

PRAEFECTUS ANNONAE



Innovation and Design Thinking
Issue 2 – Fall 2020

FEATURE ARTICLE

Is Your Organization Truly Innovative?

INTERVIEW with Jeri A. Ballard

CASE STUDY: We need Drivers

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LCOL GORDON BENNETT

*Commandant,
Canadian Forces Logistics Training Centre*



**“ Innovation is about
“how” to use resources,
not the “how many”
resources there are. ”**

Since taking command, I have had several people approach me and make comments such as “you can’t do any innovation this year due to budget cuts” or “we have no money for innovation.” To be honest, these comments shock me, but are indicative of a larger misunderstanding of innovation. A lack of resources, perceived or real, is exactly why innovation must take place!

Innovation is not what resources you have or can buy, it is what you do with the resources you have that creates something better than what you had. The Wright brothers were self-financed bicycle mechanics—not exactly wealthy researchers. Meanwhile, Samuel

Pierpont Langley was highly financed, receiving \$50,000 for R&D (or about \$1.5M in today’s money) and failed to come close to match or build upon the Wright’s success. Zuckerberg created Facebook in his dorm room. Jobs and Wozniak built the first Apple computer in a garage. Gates started programming in evenings as a teenager. That being said, there are also many who have had great innovations and been well funded. Edison, Ford, Copernicus, Brunelleschi, Kamprad, and many R&D pharmaceutical companies are just a few examples. In either case, it isn’t what resources are available that matters; it is what one does with those resources in creative ways that makes the difference. Innovation is a mindset, not a dollar figure. It is a mindset that is required by logisticians. Innovation requires us to Think Different!

Innovation is about “how” to use resources, not the “how many” resources there are.

Innovation is about bringing new or better ideas and concepts to create a better outcome than the status quo. Innovations can be small and simple or they can be big and flashy, but all innovations seek to improve an end state.

One interesting trend we found that requires additional research is the link between education and innovative thinking. We noted amongst our staff and contributors to this edition that those that completed post graduate studies, participated in reading programs, took courses from places like Udemy, experimented with ideas, and sought out best practices were much better prepared to draw on diverse thinking than those that relied exclusively on military training. A wide breadth of experiences such as these appear to aid with an innovation mentality and generate a diverse way of thinking.

We have a great edition all about innovation and different points of view and initiatives. I would encourage you to give consideration to the concepts found herein and invite you to apply them. We need to create a stronger culture of innovation. Understanding what innovation is, is the first step.



FEATURE ARTICLE

IS YOUR ORGANIZATION TRULY INNOVATIVE? 22

CRITICAL THINKING

INNOVATING THE GREEN WAY 10

BOOKS IN REVIEW

TALKING TO STRANGERS 32

THE LEADERSHIP SECRETS OF COLIN POWELL 33

ARTICLES

APPROACHES TO INNOVATION AND THEIR COMPATIBLE LEADERSHIP STYLES 6

FOOD SERVICES 9
More than Nutrition and Calories: It’s a Psychological Warfighting Enabler

Training for the Logistics Fight:..... 12
The Art and Science of an Expeditionary Logistics Instructor

WAR PIPE OF THE NORTH: 14
History of the Bagpipe as an Instrument of War

INJURY REDUCTION STRATEGIES 18

THE TRIAD OF WARFIGHTING ACUMEN 30

DRUCKER ON INNOVATION 34

HOW IS THE AUTOMATION OF TRUCKS IMPACTING THE TRUCKING BUSINESS? 38

OPTIMIZED INCORPORATION OF PHOTOVOLTAIC POWER GENERATION SYSTEMS IN CAF DEPLOYMENTS..... 42

DESIGN THINKING TO SOLVE LOGISTICS CHALLENGES..... 50

DISRUPTIVE INNOVATION 56

AVOID PAYING DEATH BENEFITS TO THE WRONG PEOPLE 62
Here are the basics of death benefits you need to know!

SECURING PHARMACEUTICAL SUPPLY CHAINS IN THE DEVELOPING WORLD 68

CASE STUDY

WE NEED DRIVERS 76

INTERVIEW

JERI A. BALLARD 80

Front Cover photo:
Cpl Luong,
Financial Services Administrator
from 3 Wing, Bagotville”

PRAEFECTUS ANNONAE

Leadership in Sustainment

Definitions

1. A Leader in sustainment.
2. One who stands in front and supports.
3. An organizer of provisions.
4. A permanent, distinguished, superior, and distinct support leader.
5. *The name of the Royal Canadian Logistics Service journal.*

During the development of this journal, members of the Canadian Forces Logistics Training Centre were invited to propose names for it. Submissions included French, English, Esperanto, and Latin names. Submissions often related to memorabilia, symbolism, history, and cap badges.

These elements were taken into account with an emphasis on both sustainment and leadership. Dean of Humanities and Latin professor Dr. Hugh Elton of Trent University was consulted in order to discuss the various submissions. From this process, Praefectus Annonae was selected as the term that captures the spirit of both sustainment and leadership. We thank Dr. Elton for his expert advice and encouragement as well as all those who submitted suggestions.

The views expressed in this journal are those of the authors and not those of their organizations, DND, or the CAF.

Design and Layout:



*MWO Roger Gonsalves
31 Service Battalion – Bellum est Cras*

Approaches to Innovation and their Compatible Leadership Styles

By: Capt Arthur Clarke, CPA, CMA



Introduction

This article will outline some different approaches to innovation (specifically proactive, active, and reactive types), highlight the key differences between them, and offer a perspective on which type of leadership would best suit each approach. A case will be made regarding when each approach might prove to be beneficial, as the initial tendency might be to lean towards proactive innovation as the most advantageous in all situations.

Approaches to Innovation

Proactive innovation is demonstrated by organizations that are constantly seeking improvements to the ways they do things. The sub-types of innovation that fall within this approach include “radical” and “disruptive”. One example of radical proactive innovation was the introduction of the smartphone when Research in Motion (e.g., BlackBerry) developed a technological breakthrough that created a radically different phone market.

A disruptive case of this approach to innovation was exemplified by Netflix’s change from a mail-out movie business to online streaming and subsequent in-house production of entertainment content. However, not every organization can participate in this type of approach as

there are significant barriers to entry, such as financial, knowledge and human.

Taking an **active approach** to innovation is not as flashy as a proactive one, where disruptive technologies and radical new markets are developed. Rather, active innovation is incremental by nature. Organizations that often use this method include Apple and Microsoft, as they make incremental enhancements to their products and services on an ongoing basis. Nevertheless, these companies are also well known for proactive approaches to product development (e.g., the iPad).

The **reactive approach** to innovation includes the “environmental” and “situational” sub-types. Environmental innovation is exhibited by those organizations that only innovate because their offerings are practically obsolete and they are now forced to make changes in order to remain relevant in their market. Situational innovation stems from an organization’s response to a crisis. The reactive approach to innovation may seem like the least prudent way to capture innovative ideas, but it can certainly focus the efforts of those involved in the process.

As the novel coronavirus made its way across the globe, organizations around the world scrambled to adapt in order to sustain their business operations. Many of them created virtual work environments that utilized the video conferencing technology provided by Zoom to achieve this goal. While CFLTC was still employing the active approach to innovation, the coronavirus pandemic forced the training centre to send all remaining residential students home. This required CFLTC instructors and staff to seek out different ways of delivering training, primarily by offering distributed learning (DL) course content. The urgency and importance of creating DL courses combined a prioritized task focus and a reduction of distractions, which certainly had the potential to increase the efficiency of innovation opportunities. In this case, the situation created an opportunity to accelerate various initiatives. The reactive approach worked well under these conditions.

Following at least one of these approaches to innovation is an essential requirement for all organizations. Even large, bureaucratic organizations need to follow an innovation approach to stay current and maintain its relevance. Those organizations that fail to innovate in some form will not be able to sustain their operations, let alone their competitive advantage, as stakeholders will lose interest and confidence in the organization.

Compatible Leadership Styles

Creating a culture of innovation within an organization is not an easy task. The staff participating in the process need to know that their contributions will be valued and those who fear failure and/or change will need to feel supported along the way. However, there is normally no tolerance for incompetence at organizations that strive for radical and disruptive innovation as seen by those who work for Amazon or Google, due to the long list of people ready and willing to take their place. This is why having the right leader with the right leadership style in their toolkit is essential to maximizing innovation progress. In *Leadership That Gets Results*, Daniel Goleman presents six leadership styles: Coercive, Authoritative, Affiliative, Democratic, Pacesetter, and Coaching. Each of these styles offers a unique way of pursuing organizational innovation, but some are more compatible with particular approaches to that innovation.

The leadership styles most suited to the proactive approach include pacesetter and authoritative. To establish a culture of high performance, a pacesetter leader is required to ensure stellar employees are given suitable standards to maintain and goals to achieve. This style is also appropriate because the people who are looking for leadership under the proactive approach will have high standards for themselves, so their leader should be one who is able to set the bar even higher by their own example. Alternatively, the authoritative leader sets a clear vision that enables people to reach a common goal that challenges the organization to accomplish something remarkable. Those organizations that are striving for radical or disruptive innovation need a leader who can present a vision that establishes an appropriate business culture.

In considering the active approach to innovation, the leadership styles that can best facilitate the incremental approach are the democratic and coaching ones. The democratic style builds consensus and can encourage staff to contribute valuable ideas for improvement as the organization seeks to enhance their existing products and/or services. It builds on the ideas and contributions from the lowest level of the organization to the highest and helps them continuously enhance their operations. On the other hand, the coaching leadership style helps employees improve their performance and reach their full potential. A leader who utilizes this style will be able to tap into this improved performance which should translate into incremental progress for an organization’s offerings.

The reactive approach to innovation can call for a more dictatorship-like style of leadership or, conversely, a more harmonious style may be appropriate. This is why the coercive and affiliative leadership styles should be considered when the reactive approach to innovation is required within an organization. An assessment of the particular circumstances will determine the direction to take. In times of crisis, it may be necessary to adopt a coercive style to turn a bad situation around quickly. On the other hand, stressful situations might call for a compassionate leader who is able to connect with employees and see them through a difficult time using the affiliative style.

Food Services

More than Nutrition and Calories: It's a Psychological Warfighting Enabler

This article is an excerpt taken from a briefing given to the Cooks Cadre by the Commandant of the Canadian Forces Logistics Training Centre in January 2020.

INNOVATION APPROACH	INNOVATION TYPE	LEADERSHIP STYLE
PROACTIVE	Radical, Disruptive	Pacesetting, Authoritative
ACTIVE	Incremental	Democratic, Coaching
REACTIVE	Environmental (Catch up), Situational (Crisis)	Coercive, Affiliative

Conclusion

A leader should not employ only one leadership style; instead, they should be comfortable using a variety of styles depending on the circumstances in question. This is not unlike the way approaches to innovation should be seen. An organization could be employing an active approach to innovation when a team member discovers something that disrupts their current business model or operations and suddenly their approach to innovation needs to shift to a proactive one. Just as a good leader needs to be flexible with their leadership styles, so does an organization with its approach to innovation.

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Cpl Harold Daniels prepares pizzas in the galley for the traditional Saturday night supper while transiting the North Atlantic.
Photo: Cpl Tony Chand, Formation Imaging Services

Why does a warm meal increase the morale of soldiers in wartime? Couldn't we just feed them a room temperature sandwich, a hot beverage, and an apple? If you asked an accountant, the caloric and nutritional value is exactly the same, so why take the time and effort to take great lengths in providing hot food? The numbers and principles of logistics would tell us that it is much more efficient to do the easiest option if calories and nutrition are the same. So, what is it about a warm meal that we want? Food services has a psychological role to play in the battlespace. It is part of psychological operations for the blue force.

It has been told that during a medieval siege in Europe both the attackers on the outside of a castle and the defenders inside the castle were running out of food. The king inside the walls was facing potential starvation. Suspecting that his enemies were also running out of food, he desired to trick his enemy into thinking that he was better provisioned than the attackers. As an act of desperation and psychological planning, he decided to hurl the castle's last cow over the wall of the compound. His enemies, seeing that a good cow was being thrown out, determined that if the defenders of the castle were in such a position to hurl food over the wall, they must be better provisioned than the attackers were. Consequently, the enemy forces departed thinking that they would be unable to sustain the siege any longer. One cow and a clever, risk taking king ended the siege without further bloodshed.

Whether this story is true or not or is from some lost *Monty Python* movie clip, it does illustrate that food services can be employed as a psychological element. Hot food increases morale due, not only to its nutritional value, caloric content, and body warming heat, but also the psychological elements of support, comfort, and respite from warfighting.

The expression attributed to Napoleon that "armies march on their stomachs" is accurate. Many a campaign has been won or lost for lack of food or a lack of safe, nutritious food. Many a soldier's morale has been positively affected through the use of hot food. This was part of the reason the haybox concept was created by the French during WWI. Poor food, a lack of food, or spoiled food does not contribute to warfighting.

When Napoleon's Grande Armée was running of food, word quickly spread. Desperation ensued and the soldiers broke discipline pillaging depots and supply trains in a mad dash to get food before it was gone. Would the same reaction have occurred if field message pads or toilet paper were running low? Of course not. Food, or a lack thereof, has a psychological effect on troops for good or bad.

The Canadian Forces Logistics Training Centre seeks to train logistics warrior cooks. Its mission for the Cooks Cadre is to create the best military cooks in the world. Exceptional cooks sustain the force on both a physiological and psychological plane.

CRITICAL THINKING – INNOVATING THE GREEN WAY

The Future is Efficient and Environmentally Conscious
By Avr Reeve K.A. and Pte Von Eggers S.J.

Logistics is defined by the Oxford English Dictionary as “the detailed coordination of a complex operation involving many people, facilities, or supplies”. Simplified, this means that logistics is the management of information and items, from the planning and procurement stage, through the transport and maintenance phase, right down to disposal. With this information, the obstacle faced within logistics naturally becomes a question of, “how?” How are we going to manage this information? How are we going to transport these goods? When we ask the question ‘how,’ whether we are sending supplies overseas for deployment or across Canada to replenish a warehouse, there are several contributing factors that lead to our decision – cost, accessibility, restrictions. And now in response to the Paris Agreement, and the resulting Canadian government policies and Federal Sustainable Development Act, environmental sustainability is also a major deciding factor within logistics. All manner of logistics must be innovative and continually improving; completed with the highest level of efficiency without sacrificing environmental health, and within a justifiable budget.

The Royal Canadian Logistics Service first received its royal designation on October 16, 2018 on its 50th anniversary. Within those 50 years, many changes have been made within the CAF and society as a whole in how basic functions are processed. Certain everyday methods that were once commonplace have been updated to reflect the changing views of the world as we have industrialized towards convenience and then grown from there to a more socially accountable people concerned about the amount of pollution in our air and waterways, and the depleting ozone layer.

As of 2005, the DND has made steps under the Federal Sustainable Development Strategy target, to reduce Greenhouse emissions within their operations by 40% by 2030. They are striving to reach this goal by making several changes, including how they meet the fuel requirements of their commercial vehicle fleet and investing \$225 million by 2020 into a wide range of infrastructure projects to reduce their carbon footprint. Also in 2006, a policy on Green Procurement was enacted

to dictate the environmental standards that must be met when purchasing supplies, including but not limited to: What the products are made of, how they are packaged, and the environmental criteria of the transportation company responsible for delivering them (such as the company being SmartWay certified). These policies have had a positive effect within the CAF, but ultimately have led to a positive effect beyond the scope of the CAF also. By having high standards when seeking bids for supply, it promotes companies to raise their standards in order to qualify. This in turn promotes innovation within the industry as these companies seek out new and greener technologies in order to compete for these tenders.

At CFLTC, the school for the Royal Canadian Logistics Service, we can make departmental changes. Although we train across the full spectrum of logistics covering Supply, Foods, Explosives, Human Resources, Financial Services, Transport, Traffic and Logistics Officer training, many of the processes are common among each facet. The CAF has made large scale steps, but there are smaller scale changes that we can make within the CFLTC to fit within this mandate. This includes better campaigns to encourage recycling within the department, including on-site shredders in order to safely recycle sensitive documents, can and bottle recycling or better yet promoting reusable travel mugs (perhaps CFLTC branded, which will further promote school operations). Reusable mugs reduce disposable cup usage at the canteen thereby reducing waste and single usage. Reminders to utilize low power mode on the computers and printers or automation to shut off lights when the rooms are not in use can save electricity.

Branching out from CFLTC, the CAF as a whole can continue to improve its environmental platform by switching to a paperless record system accessible across all Canadian bases. This would be an investment, as it would involve creating computer-based platforms for personnel management, but would be highly innovative and green in its application. This would lead to a heavy reduction in redundant paperwork, as forms would not have to be completed by hand with every move between bases; updates could be made with human resources personnel at a computer or self-serve kiosk. If human resources can now also complete these changes via the computer, and have signatures completed via e-signature technology,

this would streamline the job functions of those personnel and minimize the amount of errors from translating information from paper to digital on a constant basis.

Many large companies and corporations are stepping into the future of online ordering and warehouse storage and delivery streamlining. Currently each base houses a large warehouse that holds clothing or necessary kit items for members, but often times members show up and are unable to get the necessary sizes or pieces of kit that they are looking for or require, wasting valuable time in their day by going back and forth. If we could revolutionize Supply and Clothing Stores into an online ordering system, we could not only cut down on fruitless trips to and from the stores facilities by members looking for items, but also on excessive storage and housing space for sizes and items not frequently requested by members on each base. We could do this by creating an online ordering system similar to Logistics Unicorn where members can sign-in and pick the exact items and sizes they require as well as kit items to be ordered and delivered directly to their base where they would then receive an e-mail notification once it is ready to be picked up at Supply. Taking a look at the Amazon-style of warehouse system, the CAF could look into building or expanding to larger main warehouses in the Western, Eastern, and Central areas of the country where all of the main items are stored and shipped out as required by members. This could allow for less surplus being stored where it is not needed on each base and would allow for items to be more readily shared across bases on an as-needed basis for members.

When it comes to the future of logistics, innovation and green technology go hand-in-hand. You cannot innovate efficiently unless you are taking the environmental impact into consideration – new technology and methods simply must be green to have a place within CAF operations. Through this commitment is how the Royal Canadian Logistics Service will continue to achieve and proudly display its motto *Servitium nulli secundus - Service second to none!*

Training for the Logistics Fight:

The Art and Science of an Expeditionary Logistics Instructor

I recently had the privilege of attending the Intermediate Marine Air Ground Task Force Logistic Operations Course (IMLOC). The course is 34 individual training days, running six days a week over six weeks and held by the Marine Corps Logistic Operations Group (MCLOG) at the Marine Corps Air Ground Combat Center in 29 Palms, California. While the tempo is intense, it has reason. The aim of IMLOC is to certify Marine Combat Service Support Officers and Senior Non-Commissioned Officers to work as Expeditionary Logistics Instructors (ELI) in a Marine Expeditionary Force/Brigade/Unit.

Although the “I” stands for Instructor, MCLOG proves it does not hold the same context as a Training Centre instructor. The “I” represents someone who has the capacity, abilities, and knowledge to advise a Commander on logistics and plan at the operational and tactical level. In order to be rated as an ELI, during the IMLOC the students must demonstrate their proficiency in the operational planning process, the integration of warfighting and logistics functions in a Joint, Interagency, Intergovernmental, Multinational environment, and across a full Range of Military Operations. They must

also be capable of conducting force deployment planning, developing and analysing unit readiness and training, and most importantly, leading the logistics fight.

The fidelity and fighter philosophy of a Marine is significant in the way the Marine Corps (MC) approaches logistics. In order to conduct logistics effectively, ELIs are trained to win the logistics fight by not simply pulling planning factors out of a staff data manual or applying an existing nodal analysis to a new situation. They must understand the major assumptions that underlie the

calculations and the implications of change inherent to a fluid environment such as war. In other words, the art and science of logistics requires that ELIs understand not only the various elements of logistics but also the four rules of doctrine, (know what doctrine says, know where to find it, use terms and symbols correctly, and apply with judgment). Judgement permits an ELI to complement the science (analysis and calculation) with the art (foresight and intuition) in order to anticipate future requirements of the logistic plan.

An ELI can discern the difference between when doctrine is applicable and when to deviate from it, understanding the practicality and that the best answer is sometimes the most simple. The aforementioned rules are imperative when looking through the lens of interoperability. In today’s operating environment, we are continuously involved in a Combined Joint Task Force somewhere in the world. As such, we cannot enable the CJTF logistically, nor can we leverage reciprocal support if we do not fully understand our partner nation’s support network, which may require us to deviate from logistical norms.

In closing, as a Canadian I learned more than just another way to lead the logistics fight, I learned that to be an effective leader in the Marines, you must first understand what it means to be a Marine. As a logistician who has served in the Royal Canadian Logistic Service for 30 years, we must take a lesson from this as we look to our future. The act of leading is a sacred responsibility and a rewarding experience; it is about the relationship between the leader and the led. To that end, in order to effectively lead logisticians, we must first understand logistics and what it is to be a logistician. This will strengthen us, influence our attitudes and allow us to meet any logistical challenge.

Capt Jaret Sole
Expeditionary Logistic Instructor



Servitium nulli Secundus



Ex Susinendum Victoria



Picture by Sgt Clemente, USMC. Marines guide a vehicle onto a Landing Craft Mechanized-8 boat during a beach operations group exercise at Onslow Beach, N.C., March 30, 2017. The operation was part of field exercise Bold Bronco 17 and allowed Marines to conduct amphibious training with the Army. The Marines are landing support specialists with Combat Logistics Battalion 8, 2nd Marine Logistics Group.

War Pipe of the North: A Brief History of the Bagpipe as an Instrument of War

By MCpl Charles Macleod, CD

On August 19th, 1942, an attack on Dieppe was pushed inland by the Queen's Own Cameron Highlanders of Canada. Their bagpipers, headed by LCpl Alexander Graham, led the troops into battle.⁴ The Cameron Highlanders defied heavy German gunfire and artillery to advance 3.5 miles up the Scie river valley, halting just south of Pourville. LCpl Graham was heralded for his bravery; he played his bagpipe on the bow of the landing craft as it approached the shore as well as on the beaches once they landed. His pipers, Gunn, Young, Campbell, and Smith were all killed in action and Graham was taken prisoner. This was the last time Canadian soldiers were piped into battle, but it was most definitely not the first.

The bagpipe was declared an instrument of war in 1746 after the Battle of Culloden, which took place at Inverness, Scotland.⁵ It was the final battle of the Jacobite rebellion. Piper James Reid was taken prisoner by the British and put on trial for treason. Reid tried to evade the charges stating that he only played his bagpipe and did not take part in the actual fighting; he had no gun or sword. The judges disagreed on the grounds that highland regiments never went to war without a piper leading their troops. Reid was hanged, drawn, and quartered, and the bagpipe was officially declared an instrument of war.

The first recorded instance of a bagpipe being used during battle in Canadian military history was at the British victory at the Plains of Abraham in 1759. The musical contingent of the 78th Fraser Highlanders was made up of 30 or so pipers and drummers. One of their most ferocious and effective battle tactics was the Highland charge. With their bagpipers playing in ranks, the Frasers drew their swords and charged. One French-Canadian soldier recollected them "...flying wildly with streaming plaids, bonnets, and large swords, like so many infuriated demons...we never opposed such a shock in the centre of our line".² The bagpipe played a crucial role in many battle charges in subsequent centuries.



During World War 1, the kilted 16th Battalion was trapped under a barrage of German machine gun fire, grenades, and mortar bombs. Piper James Richardson, at only 20 years of age, implored his commander to let him to strike up his bagpipe.³ While playing, Richardson nonchalantly paraded back and forth on the berm of the trench in full view of the enemy. This audacious act invigorated the troops and they charged. The 16th won the battle that day and Piper Richardson was posthumously honoured with the Victoria Cross for his bravery in rousing the soldiers. Later on the day of the battle, Piper Richardson was tasked with escorting POWs and wounded soldiers to the 16th battalion's rearward position. On his way there he realized he left his bagpipes at the front line. He insisted on retrieving them and, sadly, was never seen again.

Piper Richardson's heroic actions were clearly exceptional but they were not a novelty. During the First World War it was commonplace for pipers to play during charges and to march their companies to and from the front lines. Canada sent between 25 and 30 pipe bands overseas for precisely these purposes.³ The 107th Pioneers, PPCLI, and the 1st and 4th Canadian Mounted Rifles all had



(Opposite page)
Queen's Own
Cameron
Highlanders of
Canada playing at
Ten Boar, 1945

(Above) Painting Piper
Richardson by James
Prinsep Beadle

(Right) Piper James
Richardson

pipers in their ranks. The intensely rousing impact the sound of the bagpipe had on the troops about to go over the top was remarkable. During the Second World War these practices continued, however, highland regiments were authorized to bring only six pipers overseas. It is widely believed that the number of pipers who actually went was considerably higher, as many of the units would purposely stock their manning rolls with clerks and medical orderlies who could also play the pipes.

The bagpipe was not only an effective instrument of war on the front lines but at home as well. The pipes and drums were an important recruiting tool and influential in cultivating public support for their respective regiments. Moreover, the health of a regiment's pipe band was generally regarded as a reflection of the Commanding Officer's social status, as funds for full highland dress uniforms were not provided by the Militia Department.³ Lifting the morale of the troops and garnering public support are important roles that the pipes and drums still



perform today - they continue to be an excellent military and community resource.

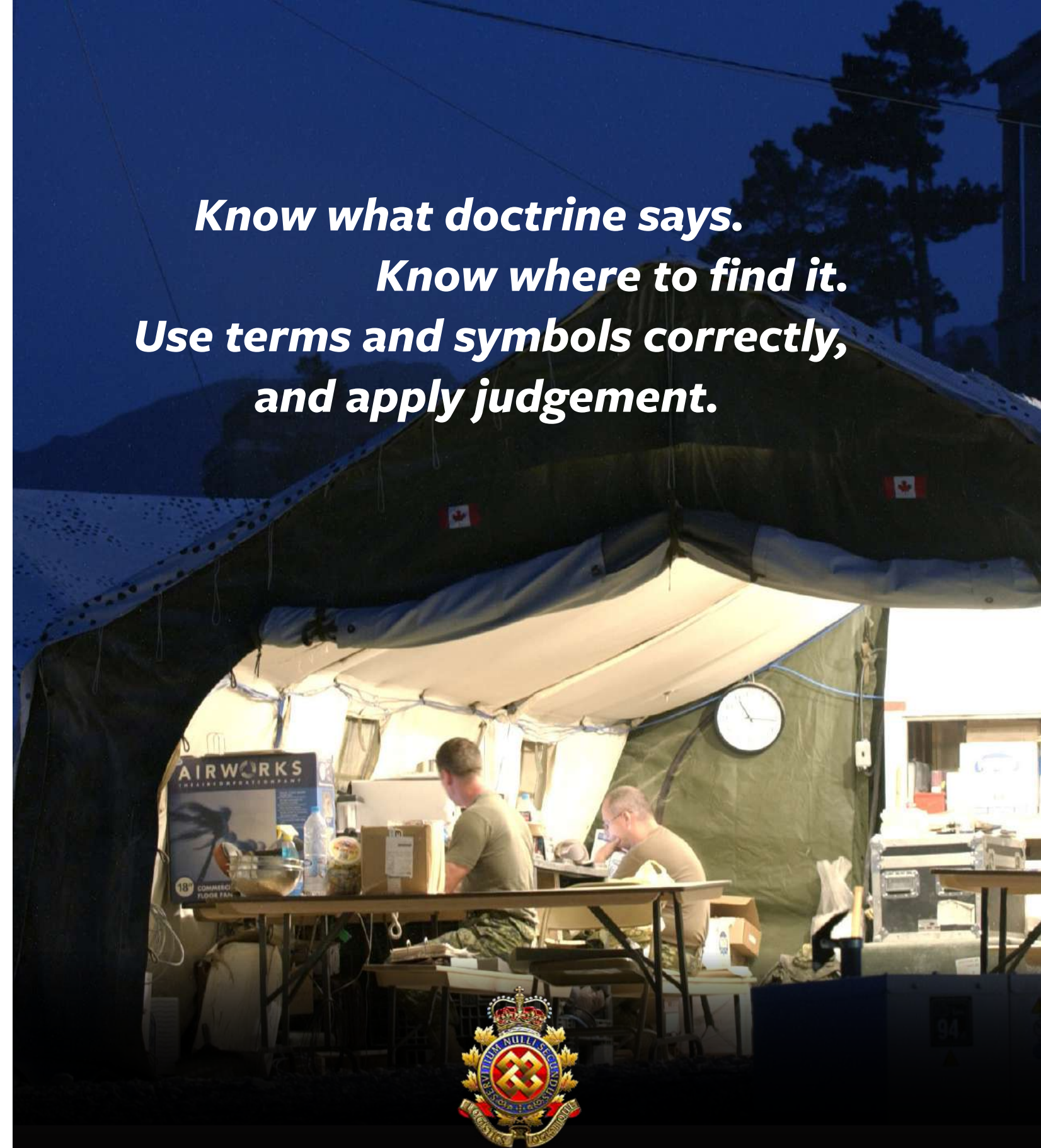
In 1996, David Brooks was charged for playing his bagpipe on Hampstead Heath in London, England, where there is a by-law prohibiting the playing of musical instruments).⁶ Brooks defied the magistrate, citing the ruling against James Reid in 1746. He reasoned that the bagpipe was not a musical instrument, but an instrument of war, so he could not be charged with the infraction. The magistrate carefully considered the historical precedent but stated that the bagpipe was a musical instrument as well as an instrument of war. Brooks was ordered to pay the fine.

While the bagpipe has not seen action on the front lines since World War Two, its role in the CAF still bears a grave responsibility. The pipes and drums are an important totem of remembrance and commemoration for the sacrifices made by so many in war and areas of armed conflict. Whether it is the commemoration of the 75th anniversary of D-Day or a ramp ceremony for a fallen soldier in Afghanistan, the bagpipe helps mark the occasion and awaken a deep felt sense of remembrance among the audience.

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**Know what doctrine says.
Know where to find it.
Use terms and symbols correctly,
and apply judgement.**



I'M A LOGISTICIAN!



Royal Canadian Navy members participate in “Sunset Yoga” as a way to stay fit and active during their deployment on Operation REASSURANCE in the Mediterranean Sea on August 17, 2019.

Photo by: Corporal Braden Trudeau, Trinity - Formation Imaging Services

INJURY REDUCTION STRATEGIES

By Jason Burke

There are many reasons why people decide to become active or begin a training program, among them is injury prevention. Unfortunately, just becoming active does not guarantee you will be injury free; you need to be training safely and appropriately.

Every four years CAF members complete a Health and Lifestyle Information Survey (HLIS). The results of these surveys have brought a number of issues to our attention; for instance, injury rates are high in the CAF. There are many strategies to reduce the likelihood of injury that have been developed as a result. Many of these ideas have been assembled by Health Services and others into the course entitled “Injury Reduction Strategies for Sports and Physical Activity”, which is offered by PSP Health Promotion (HP). A great deal of information is presented in the Health Promotion course and this article will highlight a few of the main ideas.

Sitting

While time spent sitting is great; maintaining proper posture while sitting is extremely important in order to reduce undue stress on the back and other areas of the body. The reality is everyone spends at least a portion of their day sitting. One should focus on adopting a neutral spine position while sitting, walking, and standing. There are many postural cues which deserve our attention. For example, a common error includes a rounded back while sitting. Instead of rounding the back, change your posture by not tucking your hips forward. Keep your chest up by squeezing your shoulder blades together.

Proper warm up

If you are not currently performing a warm up, you definitely should consider one. “The most common unsafe fitness training practice reported by CAF personnel was exercising without a proper warm-up - 44.9%...followed by exercising without adequate food or fluid intake - 34.4% (HLIS 2013/14).”

There are a variety of benefits to performing a warm up. At the top of the list is injury prevention. Other benefits include:

- Decreasing muscle stiffness and soreness from previous workouts;
- Increasing elasticity of muscles to prevent strains;
- Lubricating joints and preparing them for movement,
- Increasing body temperature, respiration, heart rate and blood flow,
- Improving nervous system response and performance,
- Providing physical and mental preparation and introducing new skills through rehearsals at a low intensity.

Your warm up should be progressive and completed before all sports and physical activities. Some simple examples include:

- A 5-10 minute brisk walk before a run;
- Lifting an empty bar before weight training, and;
- Using lighter weights to build up slowly before a lifting session.

Before engaging in sport, a warm up may include exercises such as routine landing, squatting, and direction change. Sport specific warm up exercises have been shown in research to decrease injury rates and increase awareness and control of the body - more specifically the knees and ankles, especially when pivoting and changing direction. Not only will warming up decrease injury, it will improve your performance.

Active Living

Becoming active daily will decrease the incidence of injury and as a bonus provides added health benefits, for example, reducing chronic diseases such as diabetes and high blood pressure. Furthermore, Canada has published physical activity guidelines to help reduce inactivity while

improving health benefits. “Adults aged 18-64 years should accumulate at least 150 minutes of moderate-to-vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more. It is also beneficial to add muscle and bone strengthening activities using major muscle groups at least 2 days per week. More physical activity provides greater health benefits.”

Modified Training Regime – High/Low Impact

Modifying your physical training regime is one example of safer training which is critical to injury prevention. Generally, exercises may be categorized as either high or low impact. One way to modify your workout is to vary the routine between high impact and low impact days. High impact training days such as running and ruck marching should be alternated with low or no impact days which might include swimming, elliptical, and biking to name a few. High impact usually refers to activities where both feet leave the ground such as jumping and running. However, ruck marching is included in the high impact category because of the added weight on the structures of your body over a long period of time.

Conversely, low impact refers to activities that produce much less stress on the body’s structure. For example, walking is considered low impact and swimming is an example of a no impact activity. These types of exercise provide an opportunity for bones, muscles, ligaments, cartilage, and tendons to rest and repair before resuming high impact activities again. This is similar to training different muscle groups on successive days and allowing 48 hours of rest before training the same body part. This helps reduce the accumulation of micro trauma in the tissue and prevents overuse injuries such as stress fractures and others.



Corporal Alice Currie, a member of the Canadian Contingent of the Multinational Force and Observers (MFO) crests the net obstacle while completing the obstacle course as part of physical training at the MFO South Camp in Sharm El Sheikh, Egypt during Operation CALUMET on April 4, 2019.

Photo: Sergeant Vincent Carbonneau, Canadian Forces Combat Camera

Training Safely

Planning an exercise program involves choices of risk versus reward. The best exercises you can choose come from the low risk category; exercises where a neutral spine is maintained. Exercises which focus on maintaining a neutral spine include standard and side planks, push-ups, and birddogs.

Core training can be performed daily but you should focus on all the core’s different areas, not just your abdomen. Your core is designed to resist movement and transfer forces. The best exercises for it include squats and dead lifts, where proper form should be your number one priority, not how much weight you can lift. In the martial arts world, the difference between a white belt and a black belt is in the details which make the moves more effective. In the fitness world, this concept is referred to as “performance enhancing details,” designed to make your training more effective and safe. PSP staff can provide great core training options and progressions which focus on maintaining a neutral spine.

Wear Sport Protective Equipment

There are two types of injuries; one type includes injuries that build up over time, called repetitive strain injuries (RSI). Carpal tunnel is one example. In contrast, injuries that happen suddenly, such as a sprained ankle, are referred to as acute injuries. Research has shown that wearing any available protective equipment when training, including helmets, goggles, mouth guards and similar items, will help reduce acute injuries. As a result of this finding, certain sport protective equipment has become mandatory when playing sports in the CAF, such as full face shields in hockey, ball hockey, and broomball. The wearing of mouth guards has also increased in contact sports, which often avoids an emergency visit to the dentist. Semi-rigid ankle braces are now highly recommended for sports that involve jumping and sudden direction changes, which many studies have shown to reduce ankle sprains by two to three fold. These are just a few ideas among many more that covered in the Injury Reduction Strategies for Sports and Physical Activity course.



Members from 4 General Support Regiment (4GS Rgt) participate in pugil stick training to improve combat skills at CFB Gagetown, in Oromocto New-Brunswick, January 19, 2017.

Photo: Cpl Geneviève Lapointe Tactics School, 5th Canadian Division Support Group Gagetown

Conclusion and Take Away Messages

Progress your training slowly and incorporate the various strategies mentioned to help reduce the risk of injury to yourself. Try to limit sitting whenever you can and, if possible, sit less than three hours per day. If you sit for one hour, try to stand and move for at least one to two minutes. Stay active daily and follow the Canadian Activity Guidelines. Wear sport protective equipment whenever possible. Warm up for at least 8-10 minutes to improve performance. Alternate high and low impact training days.

If you would like additional information on injury reduction please contact your local Health Promotion office to sign up for courses. Health Promotion has many references which can assist you in setting up an optimal workstation and which offer additional information on sitting with good posture.

Keep fit and have fun.

Jason Burke is a Canadian Forces Base (CFB) Borden Fitness Instructor. He graduated from York University in Toronto with a Bachelor of Science in Kinesiology and a certificate in Advanced Fitness and Assessment. Upon completion of his degree he became a Clinical Exercise Physiologist with the Canadian Society of Exercise Physiology. He has worked at CFB Borden for over nine years and currently holds the position of Reconditioning Specialist. His interests include increasing awareness of the importance of implementing properly taught, scientific, and technological skills within fitness practices.



Is Your Organization Truly Innovative?

(Condensed from the CFC Paper *Enabling Innovation in the Department of National Defence* by R.G. Bennett, JCSP 43, 2016-2017)

The world is full of buzzwords that get used without understanding or meaning. Innovation is often one of these buzzwords. It is frequently used, but much less frequently understood or practiced. The real question is: “How do we know if we are buzzword champions or are truly innovative?” To determine the answer to this question, innovation needs to be defined and then an assessment made to determine where our organizations stand.

The definitions of innovation are wide and varied. Famed management guru Peter Drucker stated: “Innovation can be defined as the task of endowing humans and material resources with new and greater wealth-producing capacity.”¹ Wealth-producing capacity in a military sense can mean improved efficiency in materiel usage, more effective warfighting, improved personnel training and management, and ultimately the optimization of available resources under given limitations.

Bringing a closer definition to how government innovation should work, the Organization for Economic Co-operation and Development (OECD) defines innovation as significant improvements in production, processes, techniques, equipment, design, promotion, or practices.² This definition is fairly broad, fitting most situations.

Innovation is more than simply advancing technology or an arms race. It is far more than attempting to do more with less. Innovation is a mindset and part of an organization’s culture that strives to advance and develop new or improved processes, strategies, practices, and equipment. Above all, it provides flexibility to respond to ever increasing demands and to optimize the use of resources.

Innovation is not the same as change. Change can readily be present and not be innovative. Change can be administrative, change for the sake of change, change for career advancement, or change in response to the environment. It is important to make this distinction from the outset as innovation is not based on career desires or personalities, but on a desired end state.

Summing up these definitions, innovation in DND could be defined as: The discovery, implementation, or development of new methods, processes, or tools which maximize the department’s societal, economic, and warfighting contributions. Defining innovation using this definition focuses innovation in a departmental context while encompassing the basic definitions of innovation found in industry. This creates a dynamic combination of innovation attributes that can centre on how DND should strive to innovate—something that is already inherent to innovative organizations so not defined by them in these terms.

In a military context, innovative thinking applies from the tactical level through the strategic-political level. At the tactical level, innovative thinking can provide unique solutions across a spectrum from how to effectively and ethically fight insurgents all the way to how a logistic chain is laid out for maximum effectiveness in situations that are not addressed by doctrine. At the operational level, innovative design thinking will help drive plan formulation from orders given at the strategic level while balancing operational assets such as logistics hubs to support multiple theatres of operations. At the strategic level, programs such as renewable fuels for training fleets, equipment design for arctic operations, partnerships with industry and academia, licencing R&D discoveries to industry, recruiting, support to industry, and capability specialization are just a few areas for innovation.

US military author William McRaven suggests innovation as a contributing element to special forces operations. He states, “Innovation simplifies a plan by helping to avoid or eliminate obstacles...it is also the application of unconventional tactics.”³ Such comments are supported by additional US special operations doctrine which notes that special operations are conducted by “units who apply special skills with adaptability, improvisation, and innovation.”⁴ Canada’s small military requires its members to be adaptable, develop skills to improvise, and be innovative.

The definition of innovation needs to be separated from three concepts, namely: Technology, evolution, and adaptation. Technological development is based in innovation and scientific discovery. However, the adoption of technology does not necessarily indicate that an organization is innovative. It may mean that the organization is simply evolving with the use of technology. Evolution is a change within the organization but also does not signal that an organization is innovative. Most businesses today operate using computers as opposed to carbon paper. The adoption of computers is an evolutionary change, not an innovation creation for the business that now uses computers even though efficiency and effectiveness are improved.

Adaptation and being adaptable can be seen in two different lights. Adaptation to a new environment, process, technology, or situation does not necessarily mean the organization is innovative. Adaptation may be simply a survival mechanism or common response to a changing situation. A store may change its sales tactics to adapt to a competitor. The change should not be considered innovative unless it is something either unheard of or is at least new for the industry. Dropping prices or changing from commissioned to salaried employees is simply an adaptation, not an innovation. The differentiation between being adaptable and accepting adaptations is that adaptability is predicated on flexibility while adaptation to the conditions is a forced response.

Innovation distinguishes between a leader and a follower

– Steve Jobs

Disinnovation

Disinnovation is not simply doing the reverse of innovation or failing to innovate; it is fighting against innovation. Contemporary bureaucracies by their current nature are disinnovators. Disinnovation is driven by stovepiping, myopic viewpoints, a lack of diversity, careerism, an unsuitable definition of risk, apathy, a lack of professional education, poor communication, bureaucracy, inappropriate hiring practices, poor innovation culture, and failure to make timely decisions.

Schaeffer suggests five actions that kill innovation.⁵ The first innovation killer is punishment for initiative when problems arise. Punishing initiative and failure is anathema to IDEOⁱ practices both in literature and seen through a site visit to IDEO. Punishing failure when in experimental stages eliminates initiative, grows distrust, and creates fear. In a military context, punishing failure for initiatives or when plans do not materialize due to unforeseen events is far different than punishing a soldier for failure to uphold a legal or lawful command or requirement. Creating a culture of trust and confidence is required to build innovation and advance the organization. To do so may require reasonable risk, not punishing failure, and using failure as an opportunity to grow. Some may argue that accepting failure could result in battlefield losses or a failure in acceptance to take responsibly for domestic procurement problems or be used as an excuse for underperformance. There is merit to these arguments, but when taken in a leadership context, it is leadership's responsibility to make the correct balance. Furthermore, failure from incompetence, apathy, or neglect are simply not acceptable at any point.

Schaeffer's second killer is micromanaging projects or assignments. Part of the developmental process of leadership permits the assigned person the freedoms they require to do their tasks. Arguably, micromanagement also redirects failure and responsibility towards the supervisor while killing innovation. To kill micromanagement, she recommends leaders not second-guess or overrule staff. Exceptions to this would be in extreme circumstances, breaches of health and safety, or when the leader's intent is not being met.

Her third innovation killer is a lack of a continuous improvement mentality. She argues that too many people hide behind policies and procedures using them as a scapegoat for failing to innovate. Encouraging people to regularly assess their practices and seek novel ways to improve should be part of the culture.

Finally, Schaeffer suggests that “the organization [that] favors aggressive internal competition” will undermine the objectives of innovation. Competition must be balanced against a sense of community in the workplace. Opponents would argue that competition in the military is an existing

cultural trait that is highly desirable in warfighting. This is true, but is it required for corporate operations? Should competition be against an enemy or against our own teams? Competition can be used in developing innovation if the competition is centered on improving the institution and not for personal gain such as career progression. Career progression can be a benefit but not the end state in developing innovation.

Kriegesmann, Kley, and Schwering suggest that a current zero-error culture exists in industry that is adversely affecting how organizations encourage innovation.⁶ They highlight that most businesses do not sanction deviations from established protocols.⁷ They further declare that organizations that are rigid in error prevention too often pay lip service to innovation as the incentive structures create risk aversion. They state:

He who leaves the herd of lemmings and deliberately undertakes an innovation process with a calculated risk, should, in the event of failure, not be mocked and derided, but rather encouraged to undertake further, sensible risks in a spirit of optimism.

Why Public Service Institutions Lack Innovation

Drucker cites three reasons why public service institutions are not innovative.⁸ DND with the CAF can be included in his analysis even though he does not specifically state ‘military’ as a public service institution. His declarations are based on his observations and practice in industry.

First, he suggests that public institutions see themselves as budget driven as opposed to monetary driven. The higher the budget, the more prestige the manager has. The more innovative the organization, the less funding the organization needs and the lower the prestige of the manager. In a monetary organization, profits would drive prestige as opposed to expending money as is found in government.

His second rationale is that of the veto power of constituents. The concept of the government is to serve everyone. Business serves the most profitable clients. Failing to provide a service to a small minority would be seen as having an ineffectual government organization—so even the small groups could be seen as having veto type

power. However, this also spells out the argument as to why governments need to be innovative—to ensure they can cost effectively or efficiently serve these minority markets.

He argues that the public services exist to ‘do good’ and its members see themselves on a moral absolute mission rather than an economic one. In this case, the cost-benefit is discounted in favor of perceived higher morals. He states, “The optimal level for most organizations is 75-80%” in reference to serving profitable clients.⁹ In other words, to serve 100% of clients, as the government does, it costs significantly more money with vastly diminishing returns. He continues,

The problem with satisfying the desire to do good to all is that the costs rise exponentially while the benefits drop exponentially. The harder it works to achieve its objectives by doing what it currently does the more frustrated it becomes while concurrently consuming increasingly higher amounts of resources.¹⁰

The moral plane view sees significant effort with diminishing returns. This actually argues the need for innovation in government. If the government seeks to serve all people on a moral plane, then it needs to be innovative in order to reduce the resources needed to serve the most consuming 20% of society.

Fountains of Innovation

The basis of organizational innovation is currently under debate.¹¹ Ovans highlights the debate that rages between three parallel fields of thought: People, Processes, and Culture. She notes that Ed Catmull of Pixar polled his staff to determine their thoughts on the source of Pixar's creativity—hiring great talent or processes to find creative ideas. His polls showed a 50/50 split even for this highly innovative organization.

Collins suggests that the right people with good leadership will produce stellar results regardless of the path.¹² Atkins refers to this as leadership with a vision for innovative energy.¹³ In his example, he defines the right people not so much in terms of talent, although that is part of it, but rather people that are driven to succeed in a team based environment that want the firm and the team to succeed.

ⁱ IDEO is the world's premier design firm.

The Role of Culture

Shanker and Bhanugopan state that “employee’s perception of climate affects the extent to which creative solutions are encouraged, supported and implemented.”¹⁴ Their work suggests that creating a climate for innovation is closely tied to employees being innovative. Research from industry practices and first hand observation when visiting innovative firms confirmed these findings in that culture is the preeminent success factor in developing an innovative organization. Looking at DND, military/ government culture, and innovative culture are not mutually exclusive.

In conversations with IDEO staff, the number one reason it is so innovative is due to a constant redeeming culture of innovation. Its employees are driven to design better products, better services, and improved processes. The books written by IDEO staffers and the Kelley brothers (founding partners) support what the employees stated during a site visit. Jaruzelski, Loehr, and Holman note, “More important than any of the individual elements, however, is the role played by corporate culture.”¹⁵ Hiring at IDEO plays a major role in forming culture. Culture is then created by the passion of the hires within the framework of mission accomplishment, processes developed by the founders, and an attitude of exploration and experimentation. Motivation comes from within the individual in their drive to create.

The Innovation Pyramid Model

We can determine the level of innovation in an organization through the use of the innovation pyramid. This model is based on the research for this project and includes first hand experience, observation of current practices in DND, and comparisons with observations made first hand at IDEO and other organizations with innovative industry practices. The model will show managers where they need to go and what signs they should expect to see as they develop innovation within their organizations.

The model can be used for small organizations such as platoons or be applied to larger organizations such as

an Assistant Deputy Minister’s office or the entire department. It is highly feasible that smaller organizations could be innovators while larger ones within DND may not be innovative at all. It is also feasible to have a low-level unit such as a subunit be innovative within its realm, but its higher headquarters may be far from innovative.

The heart of the pyramid is culture. A culture of innovation will drive innovation upwards while a culture of disinnovation and ‘same as last year,’ ‘not invented here,’ ‘I can’t,’ or ‘it’s not my job’ attitudes will prevent upward progression. It is important to recognize that culture is a driver towards Strategic Engagement.

The model starts with the lowest level of innovation—essentially none or at the very most limited innovation on a small scale by some individuals, but not as an organization. Innovation starts when individuals start looking to use innovation as a tool. Learning begins by researching what lessons others have learned in a particular domain. Using the example of alternative fuels for commercial military fleets, inquisitive innovators start by searching out what other organizations have developed or used. At this stage, there is simply an interest in researching basic information regarding a specific topic. There is likely no research question to answer and significant resistance to innovation in the culture.

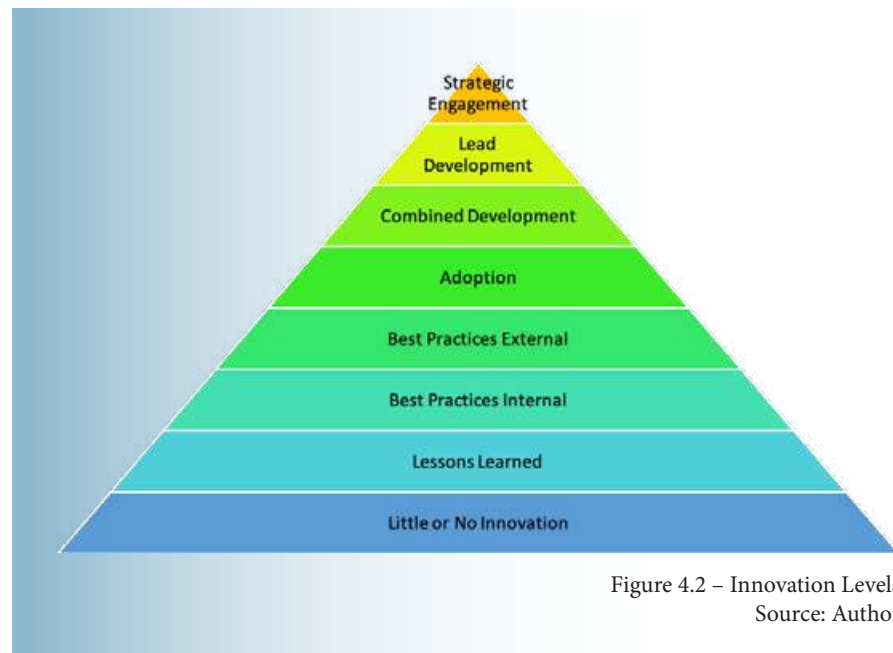


Figure 4.2 – Innovation Levels
Source: Author

Finding lessons learned is important but there needs to come with it a three-part acceptance solution. The first is to have a system to capture corporate innovation practices and lessons learned. This could be a DND innovation library, bulletin, or other method to capture, disseminate, and champion internal and external learning. How often have staff had to create briefing notes on subjects that were previously briefed a year or two prior or corporate knowledge lost due to postings or retirements? An innovation information repository that is regularly reviewed as part of education and training and championed through the DND media (e.g., Maple Leaf, regional papers, technical bulletins, DND wide emails, portal site with alerts to a subscriber list, journals, course materials, etc.) is required to facilitate best practices and then adoption.

At the best practices stage, the innovator—which may or may not be a formal leader within his or her organization—branches out to find out what best practices are available internally to the organization. These practices at their base level may be practices that should have been accepted but are not or are practices that are being used without significant fanfare. Best practices should consider both short and long term elements concurrently as noted by Deloitte.¹⁶ Best practices can be developed through two means. The first is exposure to innovation training. The second is sharing innovation successes within DND.

Adoption includes the implementation of best practices including lessons learned across DND. Adoption is accompanied by changing cultural attitudes towards innovation and advancing the level of innovation in the organization. Adopting innovation means accepting and applying principles and practices from other sectors including outside the department. Adoption sees concepts taken from others and modified to suit the organization’s needs. An excellent example of the adoption stage from industry is Jack Ma of Alibaba. He followed the same innovative principles as eBay, only he used it for business-to-business sales rather than between consumers or businesses. Ma’s adoption of essentially an eBay for business occurred four years after the start of eBay and two years after eBay officially become ‘eBay.’ By the time Alibaba was founded, eBay had already sold over one million items and had gone public.¹⁷

Combined Development starts when the organization is beginning to adopt a regular practice of innovation culture well into product or service development. Combined development is well manifested in the medical community with the US military in joint ventures with medical collaborators. Collaborations with industry and the US Defense Advanced Research Projects Agency develops technologies with outside partners—many of these partnerships have improved medical advancements.

Lead development in the model is the sub-pinnacle of full innovation. Leading innovation means that the culture has been transformed from one of little or no innovation to an organization that leads in a particular sector. Just a few examples of what DND could lead in based on current successes or present areas of development could include: Arctic sustainment, biofuels, human centric combat clothing, combat feeding, and humanitarian support to name a few. Lead development means the organization is recognized as an innovation leader at a minimum within the same industry or sector.

It is not necessary for lead development to be only strategic. Identifying opportunities at the unit or command level can also initiate a lead development project. Lead development on a consistent basis, however, requires a culture change. When consistent projects are sustained and results garnered, or innovative lessons learned and applied from failures, development flows with multiple organizations, and new development happens—only then can the organization be considered to have achieved a lead development status.

Finally, the pinnacle of innovation is the Strategic Engagement Level. At this level, the organization has embraced an innovation culture even if the projects and solutions are low cost and low key. The vast majority of members within the organization are in an innovative mindset and are thinking about how to improve their individual and collective realms of responsibility. The strategic engagement level then takes these collective thoughts and practices and engages and leads other entities outside the normal partnerships. Strategic engagement may result in high level innovations including: Patent filings; revamping of policies and procedures for the department, nation, and allies; mentoring other organizations on how to become innovative; and

demonstrating high levels of efficiency and effectiveness. At this level, failures are accepted and overcome in training and development. Examples of firms in this category include 3M, IDEO, Apple, Salesforce.com, and Pixar. At this level, innovative leaders connect with others outside their organizations and develop innovative leadership internally.

Conclusion

Understanding innovation comes from having a clear definition of what innovation is. True innovation is tied to culture and as culture improves so does innovation. The Innovation Pyramid can be used to determine from where we have come and tell us where we need to go to be truly innovative. By following the innovation pyramid, organizations can formulate a roadmap for true innovation.

Lieutenant Colonel Gordon Bennett is the Commandant of the Canadian Forces Logistics Training Centre. He has been published previously in the Canadian Military Journal and various other publications. He holds a Doctorate of Business Administration. His recent work has been centered on innovation and design thinking. This article was extracted from his directed research paper at the Joint Command and Staff College in Toronto, Ontario, Canada.

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If I were to sum up
what I've learned
in 35 years of service,
it's...

IMPROVISE
IMPROVISE
IMPROVISE

— General (Ret'd) James Mattis



The Triad of Warfighting Acumen

By CFLTC Staff

“If you haven’t read hundreds of books, you are functionally illiterate, and you will be incompetent.” This quote by General Mattis is well supported by the thousands of books he personally owns and has read.¹ He had a successful career as a well-respected US General and Secretary of Defence. General Mattis’ comment varies significantly from a Commanding Officer’s comment on an exercise several years ago who stated “I don’t need to know doctrine because I can wing it.” This poor assumption was quickly destroyed when his subordinates executed a very poorly thought out plan. Similarly, a young Platoon Commander sent to Afghanistan stated to the effect “I didn’t study anything about the area as I wanted to come with an open mind.” In these cases, one officer sought out knowledge while the other two relied excessively on a lack of information. These examples beg the question “what should we study to be effective?” The result of this research question is the topic of discussion for this article and will be referred to as the “Triad of Warfighting Acumen.”

It could be argued that history repeats itself or little is new, it is just new to those that have yet to experience it. War has been occurring for thousands of years and provides an excellent learning opportunity. Learning from prior successes and failures helps prevent the current generation of military professionals from making the same mistakes already learned from the past. Yes, technology has changed, the passage of information is faster, and the western lifestyle is the richest and most secure in history. However, wars at their foundational level are still instigated and conducted by people. Technology and information are merely tools used in modern warfighting while wealth helps determine the amount a society is willing to risk in warring with its neighbours.

This view of history becomes the first leg to the triad. Competent commanders will seek out historical lessons, see how they apply to the battlespace of today, and ensure poor lessons are not repeated. History does not only relate to the use of specific tactics, but cultural awareness,

biographical information, the application of technology, personnel management, alternate ways of thinking, and many other topics. Poor is the leader who relies exclusively on his or her own experience or training to the ignorance of history. Learning from history helps establish a base for doctrine and knowledge. The application of knowledge and experience then creates wisdom. Wisdom becomes a performance enhancing tool.

Education is an ornament in prosperity and a refuge in adversity – Aristotle

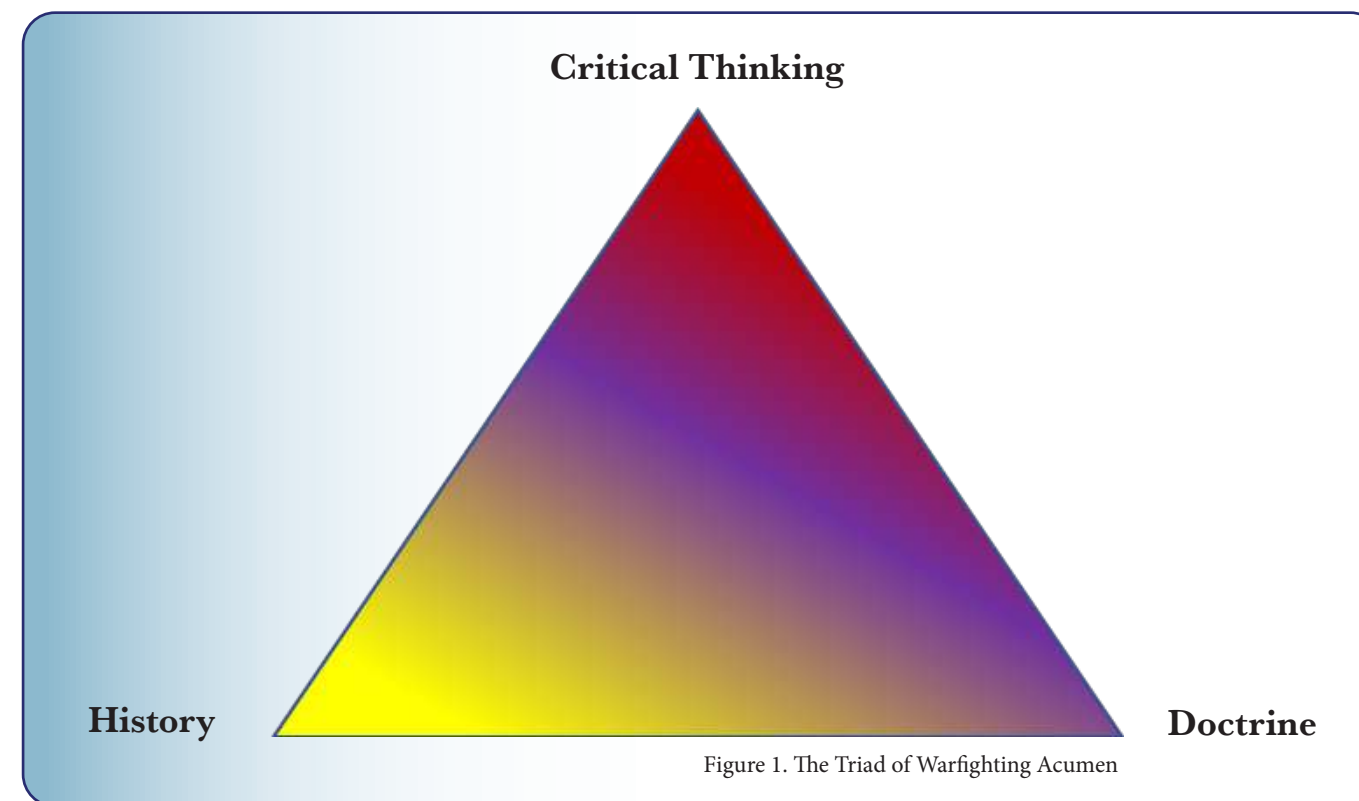
Doctrine is the second leg of the triad. Doctrine is founded on experience and lessons of the past. It is not sacrosanct and will change with time and tools. However, failing to understand doctrine for both the blue and red forces is a failure to capitalize on proven techniques. Knowing where to find doctrine and how to apply it is a necessary component of this leg being intrinsically tied to history. When a leader makes comments to the effect that they do not need to follow doctrine, this cuts off one leg of potential successful tactical acumen and weakens the structure of decision making and tactics employment.

There will be times when history may not appear to apply and doctrine does not fit the situation. Having an understanding of both of these elements can result in their use or positioning them to the side in favour of critical thinking. Can a leader effectively employ historical lessons and doctrine without the ability to critically think and problem solve? Not likely. Critical thinking is essential to the implementation of tactics. It enables the warrior to correctly apply doctrine and history while considering the nuances of the present situation. It also improves the ability of the warrior to tackle situations that may not be compatible with present doctrine; has a questionable historical background; or where history, doctrine, and modern tools need to be aligned and amalgamated. Critical thinking then becomes the third leg in the triad.

¹ Mattis, J., West, B. (2019). *Call Sign Chaos: Learning to Lead*. Random House.

Education is a progressive discovery of our own ignorance.

– Will Durant, Historian, Philosopher, and Writer

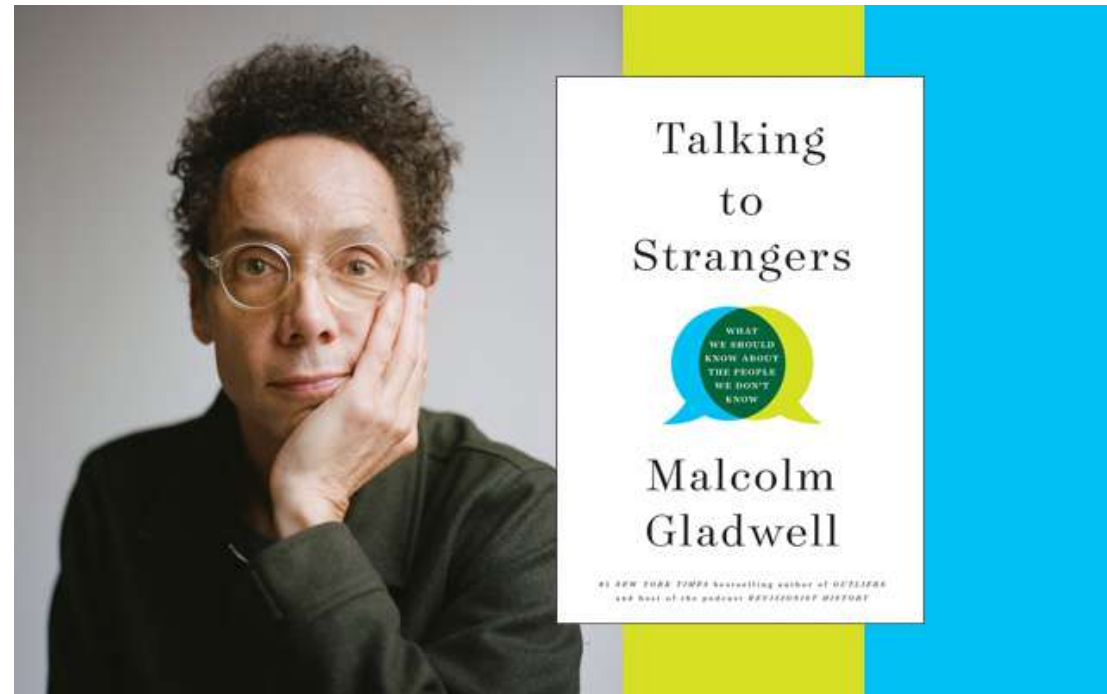


If you think education is expensive, try ignorance!

– Andy McIntyre

Decision maker and leader professional development is essential in these areas. Formal training provides the doctrine piece, but individual professional development and practice develop the other two components. Knowing the three pillars that support professional warfighting development enables life long learners to balance their study and application of doctrine and practices. Knowing the foundational pillars or sources of study will help develop better warriors, leaders, and decision makers.

Talking to Strangers



Author: Malcolm Gladwell

Pages: 346

Published: September 2019

Reading Difficulty: Accessible but sometimes challenging

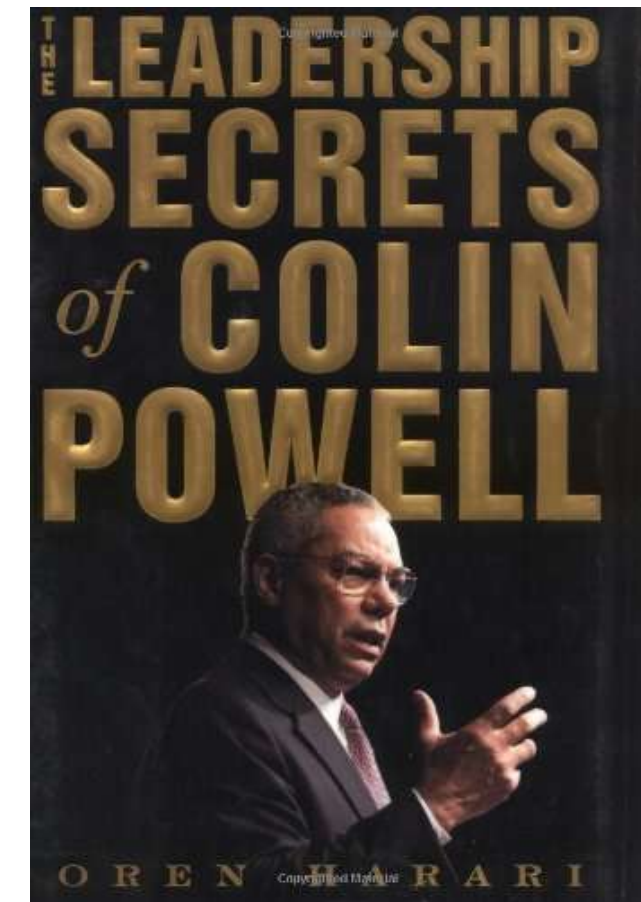
Genre: Non-fiction, Social Studies

Malcolm Gladwell's *Talking to Strangers* is an excellent tool for understanding why it is we get so much about others so horribly wrong. Drawing on examples like the Jerry Sandusky trial, the Amanda Knox trial, and even on studies of torture (e.g., "Enhanced Interrogation Techniques"), Gladwell shows us just how difficult the task of discerning the truth can be.

The author demonstrates how it is often precisely the tools which we think most benefit our ability to detect a lie or find the truth that can (and do) significantly hamper our ability to do so. Namely, judging facial expressions, making sense of quirkiness, vocal tone etc. The adverse consequences of misjudgement can often be massive. Examples include when criminality is not reported or when an innocent person is locked away for crimes they did not commit.

The reader should, however, keep in mind that these mistakes are incredibly easy to make. Everyone from CIA interrogators to fraud investigators are prone to misunderstand strangers. *Talking to Strangers* enables readers to learn some communicative mistakes early enough to correct them.

The Leadership Secrets of Colin Powell



Author: Oren Harari

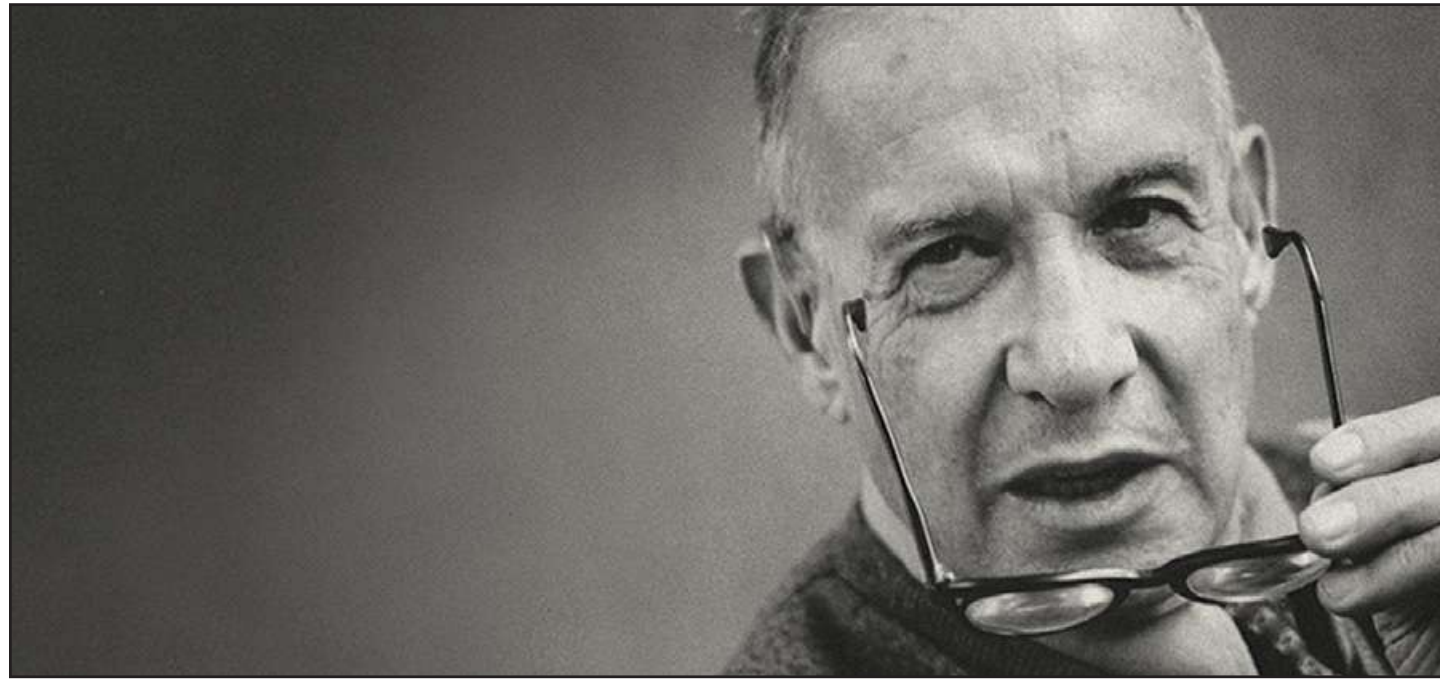
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Oren Harari, professor of Management at the McLaren Graduate School of Business, University of San Francisco, shines a light on the leadership principles, doctrine and philosophy of famed former Chairman of the Joint Chiefs of Staff and former Secretary of State, Colin Powell. Be it as a member of the US Armed Forces or as Secretary of State, Powell's career is inundated with excellence and success. *The Leadership Secrets of Colin Powell* brings the reader into the fold and dissects those successes in a clear, simple and easily transferable manner. For the aspiring leader or the leader who seeks to improve themselves in concrete, practical and demonstrable ways, Harari provides an invaluable tool.

Drucker on Innovation



This year marks 15 years since famed management consultant and author Peter Drucker passed away. In honour of his memory, here are some of his thoughts on innovation taken from *The Essential Drucker: The Best of Sixty Years of Peter Drucker's Essential Writings on Management*.

“...a high standard of living presupposes an economy of innovation and change. But innovation and change make inordinate time demands on the executive. All one can think and do in a short time is to think what one already knows and to do as one has always done...The effective person therefore knows that to manage his time, he first has to know where it actually goes.”

Drucker states that there are seven sources of innovation opportunity. These include:

1. Unexpected successes and failures by the organization or its competitors.
2. Incongruities in process, production, distribution, or customer behaviour.
3. Process needs.
4. Structural changes in industry or markets.
5. Demographic changes.
6. Changes to meaning or perception.
7. New knowledge

“An innovation to be effective, needs to be simple and it has to be focused...all effective innovations are breathtakingly simple. Indeed, the greatest praise an innovation can receive is for people to say, ‘This is obvious. Why didn’t I think of it?’”

“There are three conditions that must be met for an innovation to be successful. All three are obvious but often disregarded.

1. Innovation is work. It requires knowledge. It often requires great ingenuity.
2. Innovators must build on their strengths. Successful innovators look at opportunities over a wide range then ask which of these opportunities fits me [or] fits this company.
3. Innovation is an effect in economy and society. [It is] a change in the behavior...of people in general.”

“Successful innovators are conservative. They have to be. They are not ‘risk focused’; they are ‘opportunity-focused’. Defending yesterday, that is, not innovating—is far more risky than making tomorrow. The innovators I know are successful to the extent to which they define risks and confine them.”

“Not to innovate is the single largest reason for the decline of existing organizations.”

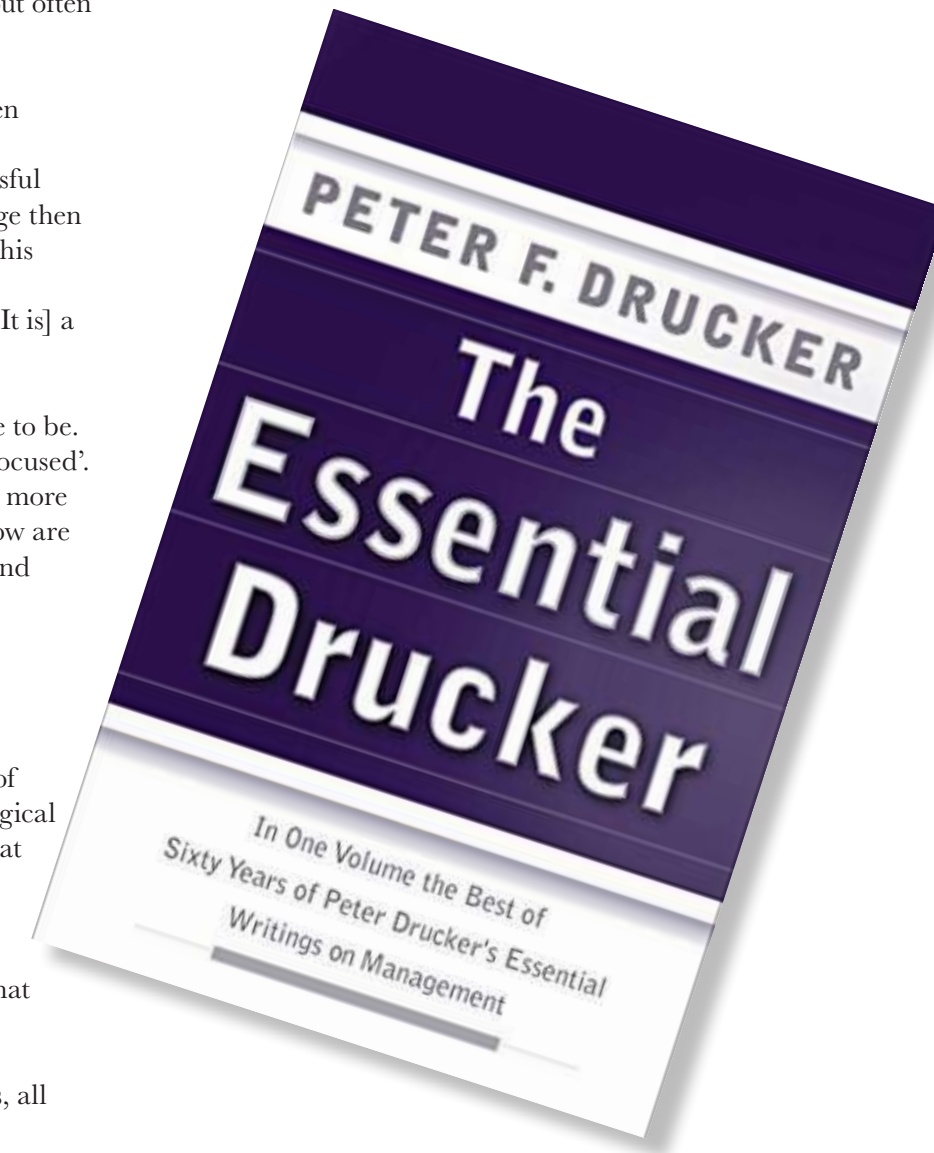
“Above all, innovation is not *invention*. It is a term of economics rather than of technology. Nontechnological innovations—social or economic innovations—are at least as important as technological ones.”

“It is the job of the business to convert change into innovation...it is a poor businessman who thinks that innovation refers to technology alone.”

Innovation “extends across all parts of the business, all functions, all activities...”

An organization “that does not learn to innovate will not last long.”

“...every organization—not just businesses—needs one core competence: innovation.”



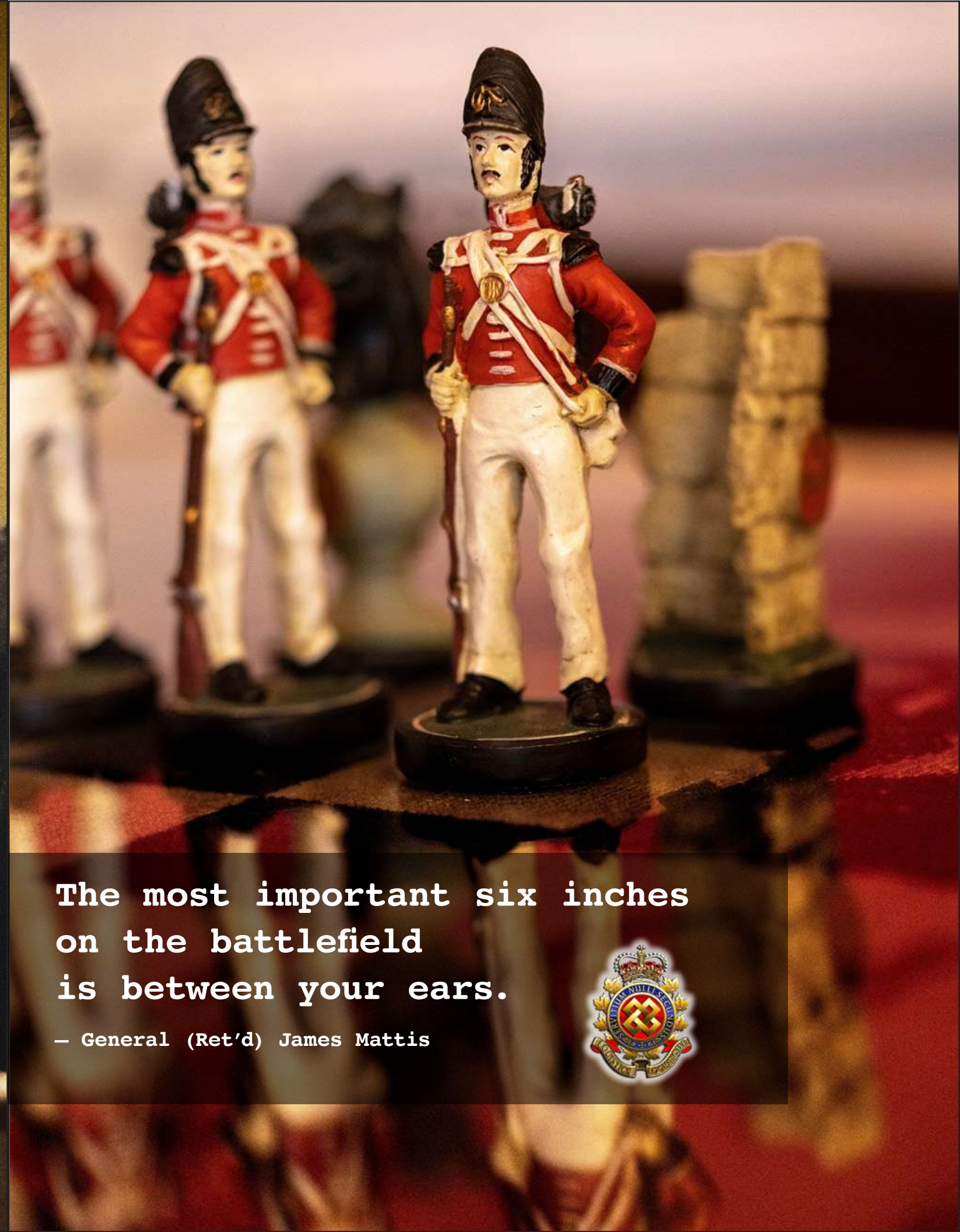
Rarely do we find men who willingly engage in hard, solid thinking. There is an almost universal quest for easy answers and half-baked solutions. Nothing pains some people more than having to think.

— Martin Luther King Jr.



The most important six inches on the battlefield is between your ears.

— General (Ret'd) James Mattis





How is the Automation of Trucks Impacting the Trucking Business?

–By MCpl Murphy

As we move into the future, technology continues to advance on a daily basis. Whether military or civilian, new technologies are intended to make the job quicker, easier, and more cost efficient. However, these same technologies could also have a negative impact. In this article, I will explain the advantages and disadvantages of self-driving trucks.

First, what is an automated vehicle? It is one which uses a combination of sensors, controllers, onboard computers and, in some cases, cameras, allowing the vehicle to control at least some of the driving functions, instead of a human driver. Examples include steering, braking and acceleration, and checking and monitoring blind spots. The Society of Automotive Engineers has developed the current standards of automation levels, ranging from 0 to 5; 0 being no automation, and 5 being full automation. The amount of human contact with the vehicle decreases as you go up in the levels. Currently in Canada, the automation of trucks ranges only from levels 0 to 2. Testing of automated vehicle technologies at levels 3 and 4 is underway in many countries, including Canada.

Over 71% of all freight in the US is moved by truckers. There are those in the industry who speculate there will be a widespread job loss with the rise of self-driving vehicles. Some professionals have forecast an estimated two to three million jobs could be lost over the next several years. While the risk of job loss is very real, the projected numbers may not be accurate since the count of truck drivers is often inflated because of misunderstandings of the occupational classification. Also, truck drivers do far more than simply driving. In a study titled “Automation Isn’t About to Make Truckers Obsolete” by Gittleman and Monaco of the Harvard Business Review, the authors argue that there are three key reasons why job losses may not be as severe as current speculation is suggesting.

Reason 1: Truck drivers do much more than drive. Do truck drivers only *drive* from point A to B? **No.** They are required to have many other responsibilities, from securing and rechecking loads to ensure they stay safe, providing customer service, and even possibly performing some vehicle maintenance.

Reason 2: Full automation isn’t as close as it seems. There have been recent news headlines about “self-driving trucks” that suggest drivers will be losing jobs. Those headlines are based on level 5 truck automation. Level 5 is extremely rare at this time.

Reason 3: There aren’t as many truck drivers as people think. A number of articles claim there are roughly three million truck drivers in the USA and another 300 thousand in Canada. In reality, the amount is measurably lower, which means fewer jobs lost even in a worse-case scenario.

What are the problems with Self-Driving Trucks? Despite all of the money and research going into self-driving trucks, there are still questions and concerns that need to be answered regarding the safety of this technology. A self-driving truck is not the same as a self-driving car. Trucks are obviously much larger and lack the ability to manoeuvre around a potential obstacle or accident like a car can. It takes a truck a lot longer to come to a complete stop when braking. There are also potential problems with the sensors being on top of a truck’s cab. (The sensors consist of a combination of GPS, radars, and cameras that are used to help navigate and control the truck). In that high-level location, the sensors have the potential to be blinded by the sun, have problems distinguishing between cars and large signs, and become impaired by inclement weather. Are these sensors going to be able to detect maximum speed changes in construction zones or comprehend what a stopped school bus is?

Other issues that professionals are concerned with include a truck being able to tell when it should be downshifted when going down a hill, for example, when driving through the Rocky Mountains.

What are the advantages of Self-Driving Trucks?

Improved safety is undoubtedly a huge potential benefit. According to data from Transport Canada's National Collision Database, driver behaviour is a contributing factor in approximately 86% of collisions causing death and injury. Automated vehicle technologies currently available, or on the horizon, could help reduce the number and severity of crashes by providing drivers with early hazard warning, initiating emergency braking when a hazard is detected or helping human drivers make better decisions on the road. These technologies will also have a major impact on people with limited mobility, such as seniors or people with disabilities. As vehicles with higher automation levels become available, it is hoped that these technologies will help to drastically reduce vehicle collisions.

For the near future, highly automated trucks will supplement drivers, not replace them. In fact, as freight demand continues to grow, the trucking industry will need more professional drivers than it employs today, not fewer. It's a safe bet that they will remain in high demand 10, 20, and even 30 years into the future, especially when taking into account the industry's ongoing struggle to recruit and retain drivers. Expect the role of the driver to evolve along with the technology, but the job will still exist far into the 21st century.

Now that we know the answer to my first question about how the automation of trucks might impact the trucking business in general, it will be interesting to see how it will affect trucking in the Canadian Armed Forces.

MCpl Murphy is a Mobile Support Equipment instructor at the Canadian Forces Logistics Training Centre.

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<https://www.ttnews.com/articles/self-driving-trucks-reality-check>

Many are called, but few are chosen.

Be the chosen.

Be a logistician.

LOGISTICIAN
2021





Task Force-Mali members transport fuel barrels while setting up a Forward Area Refueling Point during Operation PRESENCE-Mali on February 16, 2019.

Photo: Corporal François Charest, 430 Tactical Helicopter Squadron (430 Tac Hel Sqn)
TM02-2019-0011-0007

Optimized Incorporation of Photovoltaic (PV) Power Generation Systems in CAF Deployments

– By MWO Gravelle

Introduction

Armies are energy-hungry and rely heavily on fuel as a mission-critical commodity. There is a finite limit on fossil fuel and there are multiple obstacles to getting it to deployed forces. The energy needs of the military will keep increasing at a rate that cannot be sustained by the resources available to fill those requirements. It can be seen from the policies governing the Canadian Armed Forces (CAF) that there is a push towards reliable, affordable, and flexible power sources. This need is even more prominent in deployed situations where access to fuel can be compromised and unreliable.

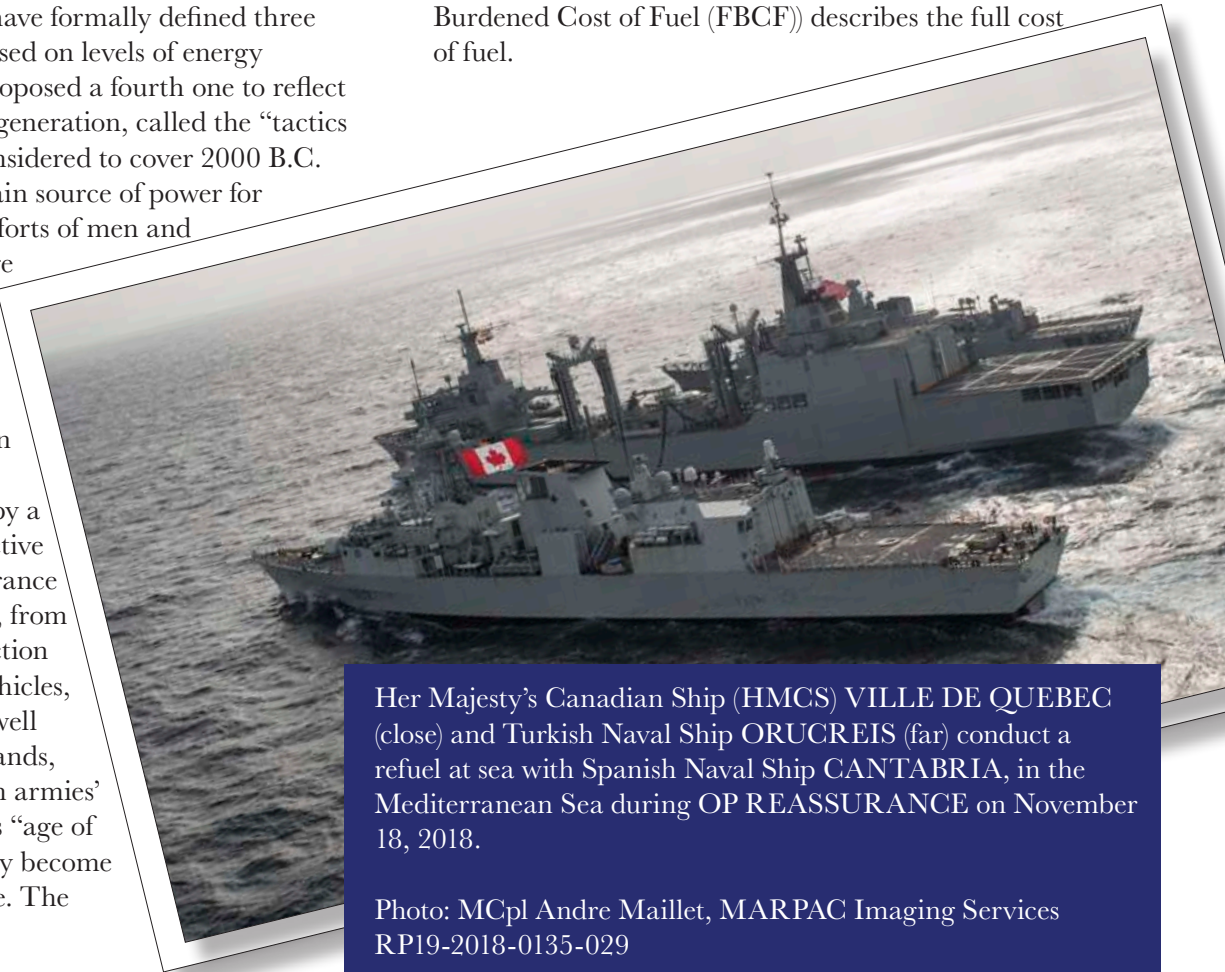
Historical Background

Military forces have always relied on energy to accomplish their mission. Historians have formally defined three generations of warfare, based on levels of energy consumption, and have proposed a fourth one to reflect modern times.²⁰ The first generation, called the “tactics of line and column,” is considered to cover 2000 B.C. to 1500 AD, where the main source of power for armies was the physical efforts of men and animals. Next was the “age of the machines,” from 1500 to 1830, where emergent technologies for lines of communication and increased mobilization demanded more energy. This era is characterized by a shift towards mass destructive power and the first appearance of artillery. Following this, from 1830 to 1945, the introduction of wheeled and tracked vehicles, railways, and aircraft, as well as increased logistics demands, created a sharp increase in armies’ energy requirements. This “age of systems” saw energy supply become a critical sustainment issue. The

suggested term for the fourth generation of warfare is “the age of automation,” due to the pervasiveness of network structures for the passage of information. Elaborate technology, added to the constantly evolving machines of war, creates a relentlessly increasing need for large amounts of energy. It has been calculated that the current systems of vehicles, aircraft, ships, bases, weapons, and equipment now require “at least one order of magnitude more energy than during World War 2”.¹¹

The Problems

The current method of fuel cost calculation is based solely on the commodity price. However, there are many other factors that contribute to fuel costs. The Fully Burdened Cost of Energy (FBCE) (sometimes also called the Fully Burdened Cost of Fuel (FBCF)) describes the full cost of fuel.



Her Majesty’s Canadian Ship (HMCS) VILLE DE QUEBEC (close) and Turkish Naval Ship ORUCREIS (far) conduct a refuel at sea with Spanish Naval Ship CANTABRIA, in the Mediterranean Sea during OP REASSURANCE on November 18, 2018.

Photo: MCpl Andre Maillet, MARPAC Imaging Services
RP19-2018-0135-029

The FBCE consists of a method to calculate the real cost of fuel being delivered on deployments by including the following metrics:

1. The purchase price of the fuel,
2. The cost of the logistics required to deliver it to the desired location (including all methods of transport),
3. The expenses related to force protection accompanying the fuel convoy, and
4. The infrastructure required to store and handle fuel along the way.

Since it is extremely hard to quantify exactly how much the CAF spends on which type of fuel and for what purpose, a look at other nations can assist. Some American estimates from 2006 amended the purchase cost of fuel used in theatre from \$1.25-3.00/L to \$25-75/L once handling, shipping, and trucking were included¹². The most staggering price estimate provided by the Americans was \$100/L to deliver fuel to deployed troops in Afghanistan in 2001.²¹ It was calculated by imagining a scenario where troops were 600 km in front of the Forward Edge of Battle Area (FEBA) and were being resupplied by air via Chinook helicopter. If resupplied by road, the cost for these troops would have been \$7.50/L, whereas by Chinook, it was estimated at \$100/L. This does not take into account the cost to get the fuel into theatre in the first place, which was roughly appraised at \$3.25/L. Therefore, the full cost of getting fuel to troops 600 km away from a main supply point in a land-locked, air resupply scenario could be from \$10.75/L to above \$100/L.

The Centre for Operational Research and Analysis (CORA) at DRDC calculated that “the fuel burdened price at different FOBs [Forward Operating Bases] in Kandahar would vary from 120% to 320% of the fuel commodity price and is dominated by the delivery escort price”¹⁰.

The same paper estimates that the cost of refueling Canadian forward operating bases (FOB) between 2009 and 2010 from Kandahar Airfield (KAF) was \$1.59-4.91/L when performing a full accounting for the cost of fuel. When using these figures, weekly costs ranged from \$19,800 to over \$45,000 in additional expense above the cost of the commodity.

Another problem is the sheer amount of logistical effort

dedicated to the acquisition, movement, and transfer of fuel from origin to user. The offshoot of this shortcoming is that more soldiers are employed in logistics than in the fighting force, which causes more demands for logistical support. The British Army, for example, has deduced that it took up to seven gallons of diesel fuel to deliver just one gallon to a FOB in Afghanistan.¹⁹ Additionally, because they are tempting targets for interference and move slowly, logistics convoys often require force protection, further reducing the number of available fighting soldiers. By incorporating renewable energy in CAF power generation options, less fuel would be needed to power the deployed camps, which would translate into fewer convoys, thus greater combat efficiency.^{10, 14, 3}

Air resupply is costly in logistics consumption. Instances of fuel delivery from KAF via Chinook resulted in the helicopter requiring refuelling five times over the round trip of 600km.²¹ Further complicating movement is the fuel delivery requirement to get fuel into non-permissive environments and across borders. When the Pakistan-Afghanistan border closed in 2011, the additional transportation costs were estimated at \$100M/month.

There also exists a human cost in logistical endeavours. Although Canada does not have sufficient data to capture that figure, the US military does. Eady et al⁶ note that in 2007, 38 personnel were killed as a direct result of participating in American fuel resupply operations - this constituted 50% of logistics casualties that year². They also note that hundreds of casualties in both Iraq and Afghanistan were directly attributable to resupply operations.

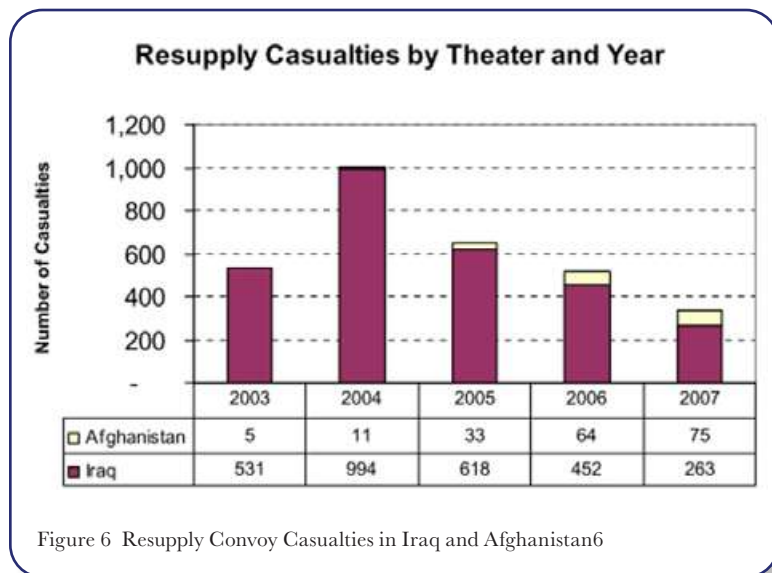


Figure 6 Resupply Convoy Casualties in Iraq and Afghanistan⁶

Even though not all operations are as dangerous as the wars in the Middle East, the fact remains that the demand for fuel comes with financial, resource, and human costs. Seeking other methods of energy production or energy savings can help reduce these costs and place fighting power where it is best employed.

Military Initiatives

Our military allies are vastly more advanced than the CAF in terms of incorporating renewable energy power generation systems into their operations. There are numerous examples of static military locations powered by renewable sources, for example in the United States⁴, in Cyprus,²² in Israel¹⁸ and in Afghanistan.^{18, 14} In 2012, NATO created the Energy Security Centre of Excellence (ENSEC COE) which specifically “seek[s] to prevent or mitigate emergent military threats and challenges, which result from the global scarcity of energy resources and the complexity of the international energy system”¹. With the stand-up of the ENSEC COE, NATO sends a clear message that the energy supply issues that could affect military forces are taken seriously and that all partner nations must strive towards increasing the energy efficiency of their military forces.¹⁶ Also, other military organizations are evidently interested in exploring the feasibility of renewable energy.¹⁷

Recently the CAF has begun its own foray into the universe of renewable energy sources for deployments. The first initiative was a joint exercise in 2011 with Great Britain which resulted in the concept of the PowerFOB. This was a “demonstration [...] to show that low power technologies, renewable energy generation and intelligent power management could deliver significant fuel savings in operational bases.”²² The aims of the project were to investigate the benefits of intelligent power management on FOBs, to examine potential low power accommodations, and to incorporate micro-power solutions. One of the main efforts was directed at integrating renewable energy with the fuel generators currently in use in deployed locations in an attempt to reduce fuel consumption by up to 50%. Both solar and wind power were used. The results of the trial were very promising and spurred British industry to keep developing products to assist in achieving that goal.

A specifically CAF renewable energy incentive has been developed by keen soldiers from 35 Canadian Brigade Group (CBG).⁷ Combining two wind turbines with modular, flexible photovoltaic (PV) solar panels, they have created a portable, rugged, and self-sufficient power generation system sufficient to power their G6 (Communications) cell CP. This system has been deployed several times to the Arctic in support of various Arctic Response Company Group (ARCG) exercises. This is the first example of military incorporation of renewable energy in a deployment and it seems promising so far. This development is a successful step in the right direction for future CAF exploration into renewable energy. If the system functioned well enough in the Arctic, it is assumed that it should perform even better in more temperate climates.

Hypothesis

This research project narrowed its focus to PV power and its ability to sustain military operations. The project was conducted using the hypothesis that deploying PV power generation systems to power Command Posts (CP) at the sub-unit level will be worthwhile enough that the adoption of such systems for most CAF deployments will be the recommended option.

The Project

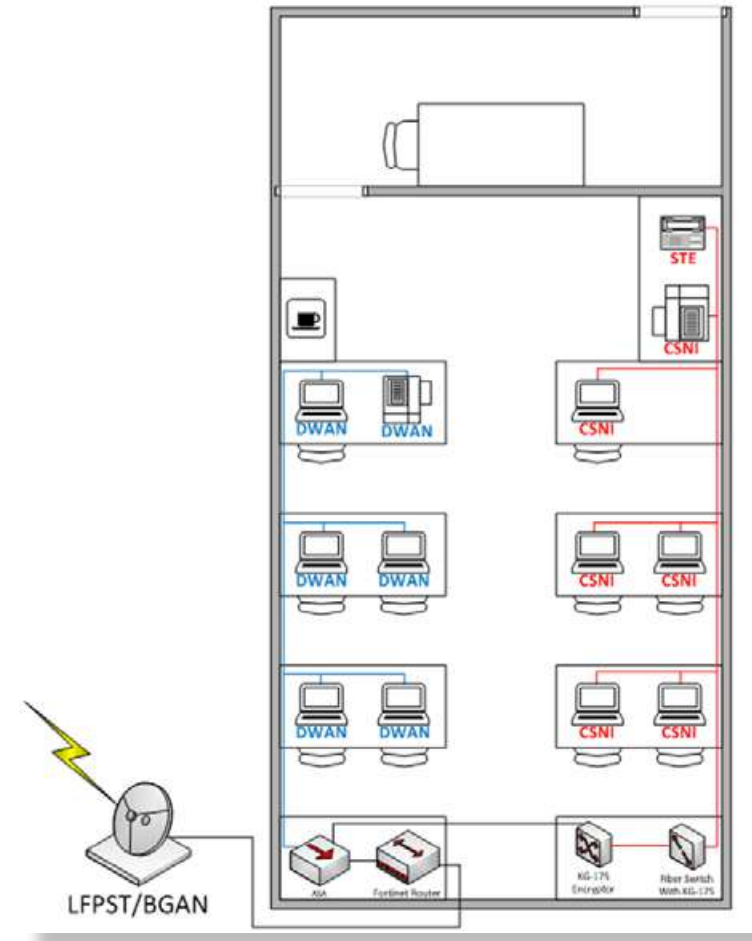
After an extensive literature review, four realistic deployment scenarios were identified and run through a micro grid renewable energy modeling software program to determine the specific feasibility and potential benefits of incorporating PV.

These scenarios include Middle East, South American, Eastern Europe, and Arctic examples. Although missions may vary, a common command post (CP) layout and standard equipment was used to determine the electrical consumption of the CP. The fictional CP was based on the Disaster Assistance Response Team (DART) CP construct found at 1st Canadian Division in Kingston, Ontario. The following figure highlights the items that would draw power in this generic CP.

Component	Quantity
Fortinet Router	1
ASA Router w/ Fortinet	1
STE Secure Terminal Equipment	1
DWAN Laptop	5
DWAN Printer	1
CSNI Laptop	5
CSNI Printer	1
Taclane Encryptor	2
Switch	1
BGAN Satellite Network	2
APC Uninterruptible Power Supply	2
Step Down Converter	1
LFPST Satellite Terminal	1
MBITR Base Station	1
MBITR Charging Station	1
PRC 522 Radio	2
PRC 117 Radio	2
Honeywell Fan	2
Coffee maker	1
LED Lighting	8

Table 1 Components of Fictional CP

Figure 1 Schematic of Fictional CP



Component	Quantity	Max Amps (ea)	Max Watts (ea)	Total Amps	Total Watts
Fortinet Router	1	1.5	180	1.5	180
ASA Router w/ Fortinet	1	1.8	216	1.8	216
STE Secure Terminal Equipment	1	0.167	20	0.167	20
DWAN Laptop	5	1.5	180	7.5	900
DWAN Printer	1	3	360	3	360
CSNI Laptop	5	1.5	180	7.5	900
CSNI Printer	1	6.5	780	6.5	780
Taclane Encryptor	2	0.85	102	1.7	204
Switch	1	3	360	3	360
BGAN Satellite Network	2	1.5	180	3	360
APC Uninterruptible Power Supply	2	12	1440	24	2880
Step Down Converter	1	3	360	3	360
LFPST Satellite Terminal	1	8.88	1065.6	8.88	1065.6
MBITR Base Station	1	0.167	20	0.167	20
MBITR Charging Station	1	4.167	500	4.167	500
PRC 522 Radio	2	0.5	60	1	120
PRC 117 Radio	2	0.5	60	1	120
Honeywell Fan	2	0.6	72	1.2	144
Coffee maker	1	7.5	900	7.5	900
LED Lighting	8	1.4	168	11.2	1344
Cooling or Heating appliance	2	15	1800	30	3600

Table 2 Power Needs of Fictional CP per Component

In actual situations, CPs would be temperature-controlled by air conditioners or heaters powered by the same generator that provides the electricity for all other components. In all cases, these appliances are the greatest single drain on energy. Because there is an infinite variety of heaters and air conditioners that could be used in any of the scenarios, their power consumption was assumed to be 3.6 kW.

The power draw of each component listed above was calculated by using the numbers given in their specification sheets. The sum represents the maximum power consumption of this CP, which is 15.4 kW. This amount represents the total power draw if all items are functioning at their maximum rate at the same time. If power consumption was monitored continuously, daily average power draw is 369.6 kWh per day (kWh/d).

Each scenario was passed through micro grid renewable energy modeling software called the Hybrid Optimization of Multiple Energy Resources, or HOMER for short. One simulation in HOMER covers an entire year of functioning of a micro grid. It examines thousands of possible combinations of system types applicable to the scenario. This then enabled changes in loads to be calculated as power in a CP can vary by up to 50% depending on the level of activity.

Results

In all optimal solutions determined by HOMER, the ideal power generation system consisted of a combination of generator, solar panels, and batteries. Consistently, across all the variables chosen for this project, including all scenarios, varying power loads, and fuel prices, the chosen setup included those three components. A separate sensitivity analysis was conducted on each scenario to determine what extremes would provoke a shift to either only PV or only a generator as the ideal power system. In each scenario the cost of fuel is based on the full cost, not just the commodity price.

The Middle East scenario, at very low assured delivery prices (ADPs) and power draws around 100%, the best power system is just a generator. At the other end of the spectrum, an only PV solution becomes ideal at prices above \$49.60/L if the energy draw is 100%

For the DART scenario in South America, the PV only solution starts to be viable when fuel is \$59.20/L and the power demand is only 184.8 kW/d, steadily becoming an

even better option for power demands up to 100% load for all assured delivery prices above \$84.41/L.

In the Eastern European scenario, there is no ADP high enough to justify a PV-only situation, because there is not enough sunlight in the winter to rely on solar as a sole source of energy.

Finally, in the Arctic, there is no ADP that will justify a complete reliance on PV in this situation, even at \$9,000/L, because there is no light for over two months per year. Therefore, there will always be a need for a generator to be deployed during the sunless months to ensure a constant power supply for the CP.

To put the results in illustrative terms, the theoretical area covered by the solar panels and the weight of the batteries was computed for each solution. This serves to give an idea of the footprint and logistical burden that components currently on the market represent, if PV were to be purchased and incorporated into deployments in the near future. The size of solar panels needed to provide one kW of power is directly related to the efficiency of the cells. One estimate determines the area needed to provide 1 kWh per day at 2 m² 15 which means that 48m² are required to provide 1 kWh per hour, for each hour of the day. Another estimate is that 20m² are necessary to provide a steady 350W throughout the day, or 57m² for 1 kW⁹. In the analysis of the results, the smaller footprint was used in order to give a general indication of the area necessary to set up a PV system. The weight of the batteries also had a great range with lower weights of just a few kilograms for small power consumption to double and triple digit weights for larger energy draws.

An overview of different renewable energy technologies determined that PV solar power is the only reasonable option that can be incorporated in deployed situations from a general perspective. The advantages of solar are:

- once built, a PV system is completely non-polluting;
- at the end of its life, most of the components can be recycled;
- the system has no moving parts, which translates into minimal maintenance and silent operation;
- it can be combined with other power generation systems as a backup to increase energy reliability;
- the system is rugged and modular; and
- the fuel for the system is free and abundant.

On the other hand, the disadvantages of solar power in a deployed setting are:

- it will never be sufficient to power a fully operational FOB, let alone the vehicle fleet that would accompany troops on a deployment;
- since the system is ultimately weather-dependent, there must be a backup to cover extensive overcast periods;
- the excess energy collected during the day must be stored for use at night when the sun is not shining;
- the panels must be kept clean at all times to maximize incoming energy; and
- the physical dimensions of the system components dictated by current technology are massive.

Conclusion

In summation, the results obtained from the simulations yield great information about the feasibility of incorporating PV in deployed power generation systems. The amount of power that can be obtained from solar sources clearly dictates that this energy system should be investigated further by the CAF in order to save money, lighten the burden on the sustainment system, and minimize casualties by reducing the military's complete dependence on fossil fuel. The benefits that can be gained by harnessing the power of the sun are even more evident when the assured delivery price is used as a true and accurate fuel cost.

On the other hand, the consideration of the real life implications of including the components of the system, such as their physical dimensions, raise important cautionary flags about the immaturity of the technology for temporary installations. Some of the NPCs for different system configurations, based on size of solar panels and number of batteries, were artificially high and could serve to discourage policy makers, unless they are made aware that the numbers have no bearing on real life economics.

Overall, the results of the simulations plainly point to potential advantages that could be garnered by incorporating PV in some locations at certain times of the year. HOMER could be used as a tool to help decide when, where, and at what ADP the solar panels could be used advantageously.

Today's reality is that energy in the form of fossil fuels might not always be available in economical, large quantities. The policies regulating the CAF's functioning increasingly require a shift to reliable, affordable, and flexible power sources. The current sole dependence on fossil fuel actually costs more than a blended solution in many cases. The expenses include metrics that are hard to quantify, such as an increased logistic tail, reduced security, or increased risk of casualties for soldiers.

The energy needs of the military will keep increasing at a rate that cannot be sustained by the resources available to fill those requirements - at least not by considering current energy sources and supply methods. The full scope of this project will serve as a starting point for policy-makers and doctrine-writers to consider incorporating renewable energy into the way the CAF conducts business on deployments.

ACRONYMS

ADP	Assured Delivery Price
BGAN	Broadband Global Area Network
CAF	Canadian Armed Forces
CBG	Canadian Brigade Group
CP	Command Post
CSNI	Consolidated Secret Network Infrastructure
DART	Disaster Assistance Response Team
DND	Department of National Defence
DRDC	Defence Research and Development
Canada	
DWAN	Defence Wide Area Network
ENSEC COE	Energy Security Centre of Excellence
FBCE	Fully Burdened Cost of Energy
FOB	Forward Operating Base
FSE	Future Security Environment
HLVW	Heavy Logistic Vehicle Wheeled
KAF	Kandahar Airfield
kg	Kilogram
kW	Kilowatt
kWh	Kilowatt for one hour
kWh/d	Kilowatt for one hour per day
kWh/m ²	Kilowatt hour per meter square
L	Litre
LFPST	Land Force Portable Satcom Terminal
NATO	North Atlantic Treaty Organization
NPC	Net Present Cost
PV	Photovoltaic

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Notes

¹ HOMER was created by the National Renewable Energy Laboratory (NREL), a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy and is used by NASA. It obtains solar data for each location on Earth from NASA's Surface meteorology and Solar Energy (SSE) Data and Information database. It has been used to simulate projects ranging from minimizing fuel consumption on a FOB in Afghanistan¹⁹ to supplementing the power grid for several Arctic communities¹⁹.

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Company Sergeant Major

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The paper is a condensed version of the same named originally prepared for the Technical Staff Program.



Using Design Thinking to Solve Logistics Challenges

– By LCol Gord Bennett

Introduction

Design thinking is now at the forefront of innovation developments at a handful of firms and is rapidly becoming a critical component of innovation at many organizations. Heather Fraser of the Rotman School of Business has stated:

It has become evident that organizations can no longer count on quality, performance or price alone to sustain leadership in the global marketplace. Design has clearly emerged as a new competitive weapon and key driver of innovation.²

Could this also be the case with military operations? Could design thinking be a window to improved innovation and a particularly useful weapon to enable smaller militaries to punch above their weight?

This paper will focus on the application of design thinking in logistics and argue that design thinking should become a critical component of logistics training, problem solving, outcomes, and sustainment operations in conjunction with or separate from existing planning tools such as the Operational Planning Process.

What is Design Thinking?

To apply design thinking, one must first understand what it is. Design thinking can be defined as:

An iterative methodology tackling complex situations that identifies problems, clarifies the environment, and captures insights through the use of diverse, multidisciplinary perspectives. The result is innovative solutions.

There are many other definitions of design thinking, but this definition sums up the process as a whole. In short, it means individuals and teams look at problems from multiple perspectives and then draw on a wide breadth of expertise and experiences to create feasible, desirable, and viable solutions.

The world's premier design firm, IDEO, has spent decades refining its design processes and the results speak for themselves in terms of the number of successful consumer products, sustainment redesigns, and process changes.

Their design work encompasses everyday consumer products and specialist projects, such as military feeding.

Their tenets include: Failing early and often, embracing ambiguity, being flexible, and generating perspectives founded in diversity. These aspects of design differ from traditional problem solving techniques and analytics used by today's militaries.

Why Design Thinking?

Military planning is normally predicated on the Operational Planning Process or OPP, which is the default problem solving tool for the CAF. However, there are many times when OPP does not necessarily work. Examples include: Support to northern operations, policy development for moves and postings, cost savings in routine or operational sustainment, environmental initiatives, mission and mission statement creation at the strategic level, supply chain management, procurement, contracting, construction, or even less complex issues such as parking at a place of duty. It is in this realm that design thinking can benefit the CAF and, in particular, its logistics operations.

Design thinking brings with it a unique ability to look at problems and alternate ways of solving them. It seeks to see how people view the world in both word and action by taking reasoned steps, seeking outliers, and observing conditions to arrive at a problem. It then generates small wins and incremental, evolutionary, or revolutionary solutions through experimentation and prototyping. The minor course corrections during the iterative process of design avoids catastrophic failures later while reducing risk. To paraphrase famed architect Frank Lloyd Wright "you can use an eraser on the drafting table or a sledgehammer on the construction site".⁵

Design thinking can generate improved performance, decreased costs, or improved service quality. Using the example of cutting edges on heavy equipment, these sacrificial pieces of steel or carbide can cost a subunit \$150,000 annually. Typically, these costs are simply budgeted for and the blades purchased. However, using design thinking, the root cause of the wear and tear

can be discovered and measures taken to change the conditions surrounding their use. Technical Services Branch Gagetown did exactly this in 2016 and discovered the root causes for premature wear which then led to actions to reduce this expense.

Design thinking reduces risk. The first way it does this is by observation and what some designers call empathy. Designers place themselves in the shoes of the end user, observe how the user responds to the situation, and then seek to develop solutions to encompass the factors discovered through a problem discovery process. Examples in logistics include: Observing how first line troops move and store food and water, observing how industry supports its logistics operations, noting frustrations from participants in the supply chain, and seeing how suppliers manage risk associated with military contracting. Procurement challenges involving clothing shortages in the government procurement system could readily be solved using design thinking as it would clarify problem areas, identify risks associated with manufacturing, determine the effectiveness of contract call ups vice automated replenishment, and compare industry best practices in procurement with government processes.

The second way design thinking reduces risk is through frequent iterations, experimentation, and prototyping. Observations of users using software prototypes with an eye to determining user friendliness and frustrations voiced or surveyed regarding relocation software and services are examples of when iterations and prototypes, as part of the design process, would head off highly expensive problems, frustrations, and failures. Testing and prototyping on a small scale with incremental improvements to systems or items results in a series of small failures, but an overall much better outcome compared to arriving at a product or service that is almost fully developed only to then identify problems. An example in logistics was the development of biodiesel at 5 Canadian Divisional Support Group (CDSG) in 2015-16. For a relatively small investment with experts in academia and co-operative education students, personnel at 5 CDSG were able to produce biodiesel on a budget of less than \$20,000 for equipment and materials.

Military training is often predicated on the ‘training as you fight’ mantra. This is important and necessary. However, it fails to take into consideration opportunities

to experiment with improved techniques and processes. One exception to this was 1 Service Battalion following Op ATHENA Roto 2. Following the rotation, the battalion staff built tabletop models to review lessons learned and experiment with solutions to a variety of problems they had encountered during their rotation. Much of what they developed became the foundational doctrine for convoy operations. None of this would have happened without experimentation, which is at the heart of design. Few are the opportunities, before deploying, to experiment with new ideas in an effort to improve processes and reduce risk during missions. Yet design teaches that the greatest success in innovation comes through iterative experimentation and the results create impressive, viable results that can reduce risk.

Members of the J4 Branch at 1 Canadian Division realized there was a problem with Supply Location (SLoc) accounting. In an effort to improve its stocktaking results, it embarked on an iterative design cycle in conjunction with Training Development Support from the Canadian Defense Academy. This ongoing project started small and is presently working through multiple iterations of incremental improvements to help create an education tool that will help SLoc holders and stocktakers learn and apply their roles and responsibilities. This is a micro form of iterative design in action that will improve supply accountability while reducing financial and operational risk.

Design consultants Colin Raney and Ryan Jacoby note that designers do not boil down ideas to one decision late in a problem solving process.⁴ Rather, design thinkers learn as they go by making a series of little decisions and course correcting as needed. Each little decision may be prompted by responses from a prototype, wargame, observation, user comment, or qualitative evidence.

Mastering a musical instrument, a new skill, or a sport comes with many failures. Even mastering walking as a child or relearning to walk following an accident sees

many failures and many attempts. Learning comes from these opportunities. Experimentation and failing early and failing fast are not normally part of logistics or military training, yet they could be part of an even greater training opportunity—if enabled.

Design Thinking and Operational Planning

Design thinking can be used independently, concurrently, or sequentially with operational planning. OPP is typically initiated by either a higher commander’s orders or through identification of a concern in the intelligence picture. Design thinking is initiated when the problem space is not well understood, stakeholder needs are not known, where little direction is provided on a way ahead, or when designing a mission statement in the absence of orders or direction.

The following figure, drawn from *The Practical Design Thinker’s Manual*,¹ shows how OPP and design can work together or apart. Design seeks to understand the problem and the environment and then use creative idea generation methods to arrive at a solution. A solution is generated that is feasible, desirable, and viable. If used in conjunction with OPP, design can be used to create a plan, clarify an end state, and list the intent. Or, the design thinking solutions do not need to be put into an OPP cycle and can be developed and executed independently. Overlap occurs where there is room for concurrence.

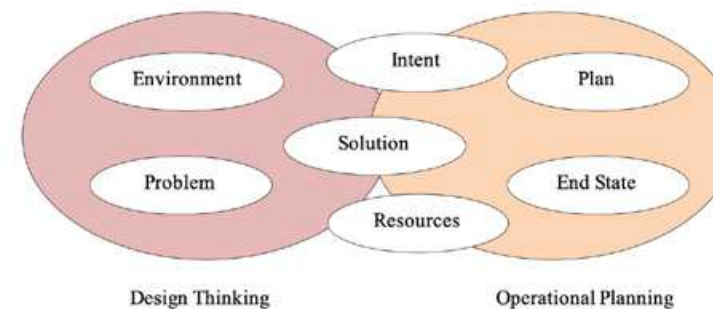


Figure 1. Design Thinking and operational planning working together or apart

OPP can benefit from the problem identification assistance of design thinking or it can be performed independently using a mission analysis that is based on the higher commander identifying a problem, mission, intent, and end state. Mission analysis then leads to a plan, synchronized resources, intent, and an end state. Design thinking places more emphasis on problem identification than OPP, while OPP draws from existing problem identification already performed by the higher commander.

OPP and design thinking bring different points of view on constraints, outliers, diversity in teams, and the timing of solution generation. Constraints are limited early in the design process in order to open up the door for a strong flow of ideas to solve the given problem. This differs from OPP and some academic research where constraints are listed up front and throughout the process. In design thinking, lofty ideas can be part of solutions and vetted towards the end of the process or used as stepping stones to new, feasible, and viable solutions. Although there may be many non-viable solutions initially, the open flow of ideas in an unconstrained planning effort often leads to viable ideas later on that would not have otherwise been considered.

Outliers

Designers look favorably on outliers. Outliers from observation can help produce better outcomes for the median user since the outlier is the person that modifies, challenges, or otherwise does something differently than the norm in a given situation. Outliers provide a unique perspective. Examples of outliers in clothing procurement include observing tall men and short women to see how adaptable a clothing prototype works for each of these groups. The reverse could also be done for short men and tall women. Alternatively, observing soldiers in a variety of environments and allowing them to modify their uniforms will help determine how to better to build uniforms that work for more people rather than ‘the average man in the average place.’ OPP would be unsuited for clothing procurement since clothing is

user based and includes outliers vice intelligence or command driven orders.

Diversity

How many operational planning groups have a myriad of specialists that are external to DND? Design thinking strives to have a diverse mindset when it tackles problems. Multidisciplinary or diverse teams of designers work better than a room full of similar individuals or people with common viewpoints. IDEO, amongst other design firms, forms teams of engineers, anthropologists, artists, and many other professions to help create a better product or service. In logistics, formulating design teams of men, women, suppliers, engineers, anthropologists, behavioral psychologists, mathematicians, and elemental representation will produce better results in sustainment areas including clothing, movements, transportation modelling, software systems, warehousing, and training than a small group of ‘voluntold’ participants from the army only or people posted in to fill a hole. When IDEO, through a United States Navy subcontractor, was contracted to redesign naval feeding at shore and at sea, it employed a diverse team and sought out large catering organizations to help it understand the problem and best practices. One site IDEO visited was a large baseball stadium—something quite diverse in thinking compared to traditional military feeding. There was diversity in the team who had observations based not only on naval feeding, but from other diverse organizations from private industry.⁶

Options

Unlike OPP, a design mindset seeks a wide variety of options early in the process. OPP creates courses of action late in the process. The most common method of solution generation with design thinking is brainstorming ideas based on what is known about the problem space. An alternate method is to ask “What if” and then tie the response to a particular function. A recent example would be looking at clothing procurement and tackling the issues with uniform part shortages. Rather than drafting endless

documents, devising new statements of requirement, seeking new bidders, and holding endless meetings over the issue, simple “what if...” scenarios could be applied from a design perspective as an idea generation tool. If the perceived problem is with contractors not buying enough stock fabric, the question could be phrased: “What if DND owned the fabric?” If the problem is with the call up procedure: “What if DND employed a bar coded automatic ordering system over the internet?” If the problem is quality footwear: “What if soldiers were given an annual allotment to buy their own boots within a certain color parameter?” This last ‘what if’ scenario is actually in play now. The result will see firms that produce poor quality footwear go out of business or improve their products. Demand will be quality based, soldiers will have boots that fit their individual feet, lower stockage costs will be noted, and no requirement for endless project management and statements of requirements with the associated contracting problems will exist. The overall solution wins over the traditional method of footwear replacement.

Additional examples of “what if” questions may include “What if we were Walmart, how would clothing procurement change?” “What if suppliers had access to the Defence Resource Management Information System (DRMIS) to determine order quantities?” “What if mass customization tailoring from a tech start up were used?”

Not only would OPP not work well in these prior examples of procurement, but OPP seeks to generate ideas late in the progress and does so from a checklist perspective. There is no room to fail early and fail fast so innovative ideas are naturally not seen in favour of common courses of action—left flanking, right flanking, forward logistics group, airmobile assault, etc. How often have courses of action been lacking innovation, are canned from prior exercises, or are selected from a pick list of options? Would not the enemy be expecting checklist solutions as well? Exercise MILLENNIUM CHALLENGE 2002 observed just that.³ The quarter of a billion dollar exercise ground to a halt on the

second day because blue force solutions were checklist, predictable courses of action. OPP and an overreliance on data analytics failed to understand the problem space, produced overconfidence, and did not provide innovative solutions. The red force dominated.

Conclusion

There are a multitude of opportunities for design thinking to be applied to logistics. Procurement, support to northern operations, transportation modeling, equipment wear and tear, biofuels, materiel ordering, training, clothing design, vehicle remarketing, life extensions, and administration can all benefit from design thinking. If CAF members are experts at OPP, then there should be few problems in these areas, yet the extensive presence of problems in some of these areas either suggests an alternate solution tool is required or significant change needs to occur in the existing process.

Design thinking is the future direction DND needs to go in order to address complex, systemic, and lingering problems. The current toolbox is insufficient to address many of these problems. Design thinking brings a multitude of tools that differ from OPP in that options are generated earlier than current problems, teams are more diverse, outliers are consulted to bring alternate points of view, and experimentation is acceptable. The result will see reduced risk, an increase in innovative solutions, improved efficiency, and improved effectiveness in logistics—all factors tied to the principles of logistics. Whether design thinking is used concurrently, sequentially, or in replacement of operational planning, given a set of circumstances, the flexibility it brings with its inherent diversity needs to be part of the repertoire of Canadian logisticians.

List of Acronyms

CAF – Canadian Armed Forces
CDSG – Canadian Divisional Support Group
DND – Department of National Defence
DRMIS – Defence Resource Management Information System
OPP – Operational Planning Process
SLoc – Supply Location

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Disruptive Innovation

By Praefectus Annonae Staff



Disruptive innovation is a term coined by the late Clayton Christensen of the Harvard Business School. Since its introduction in 1995, many companies have been employing its methods - notables include Intel, Netflix, and Salesforce.com. This article will highlight what disruptive innovation is and discuss potential military applications.

Christensen defines disruptive as describing “a process whereby a smaller company with fewer resources is able to successfully challenge established, incumbent businesses.”¹ These companies do not challenge the incumbents head-on; rather, they seek methods to satisfy the requirements of peripheral customers who need a solution that is “good enough” until improvements can be made mainstream. Disruptions, according to Christensen, are not technological leaps forward; they simply transform a product or service that is accessible to the few to becoming affordable by and accessible to the many. The “good enough” perspective that creates market accessibility, often develops new buyers and markets, which drives improvements and profitability, further enabling smaller organizations to tackle incumbent giants and improve product quality. Affordability, mass market access, creation of a value network, and simplicity are often the

hallmarks of disruptive innovation.

From these perspectives, the established companies are often more than happy to divest themselves of low-profit customers. They often do not seek alternate markets for existing products. The mainframe computer, Christensen argues, was a primary example. It was complex and expensive. When upstart firms developed the personal computer, laptop, and smart phone and made them accessible to the masses, the mainframe manufacturers missed out on gaining a share of these exploding new markets. Each home became a potential customer instead of just large organizations.

Some of Christensen’s first observations of disruptive innovation involved the US steel industry. Upstarts, in the form of mini mills, employed new technology that improved rebar production by cutting production costs by 20%. One would have thought that the integrated steel mills would have rapidly adopted this new technology, but instead, they were happy to divest themselves of this price-sensitive market sector. The mini mills thus established a foothold from which to expand and improve their products. As they did, they were able to reinvest profits and continue to chip away at the lower end markets until

they were eventually strong enough to compete with the integrated steel mills based on lower cost production and equal quality. In this case, the technology was available to both the large and small firms, but its adoption was overlooked by the “big boys” enabling the newcomers to gain a meaningful market share.

Steel has not been the only industry to change as result of disruptive innovation. Hydraulic backhoes vice steam shovels, 5.25” floppy drives vice 14” floppy drives, and transistor radios compared to home radio consoles serve as additional examples.² In each of them, the initial product offering was not as good as the incumbent, but it was affordable and accessible. Backhoes with hydraulics had problems to iron out, small floppy drives cost more per unit of storage, and transistor radios were inferior to large tube radios. However, homeowners and small contractors needed backhoes as their only other alternative was expensive manpower. Steam shovels were unaffordable compared to a small backhoe, so the backhoe became the preferred solution. Small firms could not afford large computers, but the lower cost personal computers were affordable and acceptable as long as they had a disc drive that would work reliably. Transistor radios were low quality; but, for a teenager the choice was a transistor radio or nothing at all. In each of these cases, as the technology improved, so did profitability, firm growth, and competitiveness in the larger market. In the last case, a former non-customer segment (teenagers) developed into a whole new market with caused explosive growth in companies such as Sony.

The influence of technology was key to the success of the upstart firms; but there were other factors that should be considered, as technology advancements are not always required to generate disruptive innovation. Traditional firms sought higher margins in their sales by offering products with more features. Rebar had a 12% margin while structural steel’s was 18%. So, based on traditional business metrics, structural steel was the more profitable path to follow.

Larger firms chased the higher profits largely by ignoring improving technology, low margin markets, and peripheral customers. The higher profit opportunities were pursued by what Christensen called the “Church of Finance.” This church taught that shedding low-margin products would improve financial ratios - and it worked. However, the data analytics and traditional financial measures taught in business schools and employed in firms ignored the qualitative influence of technological improvements and the effects of new entrants. Venture

capitalists and hedge fund managers were equally guilty of being so focused on the numbers that they paid little, if any, attention to strategic issues. Both groups failed to see an overall strategy, had a myopic data-based perspective, and did not consider how to anticipate a low-end competitor’s moves.

Christensen uses the example of Toyota and the US car manufacturers. Toyota did not develop the Lexus first and then bring it to the US. They spent years in development while financing their firm with low end cars. Meanwhile US manufacturers pursued higher margin markets.³ Toyota won the low-end market, which they are now losing to the Korean car manufacturers who, in turn, are facing competition from the Chinese in the global arena.

Another consideration in disruptive innovation is the over-featured items incumbent firms often develop. For a driver in need of a commuter car, a vehicle that has flashier trim, a more powerful engine that consumes more fuel, or showcases other options, are examples of over-features the product. The commuter needs only four wheels that are cheap to operate and get the job done, as noted by Christensen. The “extras” are not required and do not bring incrementally more value to this low-end consumer.

The major turning point for disruptive innovation came when Intel CEO Andy Groves sensed there was a problem with the computer chip market. This notion did not come exclusively from data analytics, but rather experience, intuition, and an understanding of the market. Groves listened to Christensen’s explanation of the steel industry and became a believer. The result was the development of the Celeron processor for low cost personal computers. Intel captured a large share of the market within a year as a result of following Christensen’s line of thinking. The application of new technology to peripheral or underserved markets that does not draw the gaze of incumbent firms until it is too late is a form of disruptive innovation.

Another key element of disruptive innovation is ensuring that the value network (suppliers, partners, customers, distributors, etc.) are better off with the new solution than they were before. Low end car commuters found a better solution with Toyota than the more highly featured American-made cars. Teenagers were able to access the radio which drove other markets for products geared toward them. Steel mills provided lower cost steel enabling lower cost construction for builders and building owners.

Disruptive innovation, therefore is characterized by three elements: the application of new or existing technology, a drive to find new customers and adequately service marginalized customers, and the creation of a better, coherent value network.

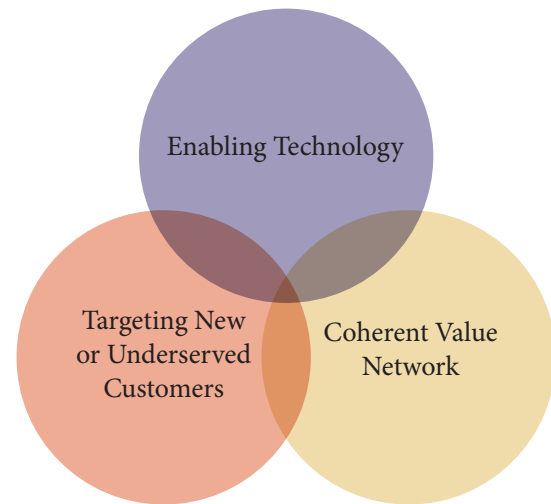


Figure 1. The Elements of Disruptive Innovation
Source: <https://www.christenseninstitute.org/disruptive-innovations/>

Confusion with Disruptive Innovation

Many pundits confuse disruptive innovation with technological advancement. This is akin to people confusing innovation with technology. There can be a relationship between them, but the two are not the same.

Christensen cites Uber as a firm that is innovative, but whose practices are not disruptive innovation. Uber is not necessarily creating new customers or satisfying low end consumers. It is replacing the poor service and high costs associated with taxis with an alternative. Those who use taxis simply switched to Ubers. Commuters still take the even lower cost public transit system. Uber is not replacing the subway system either, they're displacing taxis.

Disruptive innovation is not the same as disruptive technology. Disruptive technology may have a role to play, but the application of a new technology does not necessarily create disruptive innovation. Alibaba is an innovative firm that essentially copied eBay, but used the technology for business-to-business transactions instead of consumer-to-consumer. The internet technology they employ simply replaced phone calls, requests for quotes, faxes, and site visits. The technology increased the speed of transactions and information flows, but it did not necessarily service low-end buyers or create new customers. It facilitated the matching process and enabled companies to have greater exposure to the global market.

An industrial company needing a piece of equipment would have simply bought it regardless of the technology used to execute the purchase. It just opened the market for more overseas firms by providing a platform for them and sped up the exchange of information, while potentially lowering the industrial buyer's acquisition cost.

Is there a Military Lesson for Disruptive Innovation?

There are several applications of disruptive innovation that can be of value to military situations. The first is how to think differently about a given situation. How an innovation, technology, or invention can become more ubiquitously available to a wider population involves the creation of best practices and the development of doctrine. Innovation need not be physical. It could manifest itself as a new or better way of doing something—think intangible practices in human resources, education, planning, information, operations, and training. This is looking at the situation from a different viewpoint.

Such a perspective can be employed, for example, in recruiting and retention. Is the message we are sending through the means we employ reaching the right people? Are we creating new recruits out of people who never previously thought about joining the CAF? Are we offering a better value network than other employers while also communicating that value? Are there changes needed to recruiting and retention that help strengthen an individual's network?

For instance, if the perception is that a military member must leave the support of their ethnic enclave or family, are we not diminishing that value network while at the same not generating new customers? Thinking differently in this case may involve exercising DND's human resource management practices as part of the network. The innovation in this case is modernization of human resource methods, paired with an innovative model to recruit and retain members while reducing the weaknesses in the value network in our current system.

A member who elects not to be posted reduces the risk of loss of spousal employment, risks involved with children changing schools, the distraction in their job due to moving, and moving costs for the department. The risks and costs of home equity loss for both the Crown and the member are also reduced. Modernization of human resource techniques in recruiting and retention represent an excellent opportunity for disruptive thinking. Our current situation is not the same as during the 1990s and earlier when there was a plethora of low cost

military housing. The innovation for the CAF in this case is the change in how we see career management, career progression, human resource management, and the development of expertise. This method deviates significantly from the status quo, targets current non-customers, and strengthens the value network in terms of both the individual and his or her family, while creating an improved corporate memory. For those who wish to move, or may become convinced to do so, the rewards come with promotions and job variety, while posting planning becomes easier for the member and the institution for those that do not move.

In the throes of operational level planning, is it possible that the CAF is the incumbent and an enemy force is the new entrant? If we view the new entrant as someone who is able to win over peripheral allies or apply new or existing technology to beat CAF operations, is this not disruptive innovation? There are several examples that could support this concept – the first we will examine is the Vietnam War.

The communist leadership in North Vietnam knew it needed the support of the people. The perceived and real mistreatment by the colonial overlords of the Vietnamese created the conditions ripe for rebellion amongst the civilians—but not all of them were ready for war. General Giap knew that winning over the rest of the population would be needed (gaining new customers). The remote communities in Vietnam were underserved by the colonial powers, were frequently illiterate, and wanted a better life. Historical references to the legend of Phu Dong and others were easily incorporated into propaganda operations that could help create supporters.⁴ These conditions created an incubation opportunity for communism. Ho Chi Minh and Giap knew this. The Northern Vietnamese were serving the low-end and non-customers in this disruptive innovation. They knew that the incumbents, (the colonial powers, then the Americans, and the corrupt South Vietnamese government), were not serving these people as well as they should have been.

Giap continually communicated to his troops that they must respect the villagers. This meant not stealing their food, abusing them, or destroying their property. His information campaigns were his “technology”. These campaigns included literacy programs, which used communist propaganda, and support to communities. The value network was based on the concept that everyone would benefit and rid the country of invaders, thus paving the way for unification and stability. Notably, Giap always stated in interviews that it was a People's War, or words

to that effect.⁵ This is a form of creating perceived value in the network. Ho Chi Minh, Giap, and the leadership of the North Vietnamese usurped the incumbents following the same principles of mini steel mills seizing the power of the large mills. Technology in this case was simple propaganda operations, including the use of radios, personal instruction, rapid rebuilding of damaged infrastructure using basic techniques, reinforcing ideals, and other methods that showed results.

The second example is that of terrorists and their recruiting efforts. Their technology is the internet and propaganda campaigns disseminated via that medium. People from around the world have fled to places like Iraq, including many terrorist brides, radicalized by ideas disseminated via social media and other platforms. They are the new customers. These people are being told that they can be served in a way they are not presently, due to the restrictive nature of their traditional cultures. Whether this is perception or in fact real is debatable, but the end result is the same. The terrorist organizations seek to satisfy a low-end market with something new by better employing existing communication technology and propaganda in an effort to usurp the power of the incumbents - an existing or newly formed government, a foreign government, or perceived leader or group. The questions: “why are these recruits drawn to the terrorist organizations” and “what perceived value do they see in joining that might fill a current void in their lives,” are areas to consider in how this market is satisfied. The situation is, of course, more complex than that. But, disruptive innovation is one lens through which to look at the problem.

Why was Desert Storm successful while the present war in Iraq right now is not as successful? There are many reasons, but disruptive innovation may be one way of examining the situation. Desert Storm was enabled by the technology at the time (e.g., cruise missiles, surveillance equipment, asset tracking for logistics, etc.). The Kuwaitis were not being better served by the Saddam Hussein regime. He did not create new customers or improve the lot of an underserved population; in fact, the reverse was true. His invasion did not create a value network where all parties were better off. Clearing Hussein out of Kuwait did.

However, with the war on terror in Iraq the tables were turned. Many in the Iraqi population were not underserved by Hussein (yes, some were, such as the Kurds). Therefore, there was insufficient critical mass to tip the scales in favour of the allies. However, Hussein's

former customers were now underserved and unemployed, which contradicts the tenets of disruptive innovation. The value network for most Iraqis was shattered. Those who had jobs, lost them. Those who owned businesses and homes had an increased risk of loss or actually lost them. The average Iraqi probably did not see the value in an invasion from an outsider, indicating that the value network was neither coherent nor present. Terrorist cells and former government splinter groups then attempted to undermine allied efforts with technology by satisfying low-end customers and creating customers out of former non-customers. This latter group are those who were ousted from their positions or lost revenue, and who would not have previously supported a terrorist group under Hussein. However, the terrorist groups were also unable to create an effective value-added network. Under these conditions, neither the allies, nor former Iraqi officials, nor terrorists were successful, as none of them was able to master the three elements of disruptive innovation.

Conclusion

Disruptive innovation is another means to examine problems. It seeks to employ existing or new technology to create better value, attract new customers, or target low margin customers in ways that are profitable to the organization. Doing so generates a return, goes unnoticed by the major providers and enables future growth. Industry is full of examples of disruptive innovation and there appear to be opportunities for it to be put to good use in the military, when applied with a critical eye.

Clayton Christensen: Innovator, Thinker, Professor

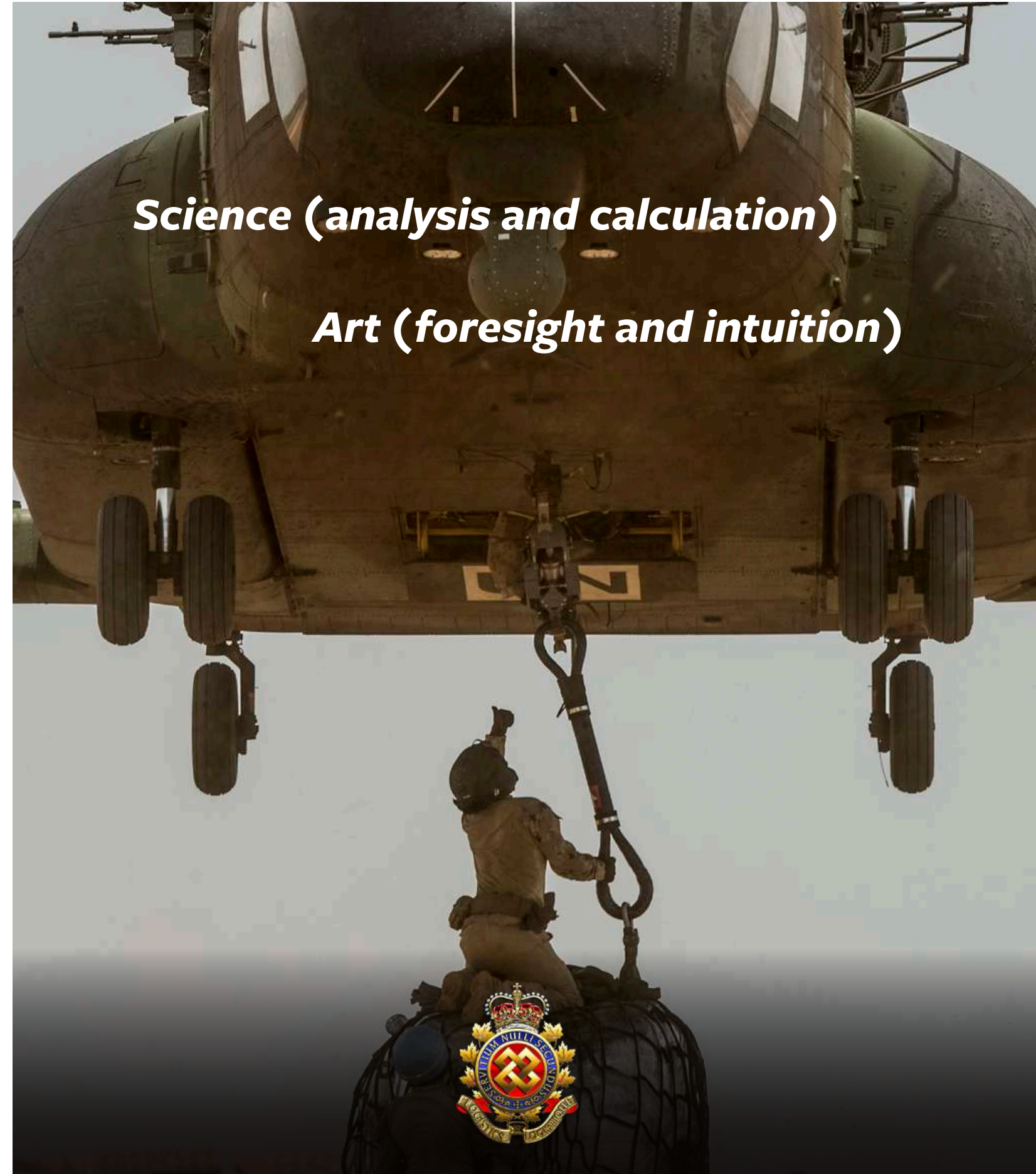
Clayton Christensen, the soft spoken creator of disruptive innovation, jobs to be done theory, and the innovator's dilemma passed away of cancer related complications on January 23, 2020. He was recognized as a top Harvard Professor and key advisor to Netflix and many other firms. His theories have been applied with success at Intel, Netflix, Xerox, Apple, Re-wired Group, Innosight, Salesforce.com, Southern New Hampshire University, and many other organizations. He was the founder of Rose Park Advisors, a firm that invests in companies based on his theories, and the Clayton Christensen Institute, a non-profit, nonpartisan think tank dedicated to innovation. After completing his bachelor's degrees at Brigham Young University, he was selected as a Rhodes Scholar at Oxford after which he completed his MBA and doctorate at Harvard. He was a professor at Harvard Business School from 1992-2020. He graced the cover of Forbes Magazine in 1999 with Intel CEO Andy Grove. Grove declared

Christensen's book *The Innovator's Dilemma: When new Technologies Cause Great Firms to Fail* as the most important book he had read in a decade.



Notes

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Science (analysis and calculation)

Art (foresight and intuition)

I'M A LOGISTICIAN!

Want to Avoid Paying Death Benefits to the Wrong People?

Here are the basics of death benefits you need to know!



By Prefectus Annone,
CFLTC, and CFB Borden SISIP staff

How would you like to pay an ex-spouse hundreds of thousands of dollars? How about an ex-ex-spouse? As ridiculous as that may seem it has been happening needlessly with some CAF members—in many more cases than anticipated. Some instances have occurred where families have not been the beneficiaries in a will, with death benefits, or insurance payouts. Meanwhile, other families have not received travel benefits when a member has died or is severely injured. All of these situations can be avoided with proper preparation. To properly prepare, an individual must consider four key documents: The will, the supplementary death benefit (SDB) form, the next of kin (NOK) form, and one's personal life insurance policy. These documents are not interchangeable, i.e. they do not change when one of the others is changed.

“These documents are not interchangeable, i.e. they do not change when one of the others is changed.”

A will is a written document that delineates what will happen with a person's estate after death. It is a legal document. The estate is the property a person owns or has an interest in and includes both assets and liabilities. A will can include wishes regarding what will happen to assets such as investments, savings accounts, vehicles, property, recreational properties, time share ownerships, jewellery, art, and other items of value. The estate takes all of these items into account. The beneficiaries of a will may not receive all that is promised in a will. According to Banks and Starkman, Toronto lawyers, probate fees are charged for the legal validation of a will and start at \$250 for the first \$50,000 in estate assets and \$15 for every

\$1000 above that. Probate, taxes, and other fees will vary from province to province. These fees are drawn from the estate before the distribution of assets.

Depending on the province, estate taxes or other government fees may also be required to be paid. Creditors of the deceased are then paid next. This includes paying off mortgages, lines of credit, credit cards, and so forth. Anything left then goes to the beneficiaries. Various financial planners and lawyers can aid in minimizing fees to ensure beneficiaries receive the maximum payout. Meanwhile, a will does not have to list a family relationship as the beneficiary. It can list a charity or any person. A will cannot give one's estate to a pet; it has to be a legal entity such as a person or charity.

The Supplementary Death Benefit (SDB) is a payment made to service members upon death. This amount varies based on salary and declines in value from age 61 and up. From age 61 it declines at a rate of 10% per year until the value is \$5,000 according to the National Association of Federal Retirees. The SDB form reviewed during the annual personal readiness verification (APRV as it is often called) outlines the beneficiary of this payout. If a beneficiary is listed, this payment does not go through the estate but directly to that person. The amount goes directly into the estate if no beneficiary is listed. The result can see a decrease in value due to taxation and/or fees if it is sent to the estate. The SDB does not need to have the same beneficiary as a will. The beneficiary does not need to be related to the deceased. The SDB applies to all regular force members whether in uniform or not. It does not apply to reservists that are not on active duty—meaning working in uniform at the time of their death. The SDB for serving members can be up to two years' salary so it can be a sizable sum.

The Next of Kin (NOK) form is important for others reasons. It does not provide a beneficiary with financial payouts, but does provide up to 14 people listed on the form with travel benefits in the event of the member's

death or serious injury. The NOK form listed individuals are generally dependents and people that may support those dependents. For instance, a member may list her spouse as a NOK member and the spouse's sister as well. There does not have to be a family relationship to be on the NOK form. The NOK form can have best friends, girl or boyfriends, or anyone else the member would like. The executor of a will is a consideration for inclusion on the NOK form.

Personal life insurance, most often offered by SISIP to military members, is a payout made in the event of death. This is different than long term disability insurance which is already a mandatory payment taken from one's monthly pay and noted as “SISIP” on the monthly pay statement.

Did you know...

There is often confusion on pay statements regarding what is a SISIP long term disability deduction and the life insurance deduction, which is optional. Life insurance pay deductions should appear as “Service Income Security Insurance Plan” on the pay statement. If this is not present, members should contact their SISIP representative to confirm their insurance validity and payments.

Personal insurance policies vary between providers. SISIP offers a war clause and a suicide clause which other providers may not offer. Insurance payouts are made tax free to a named beneficiary in the policy. Again, this person does not have to be the same person in a will or SDB. A NOK individual may or may not be listed as a beneficiary. The beneficiary can be more than one person or a charity. Insurance payouts are not part of the estate so are not taxable with the estate. If a named beneficiary is used, the funds are not subject to seizure by creditors of the deceased.

Leaving money to someone that is not a dependent with the expectation that this individual would look after a dependent is not a guarantee that the deceased member's wishes will be fulfilled. A beneficiary that receives a lump sum insurance payment of \$600,000, is not obligated to carry out the wishes of the deceased nor is the beneficiary obligated to tell the living dependent that they received a payout or how much the payout was that they received. Insurance money can be used for whatever the beneficiary wants to use it for.

A member can have more than one insurance policy with multiple providers. This will come with a cost and some insurance policies may have an order of payment

or maximum they are willing to insure for without significant substantiation. Most people only have one life insurance policy.

Key problems with death benefit documents are often seen. The first problem is that all the documents are not read during the annual personal readiness verification. An HRA clerk will only ask if the forms are good to go. If the member does not read them and signs off the APRV saying they are good, a member's family may receive a nasty surprise upon the death of the member. There have been multiple cases where members have not taken the APRV seriously only to find that an ex-spouse or even ex-ex-spouse is the recipient of their SDB payout, which can be in the hundreds of thousands of dollars. In other cases, the next of kin records were not updated and the surviving parents or dependents were not provided a travel benefit to attend a deceased member's funeral. This was still happening at the end of 2019.

Insurance policies need to be reviewed regularly, at least annually, to confirm that the beneficiary or beneficiaries listed is or are still accurate and to confirm that coverage is sufficient. A Private with no mortgage and no dependents needs significantly less insurance than a married individual with small children at home, a spouse that does not work, a disabled dependent, and a mortgage.

There is no requirement that the same person or charity be listed on each of these documents. A single person may bequeath their estate to a local animal shelter, have 14 family members and friends on their NOK form, give their SDB to a sibling, and give their life insurance policy proceeds to a parent to cover off additional funeral expenses. Alternatively, and more common, is where the same beneficiary is found on each of the documents, with the NOK form providing additional individuals that will not receive a monetary payment.

In conclusion, it is imperative that members understand their obligations and responsibilities when it comes to wills, supplementary death benefits, next of kin forms, and

life insurance products. It helps to look at these during the annual personal readiness verification process and also discuss financial needs, goals, and risks with a finance professional. SISIP is here to provide members with this information as are industry experts in most communities. Don't shock or impoverish your family by not conducting proper death benefit administration!

The following scenarios are based on real life events. They can be used for unit training or professional development individually or in groups. They are for illustrative purposes only and are not intended to provide financial advice. For detailed financial advice, consult a financial professional. See if you can determine the concerns and risks in each of these scenarios.

Did you know...

Surviving spouses are shocked (devastated) when they find out there was no extra life (SISIP) insurance and/or that as a reservist there was no SDB. Reservists do not have an SDB benefit unless they are acting in uniform. It is recommended that all members have a life insurance policy with a war clause and suicide clause.

SCENARIO 1A

Private Ahuja joined the Canadian Armed Forces regular force at age 22 as a Supply Technician after finishing a two-year diploma program in Surrey, British Columbia. He is currently posted to 4 Wing Cold Lake and lives in a small apartment he rents for \$1200/month plus natural gas and electricity. He has \$10,000 in student loans, car payments of \$400/month for the next 36 months, and no dependents. His three siblings still live in Surrey and are in their late twenties and early thirties. He wrote a will while

in basic training naming his parents as beneficiaries of his estate. What should Pte Ahuja do regarding a will, SDB, NOK, and life insurance?

SISIP Response: Private Ahuja should consider who should receive his SDB as there is no indication he has completed this form. The Human Resource Administrators in the orderly room can help him. Since he has several siblings and living parents, he should consider naming them in his NOK form if he wishes that they attend his funeral or bedside in the case of serious injury. He does not have any dependents but considering he still has student debt; it is unlikely he has many assets. In this case, his estate may or may not have sufficient monies to repay the student loans and his utility bills let alone his funeral costs if they exceed the mandated military cap. If he feels that his funeral will cost more than the funeral

benefit from the CAF, he may want to consider sufficient life insurance to cover these costs. Alternatively, the beneficiary of his SDB could pay those expenses, but there is no obligation for them to do so unless they are the ones contracting the funeral services. His creditors (the utility companies, automobile financing firm, and student loan holder) have priority for payment of his estate proceeds before his beneficiaries. They cannot take the SDB or life insurance policy proceeds unless these amounts are put into the estate.

SCENARIO 1B

Private Ahuja is now Master Corporal Ahuja, age 30. Last year he found the love of his life and got married. His wife has just given birth to their first child and he is anticipating an upcoming deployment. They have a mortgage of \$200,000. His wife is not working and plans to stay at home with the baby and future children until they are at least in high school. What actions should be considered regarding his benefits?

SISIP Response: Master Corporal Ahuja may consider changing his will by replacing his parents as beneficiaries with his wife as the new beneficiary. His wife could also be listed as the SDB beneficiary. He could add his wife as his insurance policy beneficiary or have those funds placed in trust for his child. He is not obligated to leave anything to his wife and child, although this may be contested in court as it would be highly unusual. He could list his wife and child as beneficiaries for one benefit and other individuals or charities as other beneficiaries. There is no obligation to use the same beneficiary on all forms. This could be

his choice, although not a supportive one for his family. He needs to confirm that his wife is on the NOK form now and when the baby is born, that he or she too is listed on his NOK form. The amount of insurance coverage should at least cover the amount of his mortgage plus at least several months of living costs for his wife and baby. By not doing so, he risks impoverishing his wife and child or causing his wife to work as a single parent and pay daycare costs. She may not be able to find a comparable paying job to his salary with benefits in Cold Lake.

SCENARIO 1C

Now Sergeant Ahuja is age 40. From age 30 to age 32, he became the father of two more children. After two deployments and a stressful couple of moves, he is divorced and is remarried to his second wife. They plan to have two children and have recently purchased a house with a mortgage of \$250,000. She is a Human Resource Administrator with the rank of Master Corporal. Since his divorce four years ago, he has been ordered to pay child and spousal support in the amount of \$1200/month for the next 15 years unless his ex-wife remarries, in which case it will reduce to \$900/month.

Frustrated by his divorce, he changed his will three years ago to make his sister beneficiary to his estate expecting she will look after his children if needed. He asked her to hold on to his estate proceeds to help his children in post-secondary schooling as he no longer trusts his ex-wife. His portion of the divorce settlement was \$75,000 while his ex-wife received all the rest of the assets. During his divorce, he considered committing suicide, but wisely

elected to work through his problems rather than seeking a permanent outcome to a temporary problem. Who is currently receiving his death benefits and is there any action he should take?

SISIP Response: Sergeant Ahuja should consider the needs of his existing children and second wife. If he has not changed his will, SDB, and insurance policy, his ex-wife will receive most of these payments less his will which gives his estate to his sister. Anything given to the ex-wife may or may not be shared with his children, as sharing is at the discretion of his ex-wife. Recipients of SDB and insurance payments are not subject to the wishes of the deceased and can spend the money as they see fit. The ex-wife may think she has won the lottery and go on a spending spree rather than establishing educational savings for her children or retirement investments for herself. Such actions have happened in cases where the separation was a result of financial problems.

With regard to his NOK form, his new wife should be listed on it. He should review it to confirm if his other children are on it. He may decide to leave his ex-wife on it so as to enable her to bring the children to his funeral. His parents and siblings may also remain on the NOK form to enable them to attend his funeral.

Had Sergeant Ahuja committed suicide, his insurance policy would have had to contain a suicide clause, otherwise his beneficiary would not have received an insurance payment. SISIP insurance has a suicide clause. Had he committed suicide without changing his beneficiaries, including putting the insurance awards in trust for his children, his ex-wife would have received all the payments less his estate funds going to his sister.

Even though his sister is in his will as the beneficiary of his estate, she may decide not to help children and they would have little, if any, recourse. People can change once they come into money and what they said they once would do may become another story later. Their personal situation may have also changed since the will was made—or they may even already be dead themselves!

The amount of life insurance he needs should cover off anticipated education savings for his existing children, his new mortgage, and several months of salary for his new wife. If she is expecting a child, then he should consider increasing it yet again to help cover off childcare costs when the baby is born.

SCENARIO 2

Captain Smart is a Logistics Officer with a background in Finance. She joined the military after completing her MBA in finance and was active in the banking sector prior to enrolment. She is married with two children and her spouse earns comparable pay to her as a firefighter. He is insured through his work for both death and disability. When she joined the military, she had a term life insurance policy with no war clause which she still maintains today as it was purchased through a university alumni plan at a great rate.

At the time of joining, five years ago, she owned one rental property with a value of \$500,000. The current mortgage on the property is \$350,000. She recently purchased two more investment properties with two more mortgages totalling \$800,000. She anticipates that all three will be paid off when she turns 62. Every seven years she requires \$20,000 from savings to pay for major repairs and improvements on her investment properties. For the other six years they breakeven with cash flow.

She plans to retire from the military at age 56, at which time her pay will be essentially cut in half in the form of pension income. She has aligned her retirement date with the termination of the mortgage on her personal residence, which currently has a mortgage of \$250,000. Due to the lifestyle she enjoys and her cultural background, she anticipates an extra \$10,000 will be needed for her funeral over and above any funeral benefits she would receive from the military.

She has also been saving \$8000/year for her daughter's education savings. In addition, her mother lives with her and requires regular caregiving at a cost of \$1500/month. How does Captain Smart's life situation affect how her will, SDB, NOK, and life insurance will be arranged? **SISIP Response:** The first thing to note is that her current life insurance policy does not contain a war clause. This means that her beneficiaries would not receive any life insurance money should she die in a war or deployment during combat. She should consider a life insurance policy with a war clause.

The next item to notice is the large debt she is carrying. Her investment properties are paying for themselves, less every seven years. If she intends on drawing \$20,000 from savings and saving for her daughters' education, her husband's salary may be insufficient to support these and unanticipated expenses in addition to the current

mortgage payments and living expenses while also saving for his retirement. It may be prudent to have a life insurance policy that would pay off at least some of the mortgages in order to alleviate a financial burden on her family due to unexpected repairs and the families' current expenses including her mother's care. Paying off the family home mortgage and at least one other mortgage could provide free cashflow to support the family savings plans and still cover her mother's caregiving costs. Alternatively pending the interest rate, it may be in her spouse's financial interests to invest the insurance money to generate retirement savings for him, education savings for their daughter, or cash flow to support the family finances without having to spend the lump sum payment. Both she and her partner need to sit down and budget out what would happen with various levels of insurance.

With regard to her SDB, naming the spouse and children as beneficiaries would be normal. Having a trust fund set up for the children that could contribute to their education savings with the proceeds of an insurance payout could be prudent. Joint ownership of the properties may be a consideration pending a tax attorney's recommendation that should be sought regarding how the estate will be divided in an effort to reduce estate taxes and probate fees. There are many other options that are in excess of this example so she should consider professional advice.

Her NOK form should include her family members and mother even though they are living in the same household. In the event that she is mortally wounded and the family has to travel to the hospital (potentially in a foreign country), there could be significant travel costs to incur. Having them on the NOK form confirms that they can be eligible for travel benefits. The executor of the will will be responsible for the collection of personal effects after the committee of adjustment has done its work. If the executor is not listed on the NOK forms, he or she may need to provide written permission for another person on the NOK form to collect the effects or make the trip to where the member has her personal effects to personally collect them. This happened with a recent case at CFLTC. If the executor is not listed on the NOK form, he or she may face personal or estate expenses to collect the effects should no permission be granted to the NOK to collect them. Such expenses reduce the amount of money in the estate for distribution.



Securing Pharmaceutical Supply Chains in the Developing World

By Dr. Gordon Bennet

Introduction

Counterfeit pharmaceuticals or “fake pharma” is big business. It robs the poor, gives false hope at best, and, at worst, sickens or kills buyers and their loved ones. Although there are many ways to potentially tackle this problem, this paper will outline one solution that leverages the growing use of smart phone technology and the wide spread accessibility of the internet. This solution will give buyers the power to make informed decisions and help supply chain participants and pharmaceutical manufacturers to have more control over their products. It will also bring validity to legitimate distributors and retailers.

Background

The market for counterfeit and substandard medications is booming. The World Health Organization reports that 10% of “medical products in low- and middle-income countries is substandard or falsified.”¹ Counterfeit drugs are ones labelled as containing a particular medicinal ingredient yet have no legitimate medical component. Their packaging may also copy or mimic that of legitimate brands.

Substandard medicines are also bundled into the category of fake pharma, as seen in the media. The London School of Hygiene and Tropical Medicine reports that 31% of sampled drugs in Cambodia and 12% in Tanzania were considered substandard drugs, even though their tests did not find outright fakes.² Substandard drugs taint the supply chain but also cause significant health concerns that can be as damaging as outright counterfeits. For instance, a low dosage antibiotic could create antibiotic resistance in a population as it is insufficiently lethal to adequately eliminate the bacteria. Substandard medications can also be degraded products that have been improperly stored, are expired, or have little or no manufacturing quality controls, resulting in an overdose or underdose of the medication.

Substandard and fake medications undermine the consistency and quality control required to create trust in the medical supply chain. Damage is done to both the patient who trusts a particular brand and to the brand itself that must maintain a positive, quality-based reputation.

Determining which drugs are fake or substandard and which are not requires a herculean effort. Shop owners in the developing world are often unfamiliar with the source of their products and there is no system in place to perform quality testing on a consistent basis. At present, there are no consolidated ways of targeting efforts on fake pharma supply chains to determine exactly where the optimum location would be to strike back.

Proposed Solution

Almost since the dawn of the personal computer, software manufacturers have sought to fend off counterfeit copies of their software while at the same time controlling the number of users in an effort to sustain profits and fund further research and development.

When software is purchased, an activation code is required to enable the download or use the software. Since the development of the internet, many of these codes are now delivered via email or other electronic means and entered into a website by the customer to activate the software.

Drawing from design thinking’s question “what if...”, could there be a parallel with physical goods? What if there was a way to confirm the legitimacy of pharmaceuticals in a similar manner that software companies do for their software?

With the increasing availability of low cost internet and smart phones in developing countries, there appears to be an opportunity for buyers and supply chain stakeholders to inexpensively confirm the authenticity of pharmaceuticals throughout the supply chain.

Suppose individual packaging, cases, and then pallets were labelled with a code similar to software activation codes—a code generated by an algorithm that changes periodically and is stored in a secured online database. The database would have a web-based interface to enable global access.

When the pallet of medication leaves the factory, it is tagged with a code imprinted on the bill of lading, invoice, and pallet wrap. Each supplier down the supply chain is able to enter the pallet code into the online interface to

confirm the authenticity of the pallet. It does not matter whether this is via a code reader or manually entered. The same would happen with individual cases. To confirm anti-tampering with the pallet coded cases, individual packages inside the cases would possess a different code that is mathematically connected to the original case and pallet. The invoice and bill of lading would also have the code, while faxed or emailed invoices to supply chain members will enable them to corroborate the code on the pallet during shipping. A pallet of drugs not possessing a code, or a code matching the invoice, could be rejected by downstream supply chain stakeholders unless other means of verification are conducted between them and the factory.

When the pallet arrives at a bulk-break facility, staff enter the code in the online interface, and mark it through a “buy” button in the web interface - think of it like the “pay now” button for online shopping. Activating this code prevents it from being reused on another pallet, including one that contains fake or substandard medications. Since each case is also marked with the algorithm generated code, smaller buyers are able to authenticate the code on the case they are about to purchase. The online interface at this stage has two options. The first option is to enter the case code to validate that the case is real. The second is to re-enter or confirm the case code once the case has been purchased - again using a “buy” button. Should the pallet code not be entered, the first “buy” of the first case would cancel the pallet code as well, thus adding a second layer of security to prevent reuse.

The act of purchasing the case and entering the code as sold prevents the code from being reused, such as might happen with an empty box. The buyer can also open the case upon purchase and verify the contents by entering the third code from some of the product contained inside. This latter code is entered in the web portal in a similar fashion to what the buyer did before purchasing the case to confirm the authenticity of the product.

The process continues when customers buy the individual items from the case. The customer can enter the code from the individual package to confirm that the tamper-proof, sealed package is authentic and then press the “buy” button when it’s purchased, thus taking the code out of service. Refusal or suggestion by anyone to the customer to not enter the code and hit the buy button, suggests the potential for nefarious action and counterfeiting, consequently indicating to the customer to reject the purchase.

Should a customer not have a smart phone, legitimate merchants can possess one (even if supplied by the pharmaceutical company) and can encourage customers to use it at the point of sale to confirm the authenticity of the medication. If sellers refuse to allow a customer access, this signals that the seller is likely to not be legitimate. This process enables legitimate medication sellers to confirm quality product, thus improving the reputation of the seller and detracting from that of illegitimate vendors.

To prevent expired medication from being sold, codes can be programmed to indicate that the medication in question has expired. The pharmaceutical company can then adjust the expiry or best before dates in accordance with anticipated storage conditions.

This method will not prevent all counterfeit medications from being distributed. There will still be those patients who will take the risk of buying fake medication due to perceived value from lower prices or misplaced trust with sellers. However, currently with no significant means to authenticate which drugs are real and which are fakes, this method will enable customers to make a better-informed decision.

There are several side benefits of using a tracking system with authentication code identifiers. First, it helps counter the corruption of border officials who may be allowing fake drugs to enter the country. Secondly, the process also enables countries that are serious about blocking fake pharma from entering by verifying the pallet and case codes through the online app. Should the pallet code be stolen, the individual cases and their contents can act as an alternate method to verify the load and that the pallet code has been cancelled.

Third, when a series of erroneous or used verification codes are entered into the system and fail authentication, the backend of the interface can record from where the erroneous codes are being entered. This helps enable targeting of these locations for further action, risk identification, and law enforcement (if that is an option).

The fourth advantage is that a high level of authenticated codes being entered at certain locations can pinpoint high product use areas and be used to improve offerings to better match customer needs or suggest locations where the supply chain should be enhanced to enable additional sales and better manage stock holdings.

Finally, as customers’ confidence increases from having access to a supply of verified quality products, the reputation and brand of participating manufacturers will be enhanced.

Caveats

There are several caveats that are required in order to execute this concept. First, integrity of the online interface is required. This means that it must be both secure and accommodate all manufacturers. For this reason, this concept needs to be coordinated through a central organization similarly to how GSI functions for barcodes, or industry associations band together to create professional recognition. If multiple pharmaceutical firms create their own interfaces, it will be much easier for counterfeiters to do the same with their own brand. In short, all pharma verifications must go through one portal and one entity in a central, collaborative effort. This needs to be marketed to consumers. A common online interface also reduces operations costs in running the verification system.

Much of the population that will be buying medications in the developing world will have a low literacy rate. Therefore, the interface, marketing, and communications need to be adapted to such levels. This can actually be an advantage as the design of the interface and marketing with low numbers of words can help overcome language barriers throughout places like Africa, where many dialects are spoken.

Certification of drug companies wanting to subscribe to the service will be required. This is necessary to confirm that the products being distributed meet quality standards and accuracy in labelling. Consideration is required regarding how certification should be carried out without causing prejudicial treatment against smaller firms. Whether options should include testing by a central authority, testing by the syndicate, reputational accreditation, or something else, the integrity of the manufacturer is paramount for them to be part of the app system. This is little different than accreditations for medical facilities or universities, so there are already systems in place that can be replicated.

There will still be instances of people trying to obtain cheap medications in spite of this system, but at least buyers can make better informed decisions regarding where to buy authentic medications.

Risks

The largest risk is people not using the platform as intended. It is possible for a medication retailer to attempt to sell the medication by showing the prospective customer the first step in the authentication process without hitting the buy button to take the number out of circulation. This would enable the seller to repeatedly use the same authentication code on an individual package while refilling the container or box with fake or substandard product.

There are several ways to counter this effect. First the usual tamper-evident seals can be applied, with the accompanying warning not to buy the product if the seal is tampered with. For pill packs that are in cardboard boxes, this may not work as well unless the code is used on both the box and the foil seal. The next counter is to ensure that in the marketing of the system, people understand that they need to hit the “buy” button on the app or they risk buying fake drugs and doing harm to themselves, their family, or their neighbours.

There is the possibility of schemers selling the package of real drugs, then offering to buy back the empty package if the buyer has not entered the authentication code - perhaps for a “rebate.” The counterfeiters then reuse the packaging with fake drugs or reuse the number on a fake package. They then place another tamper proof seal on the package, insert foil packaging filled with fake drugs, use their own package, or just use the code without the packaging. This is the most dangerous risk as it could affect other buyers, branding, and public confidence in the system.

To counter this risk, there are several options. First, develop confidence in the supply chain with select sellers who are likely to have a higher level of integrity than street vendors. This narrow supply chain limits the number of sellers, creating a less competitive market, while helping to control authentication numbers on used packaging. Using a select group enables auditing and testing to happen efficiently.

A lottery ticket system can be implemented to incentivize the removal of packaging or numbers from the supply system. Customers who enter their authentication code into the interface with the buy button receive a code for a scratch ticket that entitles them to a chance to win cash or prizes. These would be distributed through the sales representatives, trusted vendors (subsequently reimbursed through the supply chain), or direct from the drug

company with claims going through the app. Claiming prizes through the app can also help the customer engage with the pharmaceutical firm for emailed promotions down the road - although the efficacy of such a plan is more debateable the poorer the country. The cash payouts or prizes need to be large enough to sway people from selling their code or package to nefarious traders. Awards need to be frequent enough so that word spreads within the community that there are lots of prizes to be had. In developing countries, this does not represent a large amount of money. A scratch ticket can be produced at a fairly low cost with security features that are difficult to duplicate, similar to those made in the West. Pharmacies that sell the drugs could be entitled to as many tickets as the number of packages of eligible drugs they have purchased. To make a claim for the ticket, the buyer provides the scratch card code to the seller who authenticates it through the same system as the drugs. Claims made through an app may be more effective in preventing retailers from stealing scratch tickets and using them themselves while still recycling the authentication codes, although there is a solution to this discussed below. There are already systems like this in Asia that help prevent sales tax evasion on the part of restaurants that take only cash.

Tear off rebates or prizes with the authentication code can be another option. The buyer purchases the product and when they return the code to the firm's agent or retailer, they receive a rebate from the drug company, or credit for a future purchase, or purchase of another product. To get the rebate, a coupon with the authentication code has to be removed from the package, delivered to the drug company and entered into the portal. If physical distribution is needed for rebate awards, this can be done periodically through a pharmaceutical representative in the area or by mail.

An alternate method is to use a scratch card system as previously mentioned but a photo of the code, taken by the buyer's smart phone, is sent to the drug company and the electronic rebate, prize, or coupon is returned via text message, Facebook Messenger, email, or some other common communication means available locally. The photographed code is entered in at the clearing office and authenticated, thereby removing it from the system. This could be done manually or automatically through software that reads photographic images much like toll road cameras.

The marketing program would need to highlight the prizes and awards in order to encourage less reputable sellers to provide the ticket or forgo the purchase. This prevents sellers from keeping all the tickets so they can claim the rebates themselves and use the funds to repurchase the packaging or codes from unsuspecting customers. Slogans such as "No ticket. No purchase." can be used along with the reason why the system is in place - to protect the customer and enable them to shop with confidence.

Another method to fix this problem is the use of dual authentication numbers. The external package contains one number and the product inside (e.g., foil packed pills, a pill bottle inside a box) contains the second number. Each number can be entered into the interface to cross confirm that both the package and medication are authentic. The algorithm would know how to match the numbers together. This would reduce the incidents of sellers randomly recycling repurchased packaging with numbers. If the inside and outside numbers don't fit the algorithm calculation, then the product has been tampered with.

Hacking is also a risk. The interface needs tight, online security to prevent criminal elements from seeding the interface servers with fake data numbers or discovering the algorithm. This would be accomplished via standard security protocols already found in many organizations. Some consulting firms have established cyber security branches that specialize in this type of issue. Updating the algorithm periodically will also help maintain the integrity of the codes. Blockchain could also be applied here.

The next potential risk is copycat sites. Not much is known about the organizations that produce and distribute fake medications, but their activities are unlikely to be globally coordinated. This is an advantage for large, global manufacturers. Pharmaceutical industry members working together bring the advantages of scale, cohesion, expertise, and marketing that fragmented, criminal organizations are unlikely to be able to emulate without exposing their fraudulent acts. To reduce the risk of copycat sites, there should be only one cohesive brand that represents all pharmaceutical firms in the syndicate with one portal. Any copycat sites that do arise can be identified as targets for counter-cyber operations. Look-alike sites could be targeted for closure, although in both of these cases it is not illegal to have such sites. Advertising the exact portal web address is critical, and the purchase of similarly worded web addresses is recommended.

The ethics of pricing could be seen as a risk. Verified medications should not be sold at a large premium price based on the premise that the drugs are authentic, as happens in some industries. Fair pricing for the markets is still required, which can include a small premium to highlight quality and pay for the authentication system. Whether pricing is part of specific regional branding, package size changes permitting lower purchase prices (similar to laundry detergent), or another method is used to keep apparent costs down, a premium should not be inflated. If prices rise, customers may still resort to counterfeit medications with the hope they provide some benefit. Dropping prices on older drugs that are already in a highly cash flow positive position to make them more affordable for the world's poor may also be a consideration to offset the desire to buy counterfeit drugs. These methods are outside the scope of this paper but merit further discussion.

Even though there may be an authentication system, this does not mean that all customers will use it, nor that everyone would have access to it. Those with smart phones will have access, those without will not. This system could prevent the sale of expired medications if the codes are entered into the portal. It could be argued that medications that were slated for disposal could be resold (which is seen even in flea markets and discount outlets in North America). The authentication process could still provide validation and expiry information by showing the medication is expired when the authentication code is entered.

Other Applications

The verification process can also act as a predictor for supply chain management and future sales. Demand, storage, and stocking metrics can be better predicted by instant feedback through the app system. Perhaps a malaria medication has not been purchased as frequently in one area as in another, so restocking requirements will be lower there, while another area may see an uptick in authentication codes meaning that reordering from that area is likely to increase in the coming weeks. The app now helps with anticipating demand earlier than receiving orders, thus helping to manage overstocks and stockouts through better prediction. This will become increasingly valuable over time as trends are established.

The use of the app connects the user with the pharmaceutical company, which provides a channel for engaging the customer for future purchases, reminders, branding, and the dissemination of vaccination and other information. For instance, an option may exist to

subscribe to future health notifications or connect to a social media account. Recent experience by the author, in the Congo and Madagascar, demonstrated that Africans, for example, are active social media users even when they do not own a smart phone or computer and have to use an internet café to do so.

The system can also be used for product recalls. When the authentication code is entered, the customer or anyone in the supply chain can be notified if that product was recalled, thus informing the wholesale or retail customer of a potentially poor or dangerous purchase. This system of verification can also be used in other applications besides pharmaceuticals. Applications can include tracking military spare parts to prevent counterfeits from being inserted into a supply chain—a concern in the last decade. Tracking and verifying semiconductors and other electronics in an industrial supply chain is also a potential application.

However, products such as designer clothing and accessories may not be suited to this system, since codes could be stolen from items in a retail shop because the shopping style of buyers and open nature of the shop enables regular and significant interaction between retail customers and the goods for sale. This differs from a pharmacy, the software industry, or industry-to-industry purchasing where hands-on browsing is limited. Furthermore, designer products are most often already found in legitimate department stores in the West, as opposed to pharmaceutical distribution in the developing world where medications are typically found behind the counter in small shops. Customer access to them is typically controlled by the store owner or staff member. While it is still possible to steal and sell a code, it is not in the best interests of the seller to do so, and would equate to theft if done by an employee, causing the firm to lose money.

Summary

Unlike security measures such as holographic images, which can be copied, a two or three step verification process through the supply chain with an encrypted algorithm system is much harder to break and copy when there is centralized collaboration.

The security features of the system are more than just a tracking mechanism such as barcodes, QR codes, serialized locks or seals, or GPS trackers. This system provides a verification tool in addition to tracking, thereby creating a more secure supply chain in both asset visibility and delivering reliable product.

Counterfeit drugs are a serious problem in the developing world. This paper has presented a low cost, technology-enabled method to reduce and counter the illegitimacy of unscrupulous actors. It is built upon recent advances in technology. As with any solution, there will never be a one hundred percent resolution. However, leveraging new technologies and access to them provides a means to enable consumers to make better decisions and protect supplier's reputations. The recent advancement in communication technology in the developing world, combined with the authentication method discussed, will greatly help to reduce the presence of fake pharma. Meanwhile, this system may also be able to support other applications, from military supply chains to electronics to building brands.

Dr. Gordon Bennett is a military logistics Lieutenant Colonel, an entrepreneur, and practitioner of design thinking. His passion and experience in design thinking, both inside and outside the military, and his various career appointments in military command positions and instructional roles provide a unique perspective on design thinking and logistics problem solving.

Notes

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TRADESPERSON
PROFESSIONAL
WARRIOR



I'M A LOGISTICIAN!



This fictitious case is based on real events. It is intended as a teaching opportunity to highlight certain issues pertaining to logistics that are not covered under traditional planning techniques. The situation is a conglomerate of real situations. Primary research was conducted for this case to strengthen the realism and detail some of the concerns.



(Above) Members from Joint Task Force – IMPACT join partner nations Jordan, UK, and the US to conduct Exercise OLIVE GROVE, a joint training exercise in the Jordan desert as part of Operation IMPACT, September 7, 2019.

Photo: Corporal Ryan Moulton, JTF-I PA Image Tech KW11-2019-0040-29

“I don’t know what to do,” stated Major Lopez. “It seems that every time we have a vacancy for a mobile support equipment operator (MSE Op), the career managers send the new privates to other units saying we aren’t a priority because we aren’t an Army Service Battalion. That doesn’t mean that out here in at 4 Wing Cold Lake we don’t need drivers. We are often transporting stuff for exercises down to other bases in the US and doing heavy equipment tasks here on the base. This shortage of drivers isn’t only our problem, but industry is short too so the contracting prices we have to pay increase substantially, especially for cross-border movement.”

“I feel your pain,” replied Master Warrant Officer Anastas. “I guess I didn’t tell you, but I received a job offer from a small oil shipping company. Since the pipelines are still not complete yet through the mountains, there is a high demand for hauling raw crude from Fort McMurray to Saskatchewan and BC. The price of oil recently up-ticked as well meaning there is more work. My guy has offered me \$15,000 take home a month to work six days a week—within driver regs of course.”

He looked down as his warm beverage on the coffee shop table and glanced out the window.

A look of shock crossed the Major’s face. “Are you thinking of leaving?” questioned Major Lopez.

“I haven’t decided yet. I’ve got 28 years in and I’m not a fan of all the administration. I joined to drive and I have been privileged to lead great soldiers over my career, but all good things must come to an end. I doubt I’ll make chief and I don’t want to drive a cubicle in Ottawa anyway,” replied Anastas. “I also don’t have to move. Remember those stats that were briefed last year that stated relocations were in the top three reasons for failed retention. I’m in that position now. My kids are off to college so I still need to work, but I wouldn’t have to move and I know this job is only a two-year gig.”

Anastas ran his hands through his black but greying hair before taking a sip of his beverage and pensively looking out the window.

“Look, I get my potential retirement isn’t your problem right now,” he continued. “Your problem is an institutional one: of getting new recruits who want to drive truck and then getting those recruits through training and posted to units such as ours. Retaining them when they are offered good gigs only seems to be a problem in Alberta so I don’t think retention is a problem except on the old-guy side like me and we don’t drive anyway so I’m not really worried about my generation.”

“OK, fair enough, recruiting is an institutional concern. I understand that it is a concern in industry as well. I just read a 2015 report by the American Trucking Association¹ that said that there was a 45,000-driver shortfall then and if the trend continues there will be a shortage of 175,000 drivers by 2024. I’ve read similar stats on Canada, but proportionate to our population. In any case, there is a shortage in industry, which suggests why we have a shortage.”

Anastas laughed. “You know what’s particularly funny about this situation?” he asked.

“What?” replied Lopez.

“The fact that you are posted to the Canadian Force Recruiting Group this summer and this institutional problem will become your problem to solve,” Anastas replied. “So, what are you going to do about it? Maybe you want to call a friend,” joked the Master Warrant Officer.

Trends in Truck Driving

Recruiting for the trades and similar professions has become increasingly difficult. Statistics Canada reports increased college enrolments in 2015-2017 by 1.1% in university and 1.3% in colleges. Most of the increase in enrolments was found in business management, architecture, engineering and related technologies, mathematics, and computer and information sciences.² From 1980-2010, Canadian universities increased from 768,000 full and part time students to 1.2 million.³ From 1975-2010 the service sector saw a 217% increase in employment in Canada.⁴ From 2000-2013 apprenticeship program graduations increased 170%.

Meanwhile, the total number of tractor trailer drivers in Canada from 1991 to 2016 increased from almost 96,000 to 181,000. From 2001-2016 the increase largely leveled off with only a minor growth of 14% with a peak number

of drivers in 2006 and a decreasing trend in drivers since then.⁵ In the five years from 2011-2016, the Canadian population grew 5%.⁶ These last two statistics suggest that the increase in truck drivers is simply mirrored by population growth and not additional increases whereas other trades and university education was increasing at a rate faster than population growth. This suggests a shift from driving to other trades and training.

From 2011-2016, the downward trend in the number of drivers cross-referenced with population growth suggests a decreased interest in driving truck. Yet, reports suggest that the trucking industry is increasing, not decreasing in size. The Conference Board of Canada notes that retirement rates exceed entrance rates and the demand for drivers in Canada could increase by up to 33,000 drivers.⁷ Furthermore, consumerism in North America is continuously growing, spurring demand for trucking.

The Saskatchewan Trucking Association reports that the average age of civilian truckers is 44.2 years with only 12% under 30 and 20% over 54. They note that the industry could be facing a shortfall of 25-33K drivers over the next few years.⁸

Meanwhile, hiring in Borden and Gagetown in 2020 and 2016, it proved difficult to find qualified drivers or driver trainers. Statistics from Gagetown shows the average age of MSE Ops and public service drivers tends to support the Conference Board of Canada and Saskatchewan Trucking Association observations.

The American Trucking Association (ATA) report entitled Truck Driver Shortage Analysis 2015 indicated other problems with hiring. The paper notes that the quality of drivers is a growing concern. They cite that 88% of firms hiring indicated that most applicants were not qualified. Lower-quality drivers or applicants, they argue, can account for increased insurance costs and increased risk of collisions. So, part of the shortfall is a training and experiential problem as opposed to strictly numbers of applicants.

Trucking as a Second Career

A new trend has begun to emerge. Forbes reports that there are increasing numbers of truckers who are starting trucking as a second career later in life.⁹ Research by Forbes and the case study authors suggest that trucking is both in demand and can be a well-paid opportunity, especially when team-driving. The ATA report states

that many firms are poaching drivers from other firms through bonuses, better routes and other benefits, causing significant churn in the industry with higher pay and better qualitative benefits. Limited primary research for this case suggested that dedicated truckers who want to be on the road can earn as much as \$15,000/month with long-haul trucking.

Long-haul trucking is not always as romantic as some people may think. Those with a wanderlust image of seeing the country most often see highway markings and loading docks. It is not a traveller's vacation plan. The work can be demanding with long hours, being away from home most of the time, eating unhealthy meals on the road combined with little exercise, and dealing with traffic in cities.

Specialist truckers for dangerous goods can often earn higher incomes than other regular cargo drivers. Contracted drivers owning or leasing their own rigs can generate reasonable returns as small business owners.

The Military Advantage

The military holds several advantages for truck drivers. First, defined benefit pensions such as military pensions are rarer in industry than in the public service or military. However, truckers in civilian industry can earn higher incomes if dedicated to travelling long distances and working longer hours. Although this monetary advantage exists, using monetary motivation alone as opposed to intrinsic motivation can have a tendency to backfire.

Vacation time is better in the military than in civilian industry and military service comes with medical and insurance benefits not found with owner-operators. Military work is recession-resistant. In the economies of western Canada, when there is work in the oil patch, days are long and money is good. However, the cyclical nature of oil and gas means that every few years there could be reduced work or layoffs. Owner-operators have generally been able to weather these conditions but may have difficulty finding loads to haul in two directions which then increases operating costs.

Although military operators are away on exercises, training, and deployments, they are not on the road six days a week all year. Compared to long-haul trucking, MSE Ops can be at home more often.

The military offers training advantages in that MSE Ops in Canada are trained on multiple pieces of equipment. This can provide job variety not found in industry and aid with intrinsic motivation and job satisfaction.

A major drawback to military service, noted from primary research in the Greater Toronto Area (GTA), is that operators can be posted frequently throughout their careers. Moving of personnel has been a significant detractor for new Canadians and even first-generation Canadians. In writing this case, recruiting issues were discussed with individuals from ethnic enclaves in Toronto and one of the biggest drawbacks they communicated was having to leave their families and the comfort of their community. Additional concerns included a lack of clear understanding of jobs available in the Canadian military and the perception of militaries since many newcomers came from nations where the military is not well-respected. An uptick in the number of first- and second-generation Canadians over the last few years has been noted at the Canadian Forces Logistics Training Centre. However, primary research still suggests the military employment option is not well-known or seriously considered by many Canadians.

The Problems

There are several concerns with hiring drivers. First, fewer members of society are interested in becoming truck drivers. Although recruiting efforts succeeded in generating as many recruits as the Canadian Forces Logistics Training Centre can train, the trend in society suggests there will be problems in recruiting. Foresight, a principle of logistics, is required to prevent this trend from impacting military recruiting.

Second, hiring public servant truck drivers has proven problematic in bases that have a heavy population of civilian employees. Current hiring practices found at several bases indicate that a qualified applicant for general purpose trucking must have both bus and tractor trailer qualifications. While there are many long-haul truckers with significant experience, it is rare to find drivers that have both qualifications. City bus drivers do not drive tractor trailer rigs and long-haul drivers do not often drive buses. There are only a few exceptions. Hiring in eastern Canada in 2016 suggested that the primary groups who have these qualifications are retired military, military members that will retire when public service jobs open, and individuals who frequently changed jobs—although there were a few

exceptions. Also, hiring driver trainer instructors through a civilian contractor in Borden in 2019 and 2020 indicated that contracted drivers suitable for instructing were hard to find. Of six positions available for additional instructors in 2019, only three were able to be filled in a three-month recruiting effort.

Ultimately, how can the Canadian Armed Forces and Department of National Defence ensure sustainable recruiting of drivers?

Notes

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Canadian Armed Forces members deployed with enhanced Forward Presence Battle Group Latvia receive new Medium Support Vehicle Systems (MSVS) at Camp Adazi, Latvia, December 5, 2019.

Photo: Corporal Djalma Vuong-De Ramos
RP25-2019-0076-1



INTERVIEW with JERI A. BALLARD



Jeri A. Ballard
Executive Vice President,
Real Estate, Business
Operation Centres, and
Corporate Travel
Shell International B.V.

Things written in plain English is the key to what I do. I manage people who are as senior as CEO-3 doing long-term location strategy work on down to drivers, mailroom, catering, and cleaning.

1. Can you tell us a bit about your background and how you ended up in your current position?

I have an undergraduate degree in Transportation Logistics and Aviation Management from The Ohio State University and a MBA in Finance from the University of Connecticut. The logistics degree enabled me to get a supply chain (procurement) role with Westinghouse and ABB for the first 10 years of my career and the related skills I developed of strategy, planning, negotiations and leadership opened the door for a career change into facilities management and real estate. I have been in facilities and real estate for the last 18 years. In my current role for Royal Dutch Shell, I'm the Executive Vice President of Real Estate, Business Operations and Corporate Travel, I manage a global spend of over \$1.5 billion annually and a workforce of over 10,000 people.

2. What would you say have been your three key success factors in your highly successful career?

First of all, my career was not a straight line. I took advantage of opportunities to try new things and this included a lateral step here and there. No matter who you

work for, keep an external mindset. There are great external networks to learn from for best practices and benchmarking – you get no special credit for reinventing the wheel. Don't be afraid to ask for help. I can't think of one instance where someone did not help me. If you are humble and authentic enough to say "I want this to be successful for the company and I could use your help" you would be surprised how far that can go, but you need to know specially what help you need – have a plan.

3. What are the challenges your firm faces with logistics and how does it overcome them?

As you can imagine, the remoteness of many of our projects is the primary cause of the logistics challenges and the political unrest in some countries can create safety and security risks. The scale of the worker accommodations needed to construct a major oil or gas project can range from 5,000 – 50,000 people on the ground in company provided housing that has to be designed, built and managed. Robust planning is a key to overcome most of what we face, however, it is the unplanned events that are the biggest logistical challenges. We spend considerable effort on business continuity planning so we know how to approach these events before they happen. There are events where we are moving people and equipment out of harms way, as in hurricane/typhoon preparedness and then after the event getting people and equipment back in place. The Arab Spring required a level of creativity to get all our Shell families out and to safety. Ebola outbreaks in some African countries have created problems that require cross-functional teams to solve.

4. Shell employs over 80,000 employees, not to mention many subcontractors. A number of our readers work in human resource related positions throughout the military. What are some of the best practices Shell uses in hiring new employees?

The hiring process looks at technical skills (can you do the job), your leadership skills (can you successfully manage people), and your headroom (meaning, how far do we think you will go, will you continue to grow and learn). Most jobs require the need to lead others and if someone is likely to never grow out of that role they are blocker for future talent. This is why leadership and headroom are so important.

5. What are some of the characteristics that Shell looks for in new employees?

Being a good leader is vitally important, but it goes beyond just your own team. Shell is one of the largest companies in the world and it is organized in a matrix. The ability to pull together all the parts of Shell you need to get a job done is the key to success. We call this integrative leadership when you can manage horizontally and not just vertically.

6. What advice would you give to someone just starting a career in business, logistics, or sustainment (including commercial real estate management)?

Be a student of the business, really know what is important and where value comes from. You need to think like a business person and not just with the one lens of the function you are in today. Take the assignments that are outside your comfort zone. Broader skills and experiences give you lots of career flexibility in the future. Always be looking for opportunities to learn and develop. Never say "I'm too busy to go on that training course." Early in my career when I said this a wise person said to me "do you want to be a tree or a rock – a tree grows, works around obstacles and gets taller, whereas a rock will never be more than it is today."

7. I understand that Shell has a number of projects involving environmental sustainability including LEEDS certification. Can you tell us a bit about Shell's environmental initiatives?

Shell is committed to reducing our carbon footprint and to follow the Paris Agreement. In support of this, we have been working toward greening the entire property portfolio. We set LEED Gold as our target for new buildings, with our first net zero building on the drawing board (using solar, geothermal, and active/passive facade elements). We are also working on reducing energy, water and waste including food waste.

8. How does innovation factor into your work or that of Shell? Can you provide us a few examples of unique innovative instances you have found at Shell or in your career?

We are working on leveraging innovation not just for processes and systems, but for data as well. For example, smart buildings use technology to provide for better occupant experiences, as well as reduce energy usage. The data from a smart ceiling grid or in seat monitors allows for better space planning and increasing building utilization. Drone technology has been a game changer for inspections of buildings and properties to reduce

the risk to our people. In one case, we could avoid the indigenous poisonous snakes to survey a property.

9. Biofuels have been a developing trend in both the supply-side of fuel production and in the acceptance and use of it. Is this trend something Shell or others in the main stream oil industry are considering? Why or why not?

Biofuels have grown substantially over the past decade. Today around 3% of the world's transport fuels come from biofuels. They are expected to play a valuable part in the changing energy mix in the future. Today, most biofuels are produced from corn, sugar cane or vegetable oils. All biofuels can emit less CO2 when compared with conventional fuel. But this depends on several factors, particularly how the raw materials are produced and possible indirect effects. Shell is one of the largest producers of low-carbon biofuels made from sugar cane. Through our joint venture Raízen, we blend biofuels into our fuels globally. We are also active in the development of advanced biofuels made from sustainable feedstocks such as waste and cellulosic biomass, the non-edible parts of plants.

10. Leadership is a major concern for many organizations. What key leadership traits do you feel are necessary to be an effective leader?

I think that first and foremost a leader must be authentic, meaning that they inspire others by personal integrity, transparency and humility. That they are comfortable in their own skin. Lead from an overarching sense of personal purpose and bring meaning to work. They must be an integrative and collaborative leader who can influence without formal authority and create strong partnerships by embracing diversity. Passionately invest in people to build performance for today and tomorrow. Adapt the business to changing contexts and courageously take appropriate risk and innovate. Uncompromising on safety, ethics and compliance.

If you have any questions we can set up a call to walk through any of these that don't make sense.

Best regards,

Jeri A. Ballard

Is your unit doing something interesting?

Do you have expertise in a certain area?

Is there a recent book that you recommend to others?

Did you just return from a mission and have lessons to share with the logistics community and our allies?

Do you have useful practices from industry or our allies we should adopt?

If so, we are accepting submissions with the following guidelines:

1. Ten pages or less
2. English or French
3. Pictures welcome with notations
4. Sources must be referenced as end notes, if using references

Email your submissions to the Cmdt of CFLTC at
Gordon.Bennett4@forces.gc.ca

We welcome submissions from any rank, any trade, and any element.

