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IS MATERIEL MANAGEMENT IN THE CANADIAN ARMED FORCES A WICKED PROBLEM?

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Exercise Solo Flight

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EXERCISE *SOLO FLIGHT* – EXERCICE *SOLO FLIGHT*

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A WICKED PROBLEM?**

Maj Craig Berthiaume

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IS MATERIEL MANAGEMENT IN THE CANADIAN ARMED FORCES A WICKED PROBLEM?

INTRODUCTION

Materiel management is the backbone of any organization or institution and doing it poorly can have dire consequences. The requirement and responsibility to do this is a massive undertaking and this is no different for an organization such as the Department of Defence (DND) and the Canadian Armed Forces (CAF). Despite having specialists trained in various aspects of materiel management, it is incumbent upon all members of DND to ensure that the materiel entrusted to them by the Canadian population is procured, protected and utilized to the fullest extent in order to achieve its maximum value. This is why Treasury Board Secretariat (TBS) defines materiel management as “all activities necessary to acquire, hold, use and dispose of materiel, including the notion of achieving the greatest possible efficiency throughout the life cycle of materiel assets”.¹ In other words, it is “cradle to grave” stewardship.

The largest department within the Federal Government of Canada is DND consisting of approximately 125,000 personnel, both military and civilian.² Its inventory alone equates to 9.8 billion dollars and consists of over 400,000 different stock keeping units or line items.^{3,4} To put this in context, one of the largest Canadian companies is the Canadian Tire Corporation and

¹ "Policy on Management of Materiel," last modified 26 June, accessed 13 April, 2018, <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12062>.

² "Mandate of National Defence and the Canadian Armed Forces," last modified 30 January, accessed 13 April, 2018, <http://www.forces.gc.ca/en/about-us.page>.

³ Chief Review Services, *Audit of Warehouse Management* (Ottawa: Department of National Defence,[2014]). iii.

⁴ Mark B. Beare and Canadian Forces College, *The Department of National Defence and Canadian Armed Forces Supply Chain: Public Administration Challenges and Opportunities* (Toronto, Ont: Canadian Forces College,[2015]). 1.

throughout its 501 stores across the country, it holds approximately 150,000 line items.⁵ It goes without saying that the logistical requirement to effectively manage all of this materiel within DND is no small undertaking. It is a challenge that various different stakeholders have a vested interest in and the problem of navigating this challenge is one that could be described as “wicked”.

When you hear the term wicked problem, you may get various connotations of what the true meaning is. This is because the word “wicked” has various definitions such as evil, diabolical, vicious and even awesome. The word wicked for the purposes of this essay means complex or extremely complicated and will be further defined in the categorization of a problem later in this essay. It is therefore the purpose of this essay to use this terminology in proving that materiel management within DND and the CAF is a wicked problem and one that can only be improved and never completely resolved.

In order to accomplish this, the paper will begin by providing a definition of a wicked problem, outlining its different characteristics and applying materiel management in general terms against these characteristics. This will be followed by a discussion of materiel management within DND and will consider key aspects of it including stakeholders, personnel, materiel accountability and finally technology to determine if they all add up to the definition of a wicked problem. The paper will then conclude with a summary of the evidence provided that supports the thesis along with a brief general recommendation.

⁵ Limited Canadian Tire Corporation, *Canadian Tire Corporation, Limited 2017 Annual Information Form* (Toronto: CTC Limited,[2018]). 3-4.

WHAT IS A WICKED PROBLEM?

There is much written material on the topic of wicked problems. A good portion of this literature often references or reflects on the work done by Horst W.J. Rittel and Melvin M. Webber in their writing of *Dilemmas in a General Theory of Planning*. According to them a wicked problem is one that does not have an optimal answer, is not objectively equitable for all stakeholders and one that can never definitively be solved.⁶ Rittel and Webber go further by describing 10 distinguishing characteristics of a wicked problem.

The first characteristic is that there is no clear formulation of the problem that allows you to establish all conceivable solutions and even if there is a formulation to the problem, it is actually the problem itself.⁷ In other words, there is so much contributing to the issue that the number of solutions that can be generated is countless with none being a complete solution. In the case of materiel management in general, the formulation of the problem is the requirement to manage materiel efficiently and the problem itself is finding a way to efficiently manage materiel, it can therefore be circular in nature.

The second characteristic is the idea that a wicked problem never ends or stops.⁸ In essence, this is a problem that can only be improved vice solved and regardless of the outcome, there will always be ways to get better. With the complexities of materiel management and the evolution of technologies and methods to work “smarter not harder”, the idea of continuous improvement is often what is strived for. No materiel management system will ever be perfect and the number of ways to improve is hard to measure and often dependent upon the lens by

⁶ Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences* 4, no. 2 (1973), 155-169. 155.

⁷ *Ibid.*, 161.

⁸ *Ibid.*, 162.

which you are looking. In other words, the stakeholders will often have a different viewpoint, i.e. cost saving, parts performance, limited wastage, etc.

Next, Rittel and Webber consider wicked problems to be those that cannot be solved by a true or false answer and can only be judged in a sense of good, bad, good enough, sufficient, etc.⁹ This is similar to the second characteristic where a solution is never really complete and the only way to evaluate an outcome is to determine if things have gotten better. An example within materiel management is the idea of stocktaking where you can only strive for 100% and getting there is never really possible given the magnitude of the task. So if the solution to efficient and effective materiel management is based on 100% accuracy, then you either reach perfection or you fail. In this sense, 100% is not realistic and you can only expect to strive for perfection or to get better than last time when completing such tasks.

The next characteristic fits with all other characteristics thus far. Essentially with wicked problems, there is no immediate or ultimate test for the solution.¹⁰ This really comes down to the fact that the number of stakeholders and their interests drive the results of any test. What may be good for one stakeholder may not necessarily work out in the best interest of another. An example in materiel management would be buying a new warehousing system that make it easier for a technician to manage stock, however, this system may cost an inordinate amount of money. The test result from a technician's perspective may be simply based on ease of use, whereas the result from the budget or financial representative may be based on it costing too much.

Rittel and Webber also consider the idea of the inability to trial solutions with wicked problems. The solution is often a one-shot opportunity with significant consequences if it does

⁹ *Ibid.*, 163.

¹⁰ *Ibid.*, 163.

not go well.¹¹ In the realm of materiel management, getting any solution wrong and not moving the yardsticks in the right direction is extremely costly and time consuming. Changing the way an organization is supported and sustained is a big undertaking that affects all aspects of operations. Wicked problems often have countless potential solutions, some are known and some are not.¹² With materiel management, there is no real way to know if every possible course of action has been considered. The number of stakeholders involved and their different perceptions come into play here along with the evolution of technology and different ways of thinking.

Another characteristic of a wicked problem is each is essentially unique.¹³ This can be further described as there is no “one size fits all” solution due to the constantly changing situation or environment that the problem finds itself in. As mentioned a couple of times, components of material management are constantly changing. If it is in an organization that is international, the solution for that organization in how it manages its inventory in one country may be significantly different than in another. An example could be the supply chain of the automotive industry and whether or not parts are imported or manufactured internal to the country. The decision to go with local manufacturing may cost more but the logistical difficulties of importing may be too risky.

The next characteristic is “every wicked problem can be considered to be a symptom of another problem”.¹⁴ Ineffective materiel management is the symptom of many issues. Consider a transit system whose maintenance workers are unable to get the parts required in time to keep their bus fleet operational. The problem is the inability to provide public transit with the cause

¹¹ *Ibid.*, 163.

¹² *Ibid.*, 164.

¹³ *Ibid.*, 164.

¹⁴ *Ibid.*, 165.

being the inability to fix broken vehicles, which in turn is exacerbated by the symptom of being unable to get timely parts replenishment.

One of the final characteristic of a wicked problem is that the existence of the issue can be explained in numerous ways, each of which requires a different solution.¹⁵ When considering materiel management in general, if there are stock discrepancies, they can certainly be explained in numerous ways. It could be blamed on training, lack of personnel, obsolete tracking system, inaccurate stocktaking, human error or a combination of all of this. This leads to the final characteristic that Rittel and Webber describe as “the planner has no right to be wrong”.¹⁶

What is meant by this is if the person who provides the solution turns out to be wrong, they often do not have the ability to chalk it up as a good effort. The consequences of the mistake are often too great to go without someone pointing the finger. The only challenge to this in large organizations is the finding the person to point the finger at is often difficult when there are countless stakeholders or those involved in the decision. With materiel management the idea of being able to pass off an insufficient or inadequate solution is not the same as a scientist’s ability to hypothesize and later have it proven wrong with no consequences. Although materiel management in general can be seen as meeting all of the characteristics thus far, there is a counterargument.

One could conceivably argue that materiel management may only be a wicked problem for larger scale corporations, businesses or institutions whose personnel are numerous and its stock holdings and supply system are enormous and complex. In other words, the smaller the organization, the less of a problem materiel management would be. While it may be difficult to refute this, it is hard to dismiss the fact that the components of materiel management are

¹⁵ *Ibid.*, 166.

¹⁶ *Ibid.*, 166.

constantly changing regardless of the size of the organization. With the knowledge that materiel management is the backbone of most companies, the consequences are often significant and continuous when it goes wrong.

In summary of this section of the essay, based on the concept and characteristics of a wicked problem as defined by Rittel and Webber, materiel management in general is one that meets the criteria. While considered a wicked problem in general, this essay will now move on to consider DND and the CAF materiel management specifically to determine if it meets the definition of a wicked problem. Since there were several recurring themes throughout Rittel and Webber's 10 characteristics like stakeholders, constant change, never ending, no clear solution or way to validate it, this essay will now apply them to a DND and CAF perspective.

STAKEHOLDERS

As outlined earlier, DND and the CAF make up an extremely large institution that is responsible for a multitude of inventory and equipment. Within DND itself, there lies both civilian and military members who must work together to ensure the proper stewardship, ownership and custodianship of its inventory on behalf of the public. As a result, there are numerous internal organizations that makeup the list of those who have an interest in materiel management. When considering materiel management at the strategic level, one of the key organizations is the Assistant Deputy Minister (ADM) Materiel (Mat) who is responsible for managing the "...the full lifecycle of defence materiel, from acquisition, through maintenance and support to disposal".¹⁷ In addition to ADM(Mat), ADM Finance (Fin) who is responsible for

¹⁷ "Assistant Deputy Minister (Materiel)," last modified 8 December, accessed 14 April, 2018, <http://www.forces.gc.ca/en/about-org-structure/assistant-deputy-minister-materiel.page>.

financial management and comptrollership, is also heavily involved.¹⁸ With the requirement to ensure financial accountability and responsibility for DND, ADM(Fin) is a considerable player in materiel management. Beyond simply the management and financial aspects, there is the consideration of the custodianship side of materiel management that includes all those organizations within DND that actually hold, use, store, procure and dispose of materiel.

This includes each of the environmental commands such as the Canadian Army (CA), Royal Canadian Navy (RCN), Royal Canadian Airforce (RCAF), Canadian Forces Special Operations Command (CANSOFCOM), and the Canadian Joint Operations Command (CJOC). Each of these organizations, despite being part of the overall defence team, has their own mandates and way of conducting business. Needless to say, when it comes to materiel management, each will have their own interests, priorities and requirements that drive how they want to see things happen or deal with issues within the overall system. This is only considering stakeholders internal to DND and CAF at the strategic level, as you go down to the operational and tactical levels, there are even more players including formations, brigades, units, etc. External to DND and the CAF there are organizations like TBS and Public Services and Procurement Canada, who monitor management and expenditure policies and performance in the case of the former and conduct procurement on behalf of DND in the case of the latter, which have significant involvement in the effectiveness and efficiency of materiel management.¹⁹

To sum up, there are a multitude of stakeholders who are responsible for materiel management within DND and the CAF who all have different and sometimes competing interests in finding efficiencies and dealing with issues, fitting with one of the main themes of

¹⁸ "Assistant Deputy Minister (Finance)," last modified 31 January, accessed 14 April, 2018, <http://www.forces.gc.ca/en/about-org-structure/assistant-deputy-minister-finance-corp-services.page>.

¹⁹ Alex Smith, *The Roles and Responsibilities of Central Agencies* Parliamentary Information and Research Service, 2015). 7.

Rittel and Webber's concept. Further, solutions to materiel management issues would take on a different perspective or have a different measure of effectiveness for each of these stakeholders, which also fits in with many of the characteristics and overall definition of a wicked problem. One must now consider another key theme of a wicked problem, which is the consideration of people in an organization.

PERSONNEL

In the case of the DND and the CAF, personnel are its centre of gravity. Without people you cannot carry out any of the tasks that are entrusted upon the institution by the public. When it comes to materiel management, this is no different. Even if an organization has sufficient policy, procedures and resources, it still requires personnel to execute it. If recent years are any indication, the importance of having the right number people who are trained is key to the operation of any organization, especially DND. This is reflected in the most recent Canadian Defence Policy, *Strong, Secure, Engaged* (SSE), which outlines the requirement to increase the number of Canadian Armed Forces members in order to carry out its mandate of national defence.²⁰ In order to carry out defence efficiently and effectively, materiel management is vital. Therefore, recruiting and retaining personnel has become extremely important and the trades that are required to carry out materiel management are currently suffering significantly. This can be seen when considering trends in the Mobile Support Equipment Operator (MSE Op) and Supply Technician (Sup Tech) trades.

It would be difficult to argue that the MSE Op and Sup Tech trades are not essential to materiel management. When taking just these two trades into account, both are suffering with

²⁰ Minister of National Defence, *Strong Secure Engaged: Canada's Defence Policy* (Ottawa: Department of National Defence, 2017). 13-14.

significant vacancies and trying to achieve the manning levels deemed necessary by the CAF to carry out their functions effectively. While the recent focus of SSE to increase recruiting numbers may eventually alleviate this, it is painfully slow and will take many years to achieve its overall goals.

Recent statistics from the Director Personnel Generation Requirements (DGPR) for the CAF in their Projected Status Report indicate that the MSE Ops trade will go from 1367 Trained Effective Strength in Fiscal Year (FY) 2017/18 to a total of 1231 in FY 2018/19, which is a negative variance of 136 personnel and does not even come close to the total Preferred Manning Level of 1550.²¹ In other words, vacancies within the trade itself are showing a projected negative trend. This is further supported by DPGR's Strategic Intake Plan, which is the actual amount of new recruits and occupational transfers coming into the trade that currently indicates a deficiency of 13 MSE Ops from where the trade would like to be as of February 2018 for FY 2017/18 overall.²² So it appears the shortages will not be solved anytime soon by recruiting.

In terms of Sup Techs, DGPR projects that the trade will go from 451 vacancies in FY 2017/18 to an even worse number of 642 vacancies in Trained Effective Strength in FY 2018/19, a negative delta of 191 personnel.²³ Again, this is supported by DGPR's Strategic Intake Plan numbers that indicate an actual deficiency of 36 Sup Techs below the desired number as of February 2018 for FY 2017/18.²⁴ This indicates a negative trend in regards to Sup Tech manning as well.

²¹ Director Personnel Generation Requirements, *Projected Status Report NCM* (Ottawa: Department of National Defence,[2017]).

²² Director Personnel Generation Requirements, *Strategic Intake Plan* (Ottawa: Department of National Defence,[2018]).

²³ Director Personnel Generation Requirements, *Projected Status Report NCM*

²⁴ Director Personnel Generation Requirements, *Strategic Intake Plan*

Having said this, some may argue that SSE is still relatively new and if given time and renewed focus it may reverse some of these trends. However, discussing desired recruitment numbers and accomplishing those numbers are two different things. While it is hopeful that the methods used to accomplish this may make a difference, this difference will take time and likely many years to fill the gaps that exist and seem to continue to get worse when looking at current trends. Vacancies and the difficulty of recruitment and retention are not the only factors in the challenge of improving or solving materiel management problems for the DND and the CAF, non-effective strength (NES) is also a compounding contributor.

Personnel left out of battle (LOB) or NES numbers consist of personnel that currently fill positions on paper, but are not deployable or able to operate at full capacity for reasons like medical restrictions, personal issues, maternity or paternity leave, etc. To put this number in perspective, when looking at the CA, the CA G1 (Administration) in its February 2018 Personnel Situation Report stated out of 20,751 personnel available the total effective strength was 73% with the remaining 27% non-effective strength.²⁵ This is quite a significant percentage, but it must also be taken in context.

One could argue that these numbers would have less of an effect on materiel management due to the fact that many of these personnel within the support trades, while on restrictions, are still able to go to work in clerical roles. This may be true, but having less personnel available to do operational tasks has effects on those individuals who are fully deployable due to having these same personnel chosen over and over again for tasks, sometimes leading to burnout. So despite this number not completely reflecting those physically sitting at a desk, it does have an effect on executing materiel management overall, especially in an operational setting where members are expected to be able to deploy.

²⁵ CA G1 Personnel Management, "20180228U 5000-1 C Army G1 DLPM SITREP" Ottawa, 2018). 6.

In summary of this section, the topic of personnel in DND and the CAF could probably be argued is a wicked problem on its own. As supported by statistics, personnel issues at the very least are certainly a symptom of a wicked problem. Even if one was to correct personnel challenges, the solution would only address a part or a symptom of the overall wicked problem of materiel management. The next section of this essay will focus on materiel accountability and will discuss some of the indicators and statistics that signal an issue with overall materiel management, along with some of the contributing factors.

MATERIEL ACCOUNTABILITY

Materiel Accountability is one of the many aspects of materiel management and is a key component to ensuring its success. ADM(Mat) in its role as the functional authority for materiel acquisition and support within DND is responsible for monitoring this accountability and does this through policy, procedures, audits, site visits and reporting.²⁶ One of the largest reports for each FY is the Materiel Attestation.

Materiel Attestation is the responsibility of each commander within the CAF, who must report up the chain of command in a letter attesting to the state of the equipment, materiel and procurement activities of his or her organization. This begins at the level four, or Company Command, and is consolidated at each subsequent level of command until it reaches the Commander of a Command or the level one level. This includes the Commander of the CA, RCAF, RCN, CANSOFCOM and CJOC, who must sign the overarching letter that is then sent to ADM(Mat) to fulfill its mandate. This report must include eight areas of materiel broken down as follows:

²⁶ Assistant Deputy Minister (Materiel), "6381-010030-03: Materiel Accountability Fiscal Year 2017-18 - Letters of Materiel Attestation and Stocktaking Performance Reports" Ottawa, 2018). 1.

- a. Weapons and weapons components;
- b. Ammunition;
- c. Cryptographic equipment;
- d. Designated equipment-tracked (E-Tracked) items;
- e. Bulk fuel;
- f. Controlled goods;
- g. Procurement of goods and services; and
- h. Mutual Logistics Support Arrangements.²⁷

In essence, the Commander must report that all policies and procedures for management of all classes of materiel within their area of responsibility are being followed less any exceptions that must be explained as part of the letter. He or she must also provide the Stocktaking Performance Report results for the previous FY and Stocktaking Plans for the following FYs for all accounts within their command. This is an extremely large undertaking, considering accounts number in the thousands for some commands and is presently done mostly by hand and not electronically due to either the inability of the materiel management system to carry out the function or a lack of knowledge of the functionality of the system by technicians.²⁸ This system of record is known as the Defence Resource Management Information System (DRMIS) and was implemented across DND in 2012.²⁹

The massive undertaking required to accomplish the accountability expected of the Materiel Attestation is further complicated by human error, deficiencies of personnel to

²⁷ *Ibid.*, 2.

²⁸ G4 Canadian Army, *Materiel Accountability Action Plan Semi-Annual Report for the Canadian Army FY 2017/2018* (Ottawa: Canadian Army,[2017]). 3.

²⁹ Maj Barry Moore, "Defence Resource Management Information System: Enabling the Transformation of Supporting Operations," last modified November, accessed 17 April, 2018, [https://www-304.ibm.com/events/www/grp/grp011.nsf/vLookupPDFs/Canada%20DND%20DRMIS%20Update/\\$file/Canada%20DND%20DRMIS%20Update.pdf](https://www-304.ibm.com/events/www/grp/grp011.nsf/vLookupPDFs/Canada%20DND%20DRMIS%20Update/$file/Canada%20DND%20DRMIS%20Update.pdf). 7.

accomplish the task, different organizational perspectives, limited training and a lack of digitization. This will be further supported when considering the statistics of the Stocktaking Performance Reports, which will be examined next. For the purposes of this essay, statistics from the CA level along with formations within the CA will be used because the bulk of accounts within the CAF fall within this element.

Stocktaking Performance Reports are done semi-annually and at end FY in order to determine the results of an overall unit's stocktaking performance. It compares a unit's planned stocktaking against what was actually completed followed by an assessment of the percentage of stock that was discrepant. The overall performance is scored along a scale consisting of three standards. These standards are based on results as follows:

- a. Acceptable – Less than 10% discrepancies;
- b. Opportunity for Improvement – Less than 20% discrepancies; or
- c. Plan Failure – More than 20% discrepancies.³⁰

When considering the results of the CA Materiel Accountability Action Plan Semi-Annual Report FY 2017/2018, the outcome reported by the CA Headquarters show 66.7% of planned stocktaking complete with a 7.7% discrepancy rate, which is in contrast to ADM(Mat) Director Supply Chain Operations (DSCO) report that shows 60.72% complete with a 26.61% discrepancy rate.³¹ The key takeaway here is regardless of which organization, stocktaking is around 60% complete for what was planned, which is not a good result. The discrepancy rate shows a different story that is dependent upon which organization's statistics are considered. Results are either "Acceptable" from a CA perspective or "Plan Failure" based on DSCO's

³⁰ Assistant Deputy Minister (Materiel), *Supply Administration Manual: A-LM-007-100/AG-001* (Ottawa: Department of National Defence, 2017). 236-237.

³¹ G4 Canadian Army, *Materiel Accountability Action Plan Semi-Annual Report for the Canadian Army FY 2017/2018*. 1.

numbers. The report explains this difference in discrepancy rates based on a lack of understanding of many of the technicians in using DRMIS to do stocktaking along with human errors in manually entering numbers into the system.³² Further statistics from one of the CA support bases shows that in FY 2016-2017, 20 out of 50 accounts received a “Plan Failure” rating not specifically for discrepancies, but for the failure to complete all of the stocktaking that was planned for that FY.³³

While one could argue statistics are always interpretable and can be manipulated, there is no doubt that materiel accountability has a significant challenge with manpower issues, human error and perception of success or failure dependent upon which organization completes the monitoring requirement. This further supports the categorization of materiel management as a wicked problem. The idea of completing reporting in DND and the CAF by hand vice electronically is a recurring theme in this essay that leads to the topic of technology, which must be investigated further.

TECHNOLOGY

Like with any task, technology plays a significant role. As further advancements are made, potential benefits to make required actions easier and less time consuming are made available. This is due to the ability to streamline procedures electronically and significantly reduce the human error that manual processes create. In the sense of the CAF and DND, materiel management would benefit significantly from better use of current technology or the introduction of better technology. In this regard, two significant contributing factors to materiel management being a wicked problem are training and automation.

³² *Ibid.*, 2-4.

³³ 5 CDSG Technical Services, 5 CDSG DND 2982 Roll Up FY 16-17 (Gagetown: ,[2017]).

While the benefits of DRMIS are still percolating through the supply system, there is the understanding that personnel are not fully trained or have the complete knowledge of the functionality of this new system of record.³⁴ The use of spreadsheets and manual statistical calculations are still being done outside of the system, which misses out on the full benefit of the DRMIS functionality. While the system procured and used by the CAF does not have all of the potential modules its manufacturer SAP (IBM) has to offer, organizations like the RCN have benefited from fully integrating it into their operations through the implementation of Key Performance Indicators (KPIs).³⁵ These KPIs enable them to gain real-time electronic reports on the operational statuses of their platforms as well as their materiel management performance. This illustrates that even internal to the CAF, different stakeholders have embraced the system differently.

Training is the key to gaining full benefits of DRMIS and all DND and CAF users must strive to ensure their personnel are using it to its full potential. While some could argue that the RCN is further along because they implemented the system before the other commands and that in comparison, the number of units or platforms they report on is much fewer, it is still an issue throughout the CAF as a whole and has an effect on overall materiel management. As a result, training has been recognized as a key issue for rectification and in fact, the DRMIS in-service support contract that was awarded in 2016 was put in place for this reason.³⁶ While this contract may be in place to try and correct the gap in training, it does not prevent human errors caused by a lack of automation.

³⁴ G4 Canadian Army, *Materiel Accountability Action Plan Semi-Annual Report for the Canadian Army FY 2017/2018*. 2.

³⁵ Chief Review Services, *Audit of Warehouse Management*. A-4/8.

³⁶ "Defence Resource Management Information System in-Service Support," last modified 12 March, accessed 18 April, 2018, <http://www.forces.gc.ca/en/business-defence-acquisition-guide-2015/joint-and-other-systems-899.page>.

Automation is another compounding issue that contributes to the “wickedness” of materiel management, specifically the nonexistence of it throughout most of DND. When it is discussed in CAF circles it is referred to as Automatic Identification Technology (AIT) and can be defined as technologies such as linear and data matrix barcode readers, passive and active Radio Frequency Identification, Global Positioning System tags, etc. that will “...implement supply chain management industry standard policies, disciplines, practices, processes... where they bring the greatest value and efficiencies into the Defence Supply Chain”.³⁷ Currently the only places where bar code readers are being utilized by supply warehouses are the Supply Depots in Montreal and Edmonton. All other warehouses from second-line down to first-line are tracking stock receipts and issues via manual inputs into the system. This is more time consuming and can result in human error due to mistakes in inputting by technicians. This can in turn result in the negative outcomes in materiel accountability reporting by formations and commands discussed earlier in this essay.

What further supports the claim that automation is an issue for materiel management is DND’s decision to include it as part of the Defence Renewal Initiative in 2013. Defence Renewal is the “Defence Team’s effort to comprehensively transform [its] major business processes...[through] an ambitious objective: to create a lean and efficient organization that can generate savings to be reinvested in military capabilities and readiness”.³⁸ Automatic Identification Technology falls within Defence Renewal Initiative 2.1 – Inventory Management, which identifies it as a requirement to increase efficiency through real-time data and more

³⁷ "Automatic Identification Technology," last modified 26 May, accessed 18 April, 2018, <http://forces.gc.ca/en/business-defence-acquisition-guide-2016/joint-and-other-systems-625.page>.

³⁸ Assistant Deputy Minister (Public Affairs), *The Defence Renewal Charter* (Ottawa: Department of National Defence, 2013). 4.

accurate and timely business intelligence.³⁹ While preliminary cost estimates for the technology range between \$500 million to \$1.5 billion, the benefits of bringing DND's materiel management capabilities into the 21st century outweighs this hefty price tag.⁴⁰

Technology is a key aspect of materiel management and both the use of a new system like DRMIS and the requirement to upgrade inventory management assets to become more automated and electronic are issues that will need to be addressed. Fixing these aspects of technology will by no means fully resolve the wicked problem of materiel management; however, they will certainly move the yard sticks forward in improving the situation. This paper will now conclude with a summary of the evidence presented thus far and a general recommendation.

CONCLUSION

This evidence presented in this essay has proven that materiel management within DND and the CAF is a wicked problem, essentially one that can only be improved and never completely resolved. It has done this by using the definition provided by Rittel and Webber in their pivotal 1973 article. The large number of stakeholders combined with personnel issues, materiel accountability challenges and obstacles created by technology or the lack thereof, all support and fall within the characteristics described by these authors.

Wicked problems have a number of stakeholders, each of which has their own interests. Within DND each of the Level One organizations, whether within the CAF or DND writ large, have their own interests and is affected differently by materiel management problems. Each of these stakeholders will have their own potential solutions to these problems and how they

³⁹ Defence Renewal Team, *2017 Defence Renewal Annual Report: Realizing the Opportunity* (Ottawa: Department of National Defence, 2017). 4.

⁴⁰ "Automatic Identification Technology,"

evaluate these solutions will be different, which fits the characteristic of no right or wrong answer and no immediate or ultimate test for the solution to wicked problem.

This essay has also provided evidence supporting that personnel issues within DND are a challenge that contributes to the problems of materiel management. In order to carry out the requirements of materiel management, you need people. Unfortunately, despite the recent push to deal with this by the release of SSE, trends in recruiting for the support trades like Sup Tech and MSE Op appear to indicate a negative trend. While it may be too early to determine if the efforts of SSE will turn this trend around, solving the deficiencies in numbers and filling the current vacancies along with statistics like 27% NES across the CA, will take time.

Reports such as the Materiel Attestation along with Stocktaking Plans and Stocktaking Performance Reports are also a significant challenge to produce and have shown that the ability to achieve satisfactory results is difficult. Currently, most of this reporting is done by hand using excel spreadsheets to calculate the statistics, which makes the requirement of doing this for all accounts within DND's almost impossible. This has led to poor results in the number of accounts that actually receive their required stocktaking as well as deficiencies that can often be interpreted differently depending on the organization generating the results.

Finally, when considering technology, materiel management is faced with additional challenges that it must work through in order to continue to make progress towards a solution. The DRMIS system of record has created several challenges in not only its capabilities, but also through the training that is required in order to take full advantage of its potential. This can also be augmented by the introduction of technology such as AIT. The more automated the system can get; there is a less chance of human error and greater potential for time savings.

In conclusion, materiel management in DND and the CAF is a wicked problem that meets all of the characteristics defined by Rittel and Webber. The large number of stakeholders, personnel issues, technological deficiencies, perception and interpretation challenges all line up with the main themes of the definition. This is not to say that materiel management in this regard is a lost cause. Through initiatives such as SSE, Defence Renewal, DRMIS in-service-support, technical training and the AIT program, DND and the CAF has shown that it is intent on making progress in getting better with materiel management. It is therefore recommended that DND and CAF members fully embrace these initiatives and continue to provide feedback and new ideas in order to attack the wickedness of materiel management and keep positive momentum in a never ending problem.

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