





#### PROMOTING INNOVATION IN THE CANADIAN ARMED FORCES

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# JCSP 48

# **Service Paper**

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#### PROMOTING INNOVATION IN THE CANADIAN ARMED FORCES

## **INTRODUCTION**

1. Innovation is a much-used phrase in the modern business nomenclature and the military is no exception. The Canadian Department of National Defence's (DND) keystone policy document (Strong-Secure-Engaged<sup>1</sup>) uses the word no less than 60 times, signaling that not only has innovation been crucial historically but that its significance and relevance is in no way diminished in the contemporary.

2. Many definitions of military innovation exist that are all similar yet fundamentally different. Jungdahl & Macdonald (2014) drew together multiple studies to establish three features that paraphrase and characterize this wealth of definitions. They suggest that military innovation should "change the manner in which formations function in the field, be significant in scope and impact and result in an improvement in effectiveness"<sup>2</sup>. This definition will be adopted throughout this paper as it synergizes a wider body of academic study.

# METHODOLOGY

3. This paper will draw on contemporary academic research from both the civil and military sectors to make recommendations as to how the CAF can further foster a culture of military innovation accounting for extant doctrine and initiatives. To achieve this, the study will focus initially on the importance of 'timeliness and resourcing' and will identify these elements as 'essential enablers' that pertain to all other factors discussed therein. Three tangible deliverables of innovation (equipment & technology, planning and concepts & doctrine) will then be discussed. This will provide a platform to allow the study to look at the 'best practices' that enable true innovation.

4. Recommendations are made throughout the body of work so as to clearly identify the academic genesis of each, whilst a summary of all recommendations is at Annex A for ease of review. Few of the recommendations have interdependencies and the acceptance of them all is not essential; they represent a diverse array of potential levers that the CAF holds, should it wish to increase its emphasis on innovation.

# **TIMELINESS & RESOURCING**

5. "Bringing innovations to fruition will often be expensive"<sup>3</sup>. The unique manner by which the military is funded, does in many ways, lend itself to the promotion of invention and innovation. That said, the compartmentalized nature of a defence

<sup>&</sup>lt;sup>1</sup> Canadian Armed Forces, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: Government of Canada, 2017).

<sup>&</sup>lt;sup>2</sup> Adam M. Jungdahl and Julia M. Macdonald, "Innovation Inhibitors in War: Overcoming Obstacles in the Pursuit of Military Effectiveness," *Journal of Strategic Studies* 38, no. 4 (2015), 469.

<sup>&</sup>lt;sup>3</sup> Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Cornell University Press, 2018), 252.

organization (Maritime, Land and Air being only the 'headlines' of the many subadministrations therein) means competition for funding can be fierce. Additionally, with all financing coming from public funds, the CAF much like most western militaries is forced to demonstrate 'value for money' in the same vein as any civilian company would answer to its shareholders. Even so, militaries the world over have demonstrated (with great persistence) their ability to invent and innovate. From aircraft carriers and breechloading rifles to the aircraft itself, military innovation has clearly shaped history.

6. The tank could easily adorn any list of great military innovation but even that required ministerial (UK) 'buy-in' to release the resources (both human and financial) essential to achieve the necessary concentrated developmental effort needed for this weapon to make it to the battlefields of World War I<sup>4</sup>. This example shows the clear need, not only to fund innovation but to devise procedures that can, when the opportunity arises, release both financial and human resources quickly. Away from the modern battlefield; the ubiquity posed by the contemporary "below the threshold"<sup>5</sup> threat means that even during supposed periods of 'peace', the CAF must be able to innovate with 'war-time' expedience.

## EQUIPMENT AND TECHNOLOGY

7. Technological innovation is the most visible and evident product of an innovative culture. Since Archimedes' pulleys and Leonardo's crank-driven machines, war has been "permeated by technology to the point that every single element is either governed by or at least linked to it"<sup>6</sup>. Crevald (1991) goes as far as to hypothesize that innovative technology comes first stating that: "none of the most important devices that have transformed war – from the airplane through the tank, the jet engine, radar… owed its origins to a doctrinal requirement laid down by people in uniform"<sup>7</sup>. This quote offers two insights and potential Courses of Action (COA) for the senior military leader:

a. One potential COA is to embrace this notion that technology and invention comes first, therefore configuring R&D organizations purely to horizon-scan and exploit emergent technologies.

b. There exists an opportunity to break a paradigm. If the CAF can separate the technologically possible from the operational need and foster free thinking, it may be possible for military invention to drive technology.

8. History suggests the second COA to be unlikely but there is a synergy between both COAs that means there is no requirement to select one over the other. In fact, the route to overturn the paradigm is through an organization that is truly configured to nurture and develop innovation. The sum of the recommendations contained throughout

<sup>&</sup>lt;sup>4</sup> Martin Van Creveld, *Technology and War*, 2nd ed. (New York: The Free Press, 1991), 218.

<sup>&</sup>lt;sup>5</sup> Canadian Armed Forces, *Pan-Domain Force Employment Concept - Prevailing in an Uncertain World* (Ottawa: Department of National Defence, DRAFT).

<sup>&</sup>lt;sup>6</sup> Creveld, *Technology and War*, 304.

<sup>&</sup>lt;sup>7</sup> Creveld, *Technology and War*, 215.

this paper may still not be enough to achieve this. However, they do describe an organization that would be best configured to attempt to break Crevald's (1991) proclamation.

9. Both COAs require a strong relationship between the military as the customer and its partners across industry. The military requires the invention and technical expertise of specialist firms to realize any capability and civil enterprise in turn, needs the guidance and insight of military practitioners if together a truly innovate capability is to be developed. A clear barrier to this approach is a dependence upon Foreign Military Sales. It should be noted that this does not automatically remove the ability for the CAF to innovate but early cognitive investment in an FMS project is key and may need to be included in a contract. Failure to do so means 'buying off the shelf' whereby a product is purchased with no input to the development.

**Recommendation 1.** Instigate a qualitative and quantitative review into key industry partnerships. How many military personal are assigned to work in these areas? Where are they located? What are the opinions of those involved – is there sufficient trust and information sharing? If tensions exist what are the barriers that are leading to these?

## PLANNING

10. Innovation is far from a new addition to the campaign planner's lexicon. The 'operational art' is a call to arms to think creatively and outwit the enemy. Similarly, the whole concept of manoeuvrist warfare must surely be considered innovation. Boot (2006) concisely demonstrates the relationship between planners and the technology they command "Technology only sets the parameters of the possible and creates the potential for military revolution. What indeed produces an actual innovation is the extent to which militaries recognize and exploit the opportunities inherent in new tools of war"<sup>8</sup>.

11. Unfortunately, planning is also home to the "military failure"<sup>9</sup>. Many battles have been lost along with countless lives to poor planning. This creates a significant paradox. Is it possible to promote innovation through campaign planning when so much is at stake? The answer to this question lies in education, process and sequencing. Campaign planners must learn before they can plan live operations. Specifically, that education must focus on the processes and procedures endorsed at a national level.

**Recommendation 2.** Instigate a review into the education and training of those officers who are anticipated to fulfil roles as key campaign planners.

<sup>&</sup>lt;sup>8</sup> Max Boot, *War made New: Technology, Warfare, and the Course of History, 1500 to Today* (New York: Gotham Books, 2006), 32.

<sup>&</sup>lt;sup>9</sup> Eliot A. Cohen and John Gooch, *Military Misfortunes: The Anatomy of Failure in War* (New York: Free Press, 2006).

#### **CONCEPTS AND DOCTRINE**

12. "It was the English who invented the tank and the French that engineered the best armor designs but it was the Russians who designated a strategic doctrine for Deep Battle and the Germans were the first to employ Blitzkrieg to astonishing technical effect"<sup>10</sup>. Having already discussed the importance of technology in military innovation, this quote captures the need to promote innovation in multiple facets of military undertakings. Doctrine is crucial to be able to effectively bring emergent technologies to bear against the enemy.

13. As Boot (2006) puts it "no technological advance by itself made a revolution; it was how people responded to technology that produced seismic shifts in warfare"<sup>11</sup>. Pierce (2004) refers to this as 'disruptive doctrine' and suggests that "whoever is first to combine new technologies with disruptive doctrine can gain a decisive advantage"<sup>12</sup>. Clearly, this work heralds the warning of "catastrophic defeat"<sup>13</sup> should the converse be realized. Both authors are clearly signaling the need for a close relationship between a military's doctrine writers and those charged with Research & Development (R&D) and procurement. Both use examples that show that neither should take the lead. Doctrine can steer and inform technology but similarly, it must be able to react to new developments and create its own innovations. The example Rosen (2018) use is the Air Defence of the UK during World War II. The advent of radar is a significant technological innovation but the doctrine of an Integrated Air Defence System (created by Sir Hugh Dowding) displays an innovation of at least comparable impact.

**Recommendation 3.** Instigate a review into the CAF organization(s) charged with the production of doctrine. The aim being to identify a system that allows for the greatest agility and creativity. The review may wish to consider a single doctrine organization within defence, similar to the UK model<sup>14</sup>, whilst analyzing the merits of rusticating ownership to the domains.

#### LEADERSHIP, TALENT MANAGEMENT & CULTURE

14. Rosen (2018) puts significant value on the senior leadership, proposing that "when military leaders could attract talented young officers with great potential for promotion to a new way of war, and then were able to protect and promote them, they were able to produce new, usable military capabilities"<sup>15</sup>. His study goes on to give examples of promising innovations being aborted because of a failure to adhere to these principles.

<sup>&</sup>lt;sup>10</sup> "Innovation in the Military," last modified Oct 10, accessed Jan 5, 2022, https://smallwarsjournal.com/jrnl/art/innovation-military.

<sup>&</sup>lt;sup>11</sup> Boot, War made New: Technology, Warfare, and the Course of History, 1500 to Today, 32.

<sup>&</sup>lt;sup>12</sup> Terry C. Pierce, *Warfighting and Disruptive Technologies: Disguising Innovation*, Vol. 11 (Abingdon; New York: Frank Cass, 2004), 2.

<sup>&</sup>lt;sup>13</sup> Pierce, Warfighting and Disruptive Technologies: Disguising Innovation, 2.

<sup>&</sup>lt;sup>14</sup> DCDC. Defence, Concepts and Doctrine Centre.

<sup>&</sup>lt;sup>15</sup> Rosen, Winning the Next War: Innovation and the Modern Military, 252.

**Recommendation 4.** Instigate a review into the current CAF career development pathway to ensure recognition is given both to individuals who display the characteristics of an innovator and in turn, to the ability of senior leaders to actively manage said talent.

15. Kier (2017) and Marcus (2014) both theorize that the prime driver for military innovation is cultural and how this culture interacts with military doctrine<sup>16</sup>. This theory reinforces the already identified strand of 'concepts & doctrine' whilst offering a tangible pathway for the promotion of innovation. The logical inference from this theory is that a military that wants to innovate should do so through its personnel and must therefore inculcate a 'culture of innovation'.

16. Whilst this is an academically well-supported argument, it cannot create any standalone recommendations. It is only through a broad spectrum of actions that a [innovative] culture could be fostered; hence, the volume of recommendations therein. Schein (2016) offers a number of "primary embedding mechanisms" for the promotion of organizational culture that would support the effectiveness of the cumulative impact of this paper's multi-faceted recommendations. Subordinate culture is influenced by: "What leaders pay attention to"<sup>17</sup>, "how leaders recruit, select and promote"<sup>18</sup> and "how leaders allocate resources"<sup>19</sup>. Schein's (2016) mechanisms adding further weight to Rosen's (2018) assessment of the importance of talent management.

# **INNOVATION IN THE CAF**

17. The need to foster a culture of innovation is already enshrined in the CAF's standing doctrine. 'Strong-Secure-Engaged' (2016) sets out what is expected of CAF members and what the organization's leadership will reciprocate with. The 'adapt' function of the CAF's approach to defence "Anticipate-Adapt-Act"<sup>20</sup> puts innovation at the very heart of the organization's strategy. This keystone doctrine launches a (defence-wide) initiative with a remit specific to the promotion of innovation through people and doctrine: making it clear that innovation must go beyond simple rhetoric.

18. **Innovation for Defence Excellence and Security (IDEaS).** This initiative pledges<sup>21</sup> to deliver a number of the facets outlined within this paper. Chief amongst these is a commitment that funding (\$1.6 billion over 20 years<sup>22</sup>) will be made available for research. The program is supported by an accessible and easily navigated website<sup>23</sup>.

<sup>&</sup>lt;sup>16</sup> Elizabeth Kier, *Imagining War: French and British Military Doctrine between the Wars* (New Jersey: Princeton University Press, 2017). Raphael D. Marcus, "Military Innovation and Tactical Adaptation in the Israel-Hizballah Conflict: The Institutionalization of Lesson-Learning in the IDF," *Journal of Strategic Studies* 38, no. 4 (2015), 502 & 504.

<sup>&</sup>lt;sup>17</sup> Edgar H. Schein and Peter A. Schein, *Organizational Culture and Leadership*, 5th ed. (New York: Wiley, 2016), 181-193.

<sup>&</sup>lt;sup>18</sup> Schein, Organizational Culture and Leadership, 181-193.

<sup>&</sup>lt;sup>19</sup> Schein, Organizational Culture and Leadership, 181-193.

<sup>&</sup>lt;sup>20</sup> Canadian Armed Forces, *Strong, Secure, Engaged: Canada's Defence Policy*.

<sup>&</sup>lt;sup>21</sup> Canadian Armed Forces, *Strong, Secure, Engaged: Canada's Defence Policy*.

<sup>&</sup>lt;sup>22</sup> Canadian Armed Forces, *Strong, Secure, Engaged: Canada's Defence Policy*.

<sup>&</sup>lt;sup>23</sup> "Innovation for Defence Excellence and Security (IDEaS)", accessed Jan 7, 22,

https://www.canada.ca/en/department-national-defence/programs/defence-ideas/how-ideas-works.html.

The site shows a regular pattern of events continuing into the future, employing a variety of initiatives that include competition as another key driver. A full analysis of the success of this program is beyond the scope of this paper but the following recommendations pertain:

**Recommendation 5a.** Instigate a quantitative analysis of IDEaS. How much money is being spent? What is the funding stream? Is the pledged finance available rapidly or is the process akin to other military funding mechanisms? What is a typical timeline from initiation to funding?

**Recommendation 5b.** Instigate a qualitative analysis of IDEaS. What are the demographics of people who submit under the scheme? Are there any thematic trends prevalent to the bids received?

19. This initiative is established and aligned with a number of well-respected academic theorems identified therein; it therefore seems unlikely that this initiative will need significant change. If the two previous recommendations show areas for improvement, abandoning or re-branding the program is not recommended. Change-fatigue could be damaging to the positive culture of innovation, which must be fostered. The most recent annual report<sup>24</sup> suggests that many of these questions might well be met with favourable outcomes.

**Recommendation 6a.** Continue to promote and invest in IDEaS increasing its visibility and prominence.

**Recommendation 6b.** Publicly celebrate the successes of IDEaS. To effect and inculcate a culture, the organisation must see the benefits and share in the victories<sup>25</sup>. The net effect is to inspire others and give them the confidence to put forward their ideas and innovations.

#### CONCLUSION

20. The CAF already knows the importance innovation in the military sphere. Extant doctrine clearly articulates the expectations placed on subordinates and leaders alike. Furthermore, this study identified clear investment through the IDEaS initiative that goes well beyond rhetoric. This commitment to innovation demonstrates a fundamental understanding of the need to foster a culture in order to reach the aspired level of success. Organizational culture theorists such as Schein  $(2017)^{26}$  can offer insights in to the further promotion of an innovative culture.

21. Timeliness and resourcing have been identified as 'essential enablers' to innovation and the advent of the "below the threshold"<sup>27</sup> threat negates any argument to the contrary. Beyond that, the tangible products of innovation were analysed (equipment

<sup>&</sup>lt;sup>24</sup> Eric Fournier, *IDEaS Annual Report 2019 - 2020* (Ottawa: Department of National Defence, 2021).

<sup>&</sup>lt;sup>25</sup> Schein, Organizational Culture and Leadership, 8.

<sup>&</sup>lt;sup>26</sup> Schein, Organizational Culture and Leadership.

<sup>&</sup>lt;sup>27</sup> Canadian Armed Forces, *Pan-Domain Force Employment Concept - Prevailing in an Uncertain World*.

and technology, planning and concepts and doctrine). The overriding theme from each being people.

22. An analysis of 'best practise' then found academic evidence to support the need to: focus on leadership, prioritise talent management and inculcate a culture of innovation. All recommendations pertain to people and these 'best practices'. There are no inter-dependencies between the recommendations. They have been devised to give VCDS the greatest flexibility of application, allowing for a tailored response to match the appetite for greater emphasis on innovation; whilst remaining cognisant that to increase resource in one area is to reduce it from another.

Annex: A. Consolidated List of Recommendations.

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### CONSOLIDATED LIST OF RECOMMENDATIONS

VCDS is cordially invited to consider instigating the following:

**Recommendation 1.** A qualitative and quantitative review into key industry partnerships. How many military personnel are assigned to work in these areas? Where are they located? What are the opinions of those involved – is there sufficient trust and information sharing? If tensions exist what are the barriers that are leading to these?

**Recommendation 2.** A review into the education and training of those officers who are anticipated to fulfil roles as key campaign planners.

**Recommendation 3.** A review into the CAF organization(s) charged with the production of doctrine. The aim being to identify a system that allows for the greatest agility and creativity. The review may wish to consider a single doctrine organization within defence, similar to the UK model<sup>28</sup>, whilst analyzing the merits of rusticating ownership to the domains.

**Recommendation 4.** A review into the current CAF career development pathway to ensure recognition is given both to individuals who display the characteristics of an innovator and in turn, to the ability of senior leaders to actively manage said talent.

**Recommendation 5a.** A quantitative analysis of IDEaS. How much money is being spent? What is the funding stream? Is the pledged finance available rapidly or is the process akin to other military funding streams? What is a typical timeline from initiation to funding?

**Recommendation 5b.** A qualitative analysis of IDEaS. What are the demographics of people who submit under the scheme? Are there any thematic trends prevalent to the bids received?

and to enact:

**Recommendation 6a.** Continue to promote and invest in IDEaS increasing its visibility and prominence.

**Recommendation 6b.** Publicly celebrate the successes of IDEaS. To effect and inculcate a culture, the organisation must see the benefits and share in the victories<sup>29</sup>. The net effect is to inspire others and give them the confidence to put forward their ideas and innovations.

<sup>&</sup>lt;sup>28</sup> DCDC. Defence, Concepts and Doctrine Centre.

<sup>&</sup>lt;sup>29</sup> Schein, Organizational Culture and Leadership, 8.