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Integrating the Land Vehicle Crew Training System Into Canadian Army Individual and Collective Training

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**Integrating the Land Vehicle Crew Training System Into
Canadian Army Individual and Collective Training**

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INTEGRATING THE LAND VEHICLE CREW TRAINING SYSTEM INTO CANADIAN ARMY INDIVIDUAL AND COLLECTIVE TRAINING

AIM

1. The aim of this service paper is to advise the Commander Canadian Army Doctrine and Training Centre (CADTC) in how the Land Vehicle Crew Training System (LVCTS) might best be integrated into the Canadian Army's (CA) individual (IT) and collective training (CT). Specifically, this paper will provide considerations for the formulation of a master implementation directive, so as to ensure army units receive the proper guidance upon delivery and fielding of the system to begin training immediately.

INTRODUCTION

2. An introduction of any new capability needs to be able to fit into the grander scheme and further CAF's strategic objectives. In terms of this paper, the scope of any new capability must also be well understood for proper consideration of the recommendations. This introduction will focus on both.

3. *Close Engagement* is the capstone CA strategy for the next 10 to 15 years. It is an acknowledgement that the Army's main contribution to a multinational division is at the brigade group level, therefore focusing its efforts to not only position itself to be lethal and decisive in close combat, but also to conduct both lethal and non-lethal activities at the tactical level to influence across the physical, moral and cognitive planes¹. The recently released *Canadian Army Modernization Strategy* aims to position the Army effectively to meet this challenge within the next half decade. As admitted in the publication, the change agenda includes elements of an action plan, "directing tangible initiatives to evolve force structure, readiness, sustainment, training, and personnel"². Combining elements of readiness, training and personnel is exactly what CADTC's *Future Integrated Training Environment* aims to achieve as part of this strategy, leveraging existing and developing technologies to blend live simulation field training (such as the weapons effect simulator or WES) and the synthetic training environment composed of virtual simulation (such as the LVCTS). "The goal of Army training is to provide ready land forces able to conduct operations effectively within the chaos and complexity of the battlefield"³. The LVCTS is certainly a step forward in the Army's fighting force's ability to be effective in close combat.

4. As Public Services and Procurement Canada is still seeking industry feedback at this time⁴, and knowledge of the project itself is restricted to a select few Directorate of Land Requirements personnel and senior CA leadership, this paper will briefly explain the LVCTS

¹ Canada. Department of National Defence. *Close Engagement: Land Power in an Age of Uncertainty: Evolving Adaptive Dispersed Operations*. Kingston, ON: Canadian Army Land Warfare Centre, 2019. 6.

² Canada. Department of National Defence. *Advancing With Purpose: The Canadian Army Modernization Strategy*. Ottawa, ON: HQ, Canadian Army, 2020. 2.

³ Canada. Department of National Defence. *A-FD-005-000/AG-001 - Future Integrated Training Environment*. Ottawa, ON, CA: CADTC. 1 August 2019. 1-2.

⁴ Canada. Department of National Defence - Defence Capabilities Blueprint (DCB). "Land Vehicle Crew Training System." Last accessed 24 January 2022.

project. The aim of the LVCTS is to “provide a virtual training system for the Canadian Army that will allow the crews of its principal combat vehicles to train in a safe and engaging environment”⁵. The LVCTS will replicate all crew stations within the Leopard 2 main battle tank (2), the Light Armoured Vehicle (LAV) 6.0, and the Tactical Armoured Patrol Vehicle (TAPV). The intent is to afford all crew members the ability to train with their Corps specific armoured vehicle in a virtual, yet tactile (to varying degrees), immersive and realistic environment individually or as part of a formed vehicle crew, and then collectively with other vehicles up to company and combat team level. While primarily geared towards infantry and armoured (both tank and reconnaissance) soldiers, LVCTS includes the capacity to simulate variants of the LAV employed by the artillery and engineer corps, who contribute key capabilities to a company group and combat team organizations. The LVCTS will permit crews to train as they would in the real world, in various training scenarios, ranging in design, intent, and complexity, “to enable crews and leadership to learn, maintain and improve their skills, using one or a combination of low, medium, and high-fidelity simulators”⁶. Once completed, LVCTS will be delivered to purpose-built buildings at the five major CA garrisons: Gagetown, Valcartier, Petawawa, Shilo, and Edmonton⁷. The real advantage of LVCTS, as compared to previous simulators used by the CA, is that it will connect to the virtual training and experimentation network (VTEN). This will allow all LVCTS stations across Canada to work together in the same environment, incorporating if needed other training simulators used by the Army and potentially connecting to other systems utilized by Allied partners. Constant refinement and upgrading of the project requirements have slowed the fielding of the project since its inception in 2008 (inclusion of the TAPV as requirement in 2015 for example). Currently, the initial operating capability is anticipated to be achieved in 2023/2024 and final operating capability is planned for 2027/28⁸.

DISCUSSION

5. Using low and medium fidelity systems⁹ for crew and collective training, such as the Interim Crew Gunnery System for LAV 6.0, the Leopard Gunnery Skills Trainer and Virtual

⁵ Canada. Department of National Defence - Defence Capabilities Blueprint (DCB). "Land Vehicle Crew Training System." Questions to industry. Last accessed 24 January 2022. 2.

⁶ Hogan, Daniel E. "The Land Vehicle Crew Training System: Integrating it Into Canadian Army Individual and Collective Training." Joint Command and Staff Programme service paper, Canadian Forces College, 2021. 2.

⁷ Canada. Department of National Defence - Defence Capabilities Blueprint (DCB). "Land Vehicle Crew Training System." Last accessed 24 January 2022.

⁸ Ibid

⁹ Canada. Department of National Defence. "LVCTS Statement of Requirements". Directorate of Land Requirements. 2019. - High Fidelity Simulator (HFS)/Full Mission Simulator (FMS): An exact geospatial replica of the complete corresponding vehicle crew station, including all vehicle systems, interfaces and controls. It simulates the entire crew station functionality available to that specific crew member. A HFS is so close to the actual vehicle that trained crew members can transition from the simulator to the actual vehicle, without noticeable changes. - Medium Fidelity Simulator (MFS)/Reconfigurable Simulator (RS): A blend of real and simulated equipment together. It simulates the most important crew station functionality available to that specific crew member, but the location and the look and feel of all the vehicle systems, interfaces and controls are not all exact. A MFS enables trained crew members to achieve the required skills to operate as part of a crew, and can entirely transition these competencies to using the actual vehicles, but the technical proficiency will require further training. - Low Fidelity Simulator (LFS)/Multi-Purpose Simulator (MPS): Uses commercial-grade computer and electronic equipment to broadly feature the corresponding vehicle crew station, systems and controls. It simulates the key crew station functionality. A LFS enables trained crew members to perform their key roles in the context of their numerous tactical employment scenarios, whether as part of a crew, groups of vehicle crews, or larger tactical units.

Battle Space 2 (VBS 2), is not new for the CA. Their use has augmented training methods as a tool prior to live training in the field, or simply as training event all to itself, for several years now. While each system has its own advantages and disadvantages, there is no system used within the CA that combines both high fidelity physical simulators and collective training scenarios “under a common high quality synthetic environment”¹⁰. Fortunately, Canada’s allies such as the United States and the United Kingdom have employed such systems, albeit to a lesser quality and scope to what is being brought with LVCTS, since the early 2000s. Lessons gained from their experience will be explored in this section and organized in following two categories: institutional fielding/delivery direction and unit command emphasis on using virtual simulators.

6. CADTC is responsible for the supervision, integration resourcing and delivery of land operations training¹¹. By its own admission, the G5 Army Training Authority has determined that such large-scale training-enabling projects, such as LVCTS, now require a “centrally managed, deliberate design and integration strategy”¹². A comprehensive integration strategy is essential. When the Close Combat Tactical Trainer (CCTT) (an older generation American form of LVCTS) was first fielded in the US Army in the early 2000s, published command guidance for its use was non-existent, and accounted for the disparity of usage between battalions¹³. While part of this could be attributed to army culture¹⁴, and its preference for live training, clear direction is essential in conveying the CA’s expressed intent on virtual simulation adoption to every battalion/regiment commanding officer (CO). An example with the US Air Force (USAF) and their simulators is particularly informative. “USAF policy changes requiring minimum amounts of [simulation based training (SBT)] (a minimum of three SBT sessions per month) led to a marked increase in simulator usage”¹⁵. Mandating training is important. Responsibility, however, must also extend to ensuring field units receive proper training on how to effectively use the system. According to a 2019 RAND Corporation report on *Collective Simulation-Based Training in the U.S. Army*, the mere access to training support packages could not guarantee they would be used to support training¹⁶. Furthermore, the report pointed out that a significant number of company commanders limiting or simply forgoing virtual training all together because preparation time was “time consuming”¹⁷. While CA espouses practicing mission command philosophy, in this case leaving methods of training to the discretion of the unit CO, this may be

¹⁰ Canada. Department of National Defence. “LVCTS Statement of Requirements”. Directorate of Land Requirements. 2019. 2.

¹¹ Canada. Department of National Defence. “Canadian Army Doctrine and Training Centre”, accessed 24 January 2022. <http://www.army-armee.forces.gc.ca/en/doctrine-training/index.page>

¹² Canada. Department of National Defence. *A-FD-005-000/AG-001 - Future Integrated Training Environment*. Ottawa, ON, CA: CADTC. 1 August 2019. iii.

¹³ Mastaglio, Thomas, Stephen Goldberg, Michael McCluskey, and Navair Orlando. *Assessing the Effectiveness of A Networked Virtual Training Simulation: Evaluation of the Close Combat Tactical Trainer*. Alexandria, VA, USA: Army Research Institute for the Behavioural and Social Sciences, January 2003. 7.

¹⁴ Straus, Susan G., Matthew W. Lewis, Kathryn Connor, Rick Eden, Matthew E. Boyer, Timothy Marler, Christopher M. Carson, Geoffrey E. Grimm, and Heather Smigowski, *Collective Simulation-Based Training in the U.S. Army: User Interface Fidelity, Costs, and Training Effectiveness*. Santa Monica, CA: RAND Corporation, 2019. https://www.rand.org/pubs/research_reports/RR2250.html. 85.

¹⁵ Ibid, 85.

¹⁶ Ibid, 97.

¹⁷ Straus, Susan G., Matthew W. Lewis, Kathryn Connor, Rick Eden, Matthew E. Boyer, Timothy Marler, Christopher M. Carson, Geoffrey E. Grimm, and Heather Smigowski, *Collective Simulation-Based Training in the U.S. Army: User Interface Fidelity, Costs, and Training Effectiveness*. Santa Monica, CA: RAND Corporation, 2019. https://www.rand.org/pubs/research_reports/RR2250.html. 97.

one area where rigid standards of practice and utilization rate policies may be beneficial to ensure proper adoption of the system. While prescriptions for utilization will be important, unit culture across the CA needs to be properly shaped.

7. Command climate and combat arms culture itself is an important factor to consider should implementation wish to be successful. Once again, the RAND Corporation report mentions that “research findings are clear that high levels of physical fidelity do not necessarily produce better learning or transfer of training”¹⁸. This would make sense. Clearly, it’s not just how well the system reproduces the vehicles themselves or provides training scenarios, it’s how it’s used by the end-users to improve performance. Additionally, it’s about convincing officers and soldiers that LVCTS is a critical step towards progressing to live training (including manoeuvre, employing real dismounted soldiers, and utilizing live ammunition). A 2006 US Army Research Institute for the Behavioral and Social Sciences report on the contributions of virtual simulations to combat effectiveness provides the following example for consideration. The research team generating the investigation on the effectiveness of the CCTT interviewed officers and non-commissioned officers of all rank levels from various battalion level units who had just returned from Operation Iraqi Freedom, as well as several Army National Guard Units. Respondents reported that when their units were positioned on their road to high readiness for eventual deployment, they were given priority access to live training (including live fire manoeuvres). As a result, live training was prioritized over virtual training. Since troops had trained collectively in the field, they did not feel the need to duplicate tasks in a virtual setting. “The overall impact of these factors is that deploying units did not consider CCTT essential to pre-deployment training and it was not included in training plans”¹⁹. Fore-going virtual training for live training is not the intent for the LVCTS. While it’s clear that virtual training cannot completely replace the feel and experience of live training (including training with actual dismounts and conducting live fire ranges), virtual training has its own merits. Virtual simulation allows for a challenging OPFOR not normally found in army training outside of large-scale exercises such as EX MAPLE RESOLVE. Another example is urban combat, which is commonly understood to be where a large portion combat would undoubtedly unfold should full-scale war occur. As explained in FITE, training in large urban sprawl such as cities “... is not possible to replicate those types of operations in existing range and training areas”²⁰. Command emphasis, as in what “the commander [at levels of battalion but more importantly the CO] views as important, either in terms of what the commander encourages or requires”, must be made to align with the where the army sees itself going to meet the challenges of tomorrow. The LVCTS statement of requirements provides insight into what this vision could be, writing that the system “will serve as a gateway to live training with units being validated on LVCTS prior to progression to live training in the field”²¹. Recommendations offered later in this paper will seek to address influence command climate and changing perceptions within the combat arms.

CONCLUSION

¹⁸ Ibid, 30.

¹⁹ Jones, Phillip N. Thomas Mastaglio. *Evaluating the Contributions of Virtual Simulations to Combat Effectiveness*. Alexandria, VA, USA: Army Research Institute for the Behavioural and Social Sciences, March 2006. 30.

²⁰ Canada. Department of National Defence. *A-FD-005-000/AG-001 - Future Integrated Training Environment*. Ottawa, ON, CA: CADTC. 1 August 2019. 1-2.

²¹ Canada. Department of National Defence. “LVCTS Statement of Requirements”. Directorate of Land Requirements. 2019. 5.

8. In summary, the aim of this paper was to provide considerations for the formulation of a CADTC master implementation directive of the LVCTS. While there are many factors to consider when implementing any new system, certainly one that has taken considerable time and money to develop, addressed in this paper's discussion were two key areas which would benefit to factored into the directive. CADTC must play a primary role for setting the conditions and the training policy guidelines, should it expect the project to be successfully adopted by the field force and by the Combat Training Center (housing the combat arms schools in Gagetown). Direction which lacks clear benchmarks and detailed information for the level of virtual training desired by CAF's FITE vision will hamper the attainment of this aim. Once delivered and ready for use, unit commanders and sub-unit commanders must be well educated on the advantages and possibilities of LVCTS. They must not become intimidated by the system either by ignorance or by workload aversion to exercise planning. They also must be made to understand how virtual training fits into the CA's mission of generating combat effective land forces²². "The CA intends to migrate a minimum of 20% of all live collective training and a course specific percentage of live individual training to virtual training conducted on the LVCTS"²³. Implementing these considerations as addressed by this paper will help to make the CA's intent attainable. The next section will provide some recommendations.

RECOMMENDATION

9. To best integrate the LVCTS into CA IT and CT, the following recommendations should be considered:
 - a. Unit virtual training subject matter expert (SME). Studies have shown that units who regularly used the CCTV were enthusiastic supporters and developed ways to expand usage and capabilities²⁴. Identifying a unit representative, such as the operations officer (Ops O), would aid significantly in fostering understanding of LVCTS' capabilities. Moreover, the unit OPs O, by virtue of the position, would be well aware of the updated training requirements for individual and collective training as refined by CADTC. The Ops O has a view on all training conducted by the unit and can, provided being authorized by the unit CO, amend sub-unit training plans to ensure that LVCTS has been properly incorporated. The unit Ops O possesses the ability to coordinate directly with the simulation center, as well as de-conflict with other units should scheduling issues arise.
 - b. Facilitating understanding of LVCTS capabilities. Sub-unit commanders and their staff must have easy access to training support packages, after-action reports, and other media that will help them plan their training objectives. While the simulation center's staff will undoubtedly be available to answer question or to assist with

²² Canada. Department of National Defence. *Advancing With Purpose: The Canadian Army Modernization Strategy*. Ottawa, ON: HQ, Canadian Army, 2020. 15.

²³ Canada. Department of National Defence. "LVCTS Statement of Requirements". Directorate of Land Requirements. 2019. 5.

²⁴ Mastaglio, Thomas, Stephen Goldberg, Michael McCluskey, and Navair Orlando. *Assessing the Effectiveness of A Networked Virtual Training Simulation: Evaluation of the Close Combat Tactical Trainer*. Alexandria, VA, USA: Army Research Institute for the Behavioural and Social Sciences, January 2003. 7.

planning, information must be made easier to access directly from the office or home of the interested commander looking to organize training. The information must be made simple to access, interesting to view (videos, interviews), and clearly show types of training that can be done for IT and CT. As recommended in the 2006 US Army Research Institute report previously mentioned, leadership guides should be developed to show how to integrate virtual simulations into unit training programs²⁵. LVCTS must continuously be well marketed towards its customer base. This means pushing readily accessible information into the hands of people where they work (either from home or on base).

- c. CADTC training requirements. The CA's intent is to make a minimum of 20% IT and CT training virtually based using the LVCTS. CADTC must make explicitly clear what steps in training progression must incorporate use of the system. If sub-units are expected to use LVCTS prior to conducting live fire combat team attacks, then it must be made explicit. Of course, sufficient flexibility must be built into any formal direction providing for any unforeseen issues such as LVCTS maintenance or break-down time, in order to permit the continuation of training. Conversely, LVCTS usage requirements that are too strict might run the risk of bottlenecking training. The number of infantry and armour sub-units wishing to train will find itself continuously competing for time both against each other in addition to several individual qualification courses. Unclear training requirements will make for varying standards of employment or usage across the brigades.

²⁵ Jones, Phillip N. Thomas Mastaglio. *Evaluating the Contributions of Virtual Simulations to Combat Effectiveness*. Alexandria, VA, USA: Army Research Institute for the Behavioural and Social Sciences, March 2006. 69.

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