connecting to the FMN, however they are not widely distributed at the time this paper is written.

³⁸ Heather Soyka and Eliot Wilczek, “Documenting the American Military Experience in the Iraq and Afghanistan Wars,” *The American Archivist*, Volume 77, No. 1 (Spring/Summer 2014): 182.

When records are not kept or are lost, the accountability of a military force can be quickly called into question. The lack of documentation kept surrounding the handling of detainees taken by the CAF in Afghanistan resulted in serious concerns about the professionalism of the military. “Poor record-keeping [...] meant Canadian officials themselves could not locate transferred detainees, and thus could not ascertain whether particular detainees were still detained, released, transferred to third parties, had died under torture, or were executed.”³⁹

Internal to a military, KM programs feed development of doctrine and training to improve effectiveness and drive innovation. Operational recordkeeping also permits the creation of documentary history of wars after the fact. The evidence in these records supports the awarding of military commendations and provide credence to stories commonly used to promote morale and foster traditions.⁴⁰

In summary, the imperatives for an effective IM span both the business and operational realms of the DND/CAF. As illustrated by the examples above, some of the most adverse attention the DND/CAF has received over the last ten years has roots in faulty IM. Malpractice in this domain has, at times, diminished the trust Canadians have in the DND/CAF. To prevent reoccurrence, good leadership and a balanced investment in people, process and technology is of paramount importance.

PEOPLE, PROCESS, AND TECHNOLOGY

Referring back to the *Information Life Cycle* above, each step is enabled by a combination of people, process and technology. It is essential that large organizations be united by a common vision and take a balanced approach toward the three enablers when

³⁹ Omar Sabry, *Torture of Afghan Detainees: Canada’s Alleged Complicity and the Need for a Public Inquiry*, Canadian Centre for Policy Alternatives, September 2015, 33.

⁴⁰ “Documenting the American Military Experience ...,” 186.

investing energy and resources to foster a healthy IM culture within their workplace. Any imbalance can have a significant impact.⁴¹

People

At the core of IM are the information generators. The move from typewriters to networked computers and smart devices has dramatically increased information processing and sharing amongst all employees. However, when it comes to the handling of information, some aspects of human psychology have remained constant.

In 1983, management consultant Thomas Malone attempted to explain the potential of computers to assist in managing information. His research revealed that there were two methods of organizing information in an office: *files* and *piles*. *Files* systems were characterized by neatly arranged and categorized folders whereas *piles* were generally unorganized stacks of paper, with importance given to the stacks only sparingly.⁴² Among Malone's conclusions as to why *piles* were common were that people struggled with the cognitive task of classifying information into like groups and the physical task of creating folders with multiple classification levels. He also found that people had the desire to keep frequently used information in close proximity to their chair.⁴³ Despite his visions of computers assisting with this challenge, the issue of *piles* still exists in digital form today for similar reasons. In the modern workplace, where multi-tasking is almost a necessity, added steps to properly categorize and save information such that it can be found by others and disposed of when it is no longer useful are rarely completed. Rather than applying intellectual energy into classifying

⁴¹ I-Scoop, "Information Management and Strategy – An Executive Guide," last accessed April 29, 2019, <https://www.i-scoop.eu/information-management/>.

⁴² Thomas Malone, "How Do People Organize Their Desks? Implications for the Design of Office Information Systems," *ACM Transactions on Information Systems*, Volume 1, no. 1, (January 1983): 104.

⁴³ "How Do People Organize Their Desks?," 110-111.

information, people have a tendency to move on to another task or simply avoid doing it. The fear of not being able to retrieve key documents from the network has resulted in users rampantly duplicating files onto their personal hard drives and local network folders. Like Malone surmised with paper documents, as the *piles* of digital documents gets higher and higher, the practice becomes self-defeating.⁴⁴ So why have Malone's expectations for computers not solved issues in many organizations including the DND/CAF?

Over time, improvements to IM software applications, such as electronic records management systems, have attempted to mitigate the *piles* phenomena. This has proliferated numerous ways by which we can efficiently create, store, exploit and dispose of information. However, often lacking with any new enterprise software application is sufficient user and/or administrator system training. This can lead to low comprehension of the technology's full functionality or complete avoidance of the tool altogether, thereby limiting the potential benefits of even the most powerful software applications.⁴⁵ DND's enterprise search engine is a powerful tool, yet many DND/CAF employees comment on their inability to find accurate results. Many dismiss the tool completely. However, it is arguably not the tool, but a lack of user training and instructions given to records managers and web development staff on how to optimize information for retrieval by the search engine.⁴⁶

⁴⁴ *Ibid*, 111.

⁴⁵ Jaroslava Klegová and Ivana Rábová, "Enterprise Content Management Implementation and Risk," *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Volume 63, No. 5 (2015): 1693-1694.

⁴⁶ Example based on author's experience working with the CAF as an Information Management Officer in 2013-14. A specific instance is that Central Registry (CR) staffs were not familiar with metadata fields that made information stored in the authorized document repository easily retrievable in a search, nor did users know how to use keywords and filters in the search engine to find their own documents.

Beyond training, there is a need to invest in human capital throughout the organization to shepherd the IM program. Professionals are needed to assist leadership at local levels to merge tactical information management goals to the enterprise strategy for IM. They also play a key role in assisting the IT staff build an effective information environment. In a 2010 private sector market study of over 200 businesses, Forbes Insights, in association with industry leader SAP, identified ineffectual communication between IM and IT staff as one of industries top challenges.⁴⁷ It was not until the DND/CAF response to the 2009 *TBS Directive on Recordkeeping* that Level 3 and lower units were forced to assign formal IM duties within their organizations. Unfortunately, no additional human capital or funding was provided from higher and local leadership had little choice but to assign the duties as secondary responsibilities or hire part time staff using local funding sources. With a largely untrained cadre of newly assigned IM officers (IMO), whose time was not dedicated to the problem and whom were not immediately linked with local IT staff, the initiative stumbled initially.⁴⁸

Process

Another risk is that organizations fail to provide specific instructions for how the various software applications are to be integrated into the organization's IM strategy.⁴⁹ Failure to develop processes around the tool or incorrectly configuring the tool out of step with organizational workflows within the organization leaves users frustrated and confused. This results in misuse of the system, especially if users are not provided

⁴⁷ Brenna Sniderman *et al.*, "Managing Information in the Enterprise: Perspectives for Business Leaders," (New York: Forbes Insights in association with SAP, 2010), 2.

⁴⁸ Example based on author's experience working with the CAF as an Information Management Officer in 2013-14 during the initial stages of the DND/CAF's response to the *TBS Directive on Recordkeeping*.

⁴⁹ "Enterprise Content Management Implementation...", 1693.

training on adapted processes to be used. Such an example within the DND/CAF would be the roll out of *SharePoint*. Despite its reputation as a powerful tool, there appeared to be no consistent strategy across the enterprise which informed what it is used for. In some cases, site owners used it as a collaborative tool whereas others would use it as a means to collate (i.e. duplicate) information already in the system for sharing with a particular user group. Furthermore, despite *SharePoint's* ability to do so, no feature which forced users to categorize information was implemented to protect the integrity of the *Life Cycle*.⁵⁰ This has led to SharePoint becoming a mix of Information Resources of Business Value (IRBV) and transitory documents that the DND/CAF will have difficulty disposing of in the future, not unlike challenges associated with network shared drives.

Technology

As can be deduced from the previous sections, technology requires trained users equipped with processes that are linked to an IM vision to be successfully implemented. Likewise, investing the right tools for the business, implementing them across the organization and integrating them together are also critical factors.

One investment that is essential to IM is an Enterprise Content Management (ECM) system. These systems aid organizations to standardize IM processes and preserve IRBV.⁵¹ Yet, partial or decentralized implementations (i.e. localized databases) are inhibitors to realizing the IM vision. In 2012, the Assistant Deputy Minister of IM (ADM(IM)) sent an email to all L1s authorizing the *Records, Documents and*

⁵⁰ Example based on author's experience working with the CAF as an Information Management Officer in 2013-14. It should be mentioned that the Canadian Army, on its own initiative, heavily invested in assessing business processes and workflows and using them to incorporate automated classification to all documents uploaded on their SharePoint based Army Collaborative Information Management System (ACIMS).

⁵¹ The Association for Intelligence and Information Management, "What is Enterprise Content Management (ECM)?," AIIM website, last accessed May 2, 2019, <https://www.aiim.org/What-is-ECM#>.

Information Management Systems (RDIMS), the *Document Management Control System (DMCS)* and network shared drives as authorized repositories.⁵² This disparate set of applications limits access, collaboration and bloats the departments' IT expenses. At the strategic level, it has led to significant challenges in applying common practices for IM that can be rolled out across the enterprise.⁵³

Another example which shows a failure to integrate systems together is the DND/CAF email system. Decision-makers from across the DND/CAF frequently use email to authorize transactions without ensuring the record is captured outside of their personal email archive due to a lack of integration between *Microsoft Outlook* and the various ECMs.

Leadership

Although lack of investment in one or more of the enablers above has been shown to be damning, an effective IM program is more than simply balanced financial and human investment. Senior leadership needs to develop the vision and drive specific activity within each domain. Particularly important are the enforcement of process and the use of common tools to ensure employee compliance with the Information Life Cycle. Building on the *piles* phenomena, it can be argued that people are like electrical current when it comes to saving IRBV. They will follow the path of least resistance. In other words, without leadership enforcement, employees will resort to their own personal IM habits.

⁵² L.J. Bastien, "Recordkeeping Update/Le point sur la tenue de documents," electronic mail sent to all Level 1 organizations, April 26, 2013, retrieved on the Defence Wide Area Network April 3, 2019, http://admim-smagi.mil.ca/assets/IM_Intranet/docs/en/managing-information/information-records-management/admim-direction-records-storage.pdf.

⁵³ Examples based on author's experience working with the CAF as an Information Management Officer in 2013-14.

The difficulty in leading IM change across an enterprise for an organization the size and scope of the DND/CAF requires adherence to change management best practices. The following section will evaluate the DND/CAF's activities to implement the 2009 *Directive on Recordkeeping* as they pertain to change management best practices while continuing to make reference to people, process and tools as enablers.⁵⁴

CHANGE MANAGEMENT CASE STUDY: DIRECTIVE ON RECORDKEEPING

The change management model entitled *8 Steps to Transforming Your Organization*, developed by John P. Kotter of the Harvard Business School is well known in the business world. He argues that skipping steps in his model “creates only the illusion of speed and never produces a satisfying result.”⁵⁵ To explain each step, he leverages common errors in change management initiatives that lead to failure. Table 1 represents the steps and associated errors, elements of which will be used to evaluate the response to the *Directive on Recordkeeping* within the DND/CAF.

Arguably a direct warning to departments to clean up their recordkeeping practices, the objective of the directive as stated was to “ensure effective recordkeeping practices that enable departments to create, acquire, capture, manage and protect the integrity of information resources of business value in the delivery of Government of Canada programs and services.”⁵⁶ Considering the loss of a significant portion of the records management staff in the 1990's and the decline of recordkeeping as digital

⁵⁴ Many of the observations made during the case study are based on author's experience as an IMO as well as a telephone discussion with the RCAF IMO on April 30, 2019.

⁵⁵ John P. Kotter, “Leading Change: Why Transformation Efforts Fail,” Chapter 1 in *On Change Management*, (Boston: Harvard Business Review Press, 2011), 1.

⁵⁶ Treasury Board Secretariat (TBS), *Directive on Recordkeeping*, (Ottawa: TBS, June 1, 2009): section 5.1.

systems evolved, the DND/CAF had difficulty achieving this aim.⁵⁷

Change Management Step	Associated Error
1. Establishing a sense of urgency.	Not establishing a great enough sense of urgency.
2. Forming a powerful guiding coalition.	Not creating a powerful enough guiding coalition
3. Creating a Vision	Lacking a vision
4. Communicating a Vision	Under-communicating the vision
5. Empowering Others to act on the vision	Not removing obstacles to the vision
6. Planning for and creating short-term wins	Not systematically planning for short term wins.
7. Consolidating improvements and producing still more change	Declaring victory too soon.
8. Institutionalizing new approaches	Not anchoring changes in the corporation's culture.

Table 1 – 8 Steps to Transforming Your Organization

Source: Kotter, “Leading Change: Why Transformation Efforts Fail,” 2-16.

Within the DND /CAF, the first two steps of Kotter’s model go hand in hand. In order to create a true *sense of urgency* surrounding recordkeeping across the organization, the Deputy Minister and Chief of Defence Staff must make it a high priority. However, the implementation of the directive was coordinated through signed agreements between level 1 organizations and ADM(IM).⁵⁸ Kotter argues that at least “75% of a company’s management [must be] honestly convinced that business as usual is totally unacceptable.”⁵⁹ Without leadership at the top of the organization, it is highly probable that this level of urgency was never reached.⁶⁰

⁵⁷ Department of National Defence, *Defence Recordkeeping Plan*, (Ottawa: ADM(IM), 2012): 2.

⁵⁸ *Ibid*, 6.

⁵⁹ “Why Transformation Efforts Fail,” 7.

⁶⁰ Within the RCAF, just having level 3 organizations identify IMOs as ordered in the RCAF Initiating Directive took upwards of 6 months.

The team established within ADM(IM) to oversee and coordinate the implementation with Level 1 IMOs was initially made up of a small group of DND employees and contractors. Although hard working, the team's structural position in the DND/CAF organization,⁶¹ and the lack of CAF experience within it put them at a significant disadvantage to accomplish the task within TBS timelines. Exacerbating this was that most of the lower level IMOs across the organization had been assigned IMO duties on top of their primary tasks. With the leadership's attention on operations and other higher priority tasks, the lack of investment in people to form an adequate *guiding coalition*, as described by Kotter, resulted in it having little power to accomplish rapid change.⁶²

Within the *Defence Recordkeeping Plan*, ADM(IM) set a clear vision for the future:

The cornerstone of this plan and its ongoing sustainment is changing the way the DND/CF views information. Practically the resources no longer exist to re-create information when it cannot be found, legally DND/CF information must be shown to be authentic without alteration and from a security perspective we need to ensure those who need the information have access to it. All levels of the organization must understand the department can no longer afford to have information recreated, duplicated, hoarded and hidden away. Therefore, from senior management to students working part-time all need to understand RK and follow RK practices during the course of their regular duties.⁶³

The publishing of numerous guides and tools such as the *Information Life Cycle*, which were also central to mandatory online training, were useful for employees to learn or be refreshed on the recordkeeping expectations placed upon them. However, leaders, IM staff and employees had numerous obstacles to overcome. Even though some leaders were passionate about implementing change, lack of funding to hire the needed

⁶¹ Working as staff within ADM(IM), the Recordkeeping Implementation team had little power to hold Level 1 organizations accountable.

⁶² "Why Transformation Efforts Fail," 8.

⁶³ *Defence Recordkeeping Plan*, 4.

professionals was not immediately available without sacrifice to other lines in local business plans. Many of the assigned IM staff were new to the role and had no formal training.⁶⁴ Another issue was the lack of any investment in an enterprise solution that allowed for the development of common best practices in line with the *Information Life Cycle*. This left IM staff and employees to invent localized solutions to implement the reinvigorated processes with existing tools.

Kotter makes a strong case that planning for short-term wins sustains momentum during major change initiatives.⁶⁵ Quick uptake on formal training and IM day initiatives consisting of supplemental training to all members of a unit followed by focused disposition activity allowed ADM(IM) to report progress back to TBS.⁶⁶ Yet, operational tempo of the CAF and tight timelines to for the Recordkeeping Team to accomplish IM days across the country diluted the initiative, again leaving the heavy lifting to untrained IM staff at the unit level and thereby limiting success.⁶⁷

Efforts to improve recordkeeping are still ongoing today even with the DND/CAF reporting compliance to TBS in 2016.⁶⁸ Yet it is clear is that despite having a detailed process to follow, the initial recordkeeping implementation was plagued by moderate leadership buy-in, oversights in human capital and training and lack of investment in an enterprise tool. If asked to Kotter, he might have surmised that the recordkeeping implementation was a failure long before reaching the *consolidating improvements* stage

⁶⁴ Based on author's experience working with the CAF as an Information Management Officer in 2013-14.

⁶⁵ "Why Transformation Efforts Fail," 8.

⁶⁶ *Defence Recordkeeping Plan*, 4.

⁶⁷ Based on Author's experience as a Commanding Officer in the RCAF. IM Day was conducted internal to the unit as a best effort in 2016.

⁶⁸ ADM(IM), "Recordkeeping Initiative," last accessed on the Defence Wide Area Network, May 5, 2019, <http://admim-smagi.mil.ca/en/managing-information/information-records-management/rk-initiative.page>.

of his model. Nevertheless, the DND/CAF is still attempting to take positive steps forward. A formal IM training course is now developed and will start running serials in the near future.⁶⁹ Implementation of *GC Docs* is ongoing which will bring features such as automated categorization using metadata, user collaboration spaces, prompts to users for disposition of documents based on file plans and personalized spaces where users can bookmark documents without fear of unsuccessful retrieval at a later time. However issues similar to previous initiatives still persist.

Uptake of *GC Docs* has been slow as license distribution is focused in the National Capital Region to support the move to Carling Campus. This prevents collaboration across the enterprise and user hesitation to fully use the tool. Of further concern is that expensive licensing costs are being downloaded to Level 1 organizations who are being asked to make best efforts to roll out the tool rather than it being fully supported across the enterprise.⁷⁰ The DND/CAF appear destined to again add another powerful tool without providing it to the entire organization and enforcing its use.

RESISTANCE TO THE IM CHANGE

Studies led by business management firms and the IT industry suggest that an effective enterprise IM solution is a must for any large organization.⁷¹ However, it can be argued that rigid IM policies and linkages between information flows and performance of a task can inhibit operational efficiency. There were many complaints and subsequent adjustments to process that had to be made within the maintenance communities when DRMIS was rolled out. In a recent hand written note entitled *How We Fight*, the

⁶⁹ Information provided by the RCAF IMO via telephone and follow up email.

⁷⁰ *Ibid.* The cost of a GC Docs license is \$220 per user per year as per email from RCAF IMO.

⁷¹ OpenText, "What is Enterprise Information Management," OpenText Website, last accessed on May 6, 2019. <https://www.opentext.com/products-and-solutions/enterprise-information-management>.

Commander of Canadian Joint Operations Command (CJOC) alludes to the reliance on *DRIMS* in the process of launching helicopters or launching ships.⁷² At a lower level, cumbersome entry of information turns users away from using robust ECM solutions. However, the benefits outweigh the pain of initial adaption to new systems and processes. Striving to achieve an environment where information is rapidly accessible and accurate reduces the risk of poor decision-making as well as maximizes the DND/CAF's ability maintain accountability with the GC, Canadian Society and its allies.

Some suggest that the systems that exist are good enough and the return on investment (ROI) is too narrow. Although it should always conduct ROI analysis, the DND/CAF must also consider the risk of the status quo which resulted in the examples discussed above. The financial value of the organization's reputation cannot be determined nor understated.

RECOMMENDATIONS AND CONCLUSION

To remain as an operationally relevant, trusted and efficient organization, the DND/CAF must continue to foster the development of an IM culture through leadership and a synchronized investment of energy and resources into its people, processes and technology. Underinvestment in one area may temporarily be overlooked; however, countless events over time have indicated that at best, malpractice creates user frustration and inefficient operations internal to the organization. At worst, it can destroy the DND/CAF's reputation or have unintended political consequences. The following is not meant to be an exhaustive list of considerations for the organization, nor is it a how to guide. To improve ability to leverage its information holdings, the DND/CAF should:

⁷² Michael Rouleau, "How We Fight," February, 10, 2019, 5-6.

- Hold senior leaders more accountable for information management for systems under their control.
- Consider allocation of Person Year (PY) or financial resources necessary to institute full time support to leadership at the base/garrison level.
- Continue development and implementation of formalized IM training including IMO specific courses, and instituting IM practices amongst new recruits and employees.
- Continue to adapt processes to increase internal efficiencies.
- Where possible, move to paperless processes and digital signatures.
- Consider enterprise roll out of GC Docs. Specifically designed for the GC, with enhanced collaboration capabilities and processes embedded to automate key steps of the *Information Life Cycle*, this is the best option for ECM
- Continue to seek new software or add-ons to increase automation information handling.
- Adopt NATO/FMN IM standards for all operational information and expand quantities of deployable FMN systems.
- Merge and divest of unnecessary or unsupported IM systems.
- Seek out emerging capabilities such as data analytics to fully exploit information.

Notwithstanding the strategic imperatives described above, the importance of information in the future will only increase. As British Mathematician suggested, “Data is the new oil.” In a military context, information is commonly stated to be a *weapon*. With Big Data Analytics and significant advances in artificial intelligence upon us, the more

structure given to our information, the easier the integration of these powerful technologies will be. Future research could analyze in detail how to best optimize the DND/CAF information environment for these applications.

Neither is it ever to be the most pressing nor the most exciting issue the organization faces, the DND/CAF must seek to continually improve as the amount of information collected grows. There is often tension between being effective and being efficient. IM is at least one area where being effective is being efficient. This is what is best for the DND/CAF and it's what Canadians should expect.

BIBLIOGRAPHY

- Ackoff, Russell L. "From Data to Wisdom," *Journal of Applied Systems Analysis*, Volume 16, (1989), 3-9.
- ADM(IM). "Recordkeeping Initiative," website, last accessed on the Defence Wide Area Network, May 5, 2019, <http://admim-smagi.mil.ca/en/managing-information/information-records-management/rk-initiative.page>.
- Bastien, L.J. "Recordkeeping Update/Le point sur la tenue de documents," electronic mail sent to all Level 1 organizations, April 26, 2013, retrieved on the Defence Wide Area Network April 3, 2019, http://admim-smagi.mil.ca/assets/IM_Intranet/docs/en/managing-information/information-records-management/admim-direction-records-storage.pdf.
- Berthiaume, Lee. "Court Hears Departments, Officials Collecting Own Files in Norman Case," *National Observer*, December 13, 2018, last accessed May 1, 2019, <https://www.nationalobserver.com/2018/12/13/news/court-hears-departments-officials-collecting-own-files-norman-case>.
- Canada. Auditor General of Canada. *2012 Fall Report of the Auditor General of Canada*, Ottawa: Office of the Auditor General, 2012.
- Canada. Department of National Defence. *Defence Administration Orders and Directives 6001-1, Recordkeeping*, Ottawa: National Defence, March 14, 2013, last modified June 5, 2017, <https://www.canada.ca/en/department-national-defence/corporate/policies-standards/defence-administrative-orders-directives/6000-series/6001/6001-1-recordkeeping.html>.
- Canada. Department of National Defence. *Defence Information Management Plan 2019-2022*, Ottawa: ADM(IM), January 14, 2019.
- Canada. Department of National Defence. *Defence Recordkeeping Plan*, Ottawa: ADM(IM), 2012.
- Canada. Department of National Defence. "DND/CF IM/IT Campaign Plan," February 8, 2012, last accessed on the Defence Wide Area Network April 29, 2019, http://admim-smagi.mil.ca/assets/IM_Intranet/docs/en/about/governance/presentation-pmb.ppt. This is a PowerPoint Presentation that was endorsed by the DND Program Management Board.

- Canada. Department of National Defence. *Evaluation of the Information Systems Lifecycle Program*, (Ottawa: ADM (Review Services), October 2017), last accessed May 1, 2019, <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/audit-evaluation/evaluation-information-systems-lifecycle-program.html>.
- Canada. Department of National Defence. *Information Management in the DND/CF*, Ottawa: ADM(IM), n.d.
- Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. Ottawa: National Defence, 2017.
- Canada. Treasury Board Secretariat (TBS). *Access to Information and Privacy Statistical Report for the 2017 to 2018 Fiscal Year*, last accessed May 1, 2019, <https://www.canada.ca/en/treasury-board-secretariat/services/access-information-privacy/statistics-atip/access-information-privacy-statistical-report-2017-2018-fiscal-year.html>.
- Canada. Treasury Board Secretariat (TBS). *Directive on Recordkeeping*, Ottawa: TBS, June 1, 2009.
- Canada. Treasury Board Secretariat (TBS). *Government of Canada Policy on Information Management*, Ottawa: TBS, 2007, last modified March 29, 2018, <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12742#appA>.
- Canada. Treasury Board Secretariat. *Horizontal Internal Audit of Electronic Recordkeeping in Large Departments and Agencies*, (Ottawa: TBS, December 2011), 2.
- Canada. Treasury Board Secretariat (TBS). "Management Accountability Framework," TBS website, last accessed May 1, 2019, <https://www.canada.ca/en/treasury-board-secretariat/services/management-accountability-framework.html>.
- CBC News. "Injured ex-soldiers often unfairly denied benefits, AG finds," October 23, 2012, last accessed May 1, 2019, <https://www.cbc.ca/news/politics/injured-ex-soldiers-often-unfairly-denied-benefits-ag-finds-1.1195658>.
- Connolly, Amanda. "Code Name 'Kraken': How Mark Norman's Lawyers Allege Military Used Pseudonyms to Hide Records," Global News, January 29, 2019, last accessed May 1, 2019, <https://globalnews.ca/news/4901599/mark-norman-code-names-alleged-military-information-block/>.

Combs, Tara. "The Need for Sustainable Information Governance," *Big Data Quarterly*, Volume 4, No. 4(Winter 2018): 21-23.

Ellacott, Jes. "A Single Solution For Tracking the Military's Material," *Vanguard Magazine*, Aug/Sep 2012 issue (2012), last accessed April 17, 2019, <https://vanguardcanada.com/2012/09/01/single-solution-tracking-militarys-materiel/>.

Frické, Martin. "The Knowledge Pyramid: the DIKW Hierarchy," *Knowledge Organization*, Volume 46, Issue 1 (2019), 33-46.

Girard, John. "Canadian Defence Knowledge Management," Chapter 8 in *Public Management of Defence in Canada*, edited by C. Stone, Toronto: Breakout Education, 2009.

I-Scoop. "Information Management and Strategy – An Executive Guide," last accessed April 29, 2019, <https://www.i-scoop.eu/information-management/>.

Klegová, Jaroslava and Ivana Rábová. "Enterprise Content Management Implementation and Risk," *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Volume 63, No. 5 (2015):1687-1695.

Kotter, John P. "Leading Change: Why Transformation Efforts Fail," Chapter 1 in *On Change Management*, Boston: Harvard Business Review Press, 2011: 1-16.

Liew, Anthony. "DIKIW: Data, Information, Knowledge, Intelligence, Wisdom and their Interrelationships," *Business Management Dynamics*, Volume 2, No. 10 (April 2013): 49-62.

Lipchak, Andrew and John McDonald. "Case for Action For an Information Management Strategy For the Government of Canada", D. Scott Campbell & Associates Inc., Ottawa: Library and Archives Canada, May 10, 2002.

Malone, Thomas. "How Do People Organize Their Desks? Implications for the Design of Office Information Systems," *ACM Transactions on Information Systems*, Volume 1, no. 1, (January 1983): 99-112.

North Atlantic Treaty Organization (NATO). "Federated Mission Networking," Allied Command Transformation, NATO website, last modified February 26, 2015, <https://www.act.nato.int/fmn>.

- OpenText. "What is Enterprise Information Management," OpenText Website, last accessed on May 6, 2019. <https://www.opentext.com/products-and-solutions/enterprise-information-management>.
- Rouleau, Michael. "How We Fight," February, 10, 2019.
- Sabry, Omar. *Torture of Afghan Detainees: Canada's Alleged Complicity and the Need for a Public Inquiry*, Canadian Centre for Policy Alternatives, September 2015.
- "Scientia potential est," *Wikipedia*, last modified September 10th, 2018, https://en.wikipedia.org/wiki/Scientia_potentia_est.
- Schubmehl, David and Dan Vesset. "The Knowledge Quotient: Unlocking the Hidden Value of Information Using Search and Content Analytics", Framingham, MA: International Data Corporation, June 2014.
- Serena, Chad C., Isaac R. Porche III, Joel B. Predd, Jan Osburg and Bradley Lossing. *Lessons Learned From the Afghan Mission Network: Developing a Coalition Contingency Network*, n.p. RAND Corporation, 2014.
- Sniderman, Brenna, Christiaan Rizy, Stuart Feil, and Mark Everett Hall. "Managing Information in the Enterprise: Perspectives for Business Leaders," New York: Forbes Insights in association with SAP, 2010.
- Soyka, Heather and Eliot Wilczek. "Documenting the American Military Experience in the Iraq and Afghanistan Wars", *The American Archivist*, Volume 77, No. 1, (Spring/Summer 2014): 175-200.
- Strassmann, Paul. "The Value Of Computers, Information and Knowledge," January 30, 1996, last accessed April 17, 2019, <http://www.strassmann.com/pubs/cik/cik-value.shtml#RTFTtoC8>.
- The Association for Intelligence and Information Management, "What is Enterprise Content Management (ECM)?," AIIM website, last accessed May 2, 2019, <https://www.aiim.org/What-is-ECM#>.
- The Association for Intelligent Information Management. "What is Information Management?," AIIM website, last accessed April 17, 2019, <https://www.aiim.org/What-is-Information-Management#>.
- "Welcome to Guardian – the Next Generation HR!," The Maple Leaf, last modified June 15, 2018, <https://ml-fd.caf-fac.ca/en/2018/06/14577>.