

Training a New Generation of Soldiers: the Use of Simulation Systems in the Swedish Armed Forces

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By Eugenio Montalti

Abstract

Since armies existed, countries faced the need to train them. In fact, the level of training and the modernisation of the equipment, tactics, morale, and other factors less reliant on human capital determine an army's strength. This article aims at underlying how training techniques for the military are currently undergoing the biggest leap forward they have witnessed since the adoption of firearms. Here the author will take advantage of this topic to present his first-hand experience with modern-day military training techniques involving simulators.

Introduction

This paper aims to provide an overview of the trends that can be observed in military training. Sweden is the country in which the research has taken place, more precisely in its South, in the municipality of Lund. The first part of this piece will open with the presentation of the new contract signed between Saab and the Swedish government regarding the equipment needed to prepare future generations of soldiers. Second, the paper will present the case of Italy, another country that relies on different simulation systems to train part of its armed forces. Finally, the main part of this article will present what has been observed in the field in Sweden, revealing details of the soldiers' training, how the special forces learn how to use their equipment, and how commanders come to know how to manage their units. In a phrase, what happens in a modern-day day military exercise?

New investments in Sweden

The latest news confirmed that the Swedish Defence Materiel Administration (FMV) has signed a new contract with Saab to obtain military training and simulation systems. The company had already received their first orders within the framework agreement as of 18 July (Defense Here, 2022). The equipment ordered as part of the deal is made of systems suitable to train all ground-based combat, from individual to collective training (Savage, 2022). The head of the business unit Training & Simulation Åsa Thegström added that the equipment provided in support of the Swedish armed forces works and behaves like operational equipment. It is also "interoperable", providing the best possible training and filling in the necessity for exercise together with other nations (Defense Here, 2022). This deal will last for three years, and the orders placed as of the third quarter of 2022 for SEK 340 million are expected to be delivered to the Swedish armed forces between 2023 and 2025 (Savage, 2022). The equipment subject of this contract contains live training solutions for anti-tank, vehicle, soldier systems, and more (Savage, 2022). However, as per the statement of Hans Lindgren, Head of Saab Business Development at Training and Simulation, Saab has already held contracts with the Swedish Government as the one for the Carl-Gustaf M4 Ground Combat Indoor Trainer signed in February 2021 (Savage, 2022). The new framework agreement of 2022 allows the Swedish administration (FMV) to place orders worth up to further SEK 110 million within the next three years (Savage, 2022).

Observations made in Sweden by the author 500

The exercise here described is the one that has taken place in the municipality of Lund between 11 and 13 May 2022 and takes place yearly. The Finabel mission that occurred on those dates constitutes the only chapter source together with the author's observations. As stated by the commander who accompanied us, similar exercises take place in different parts of Sweden, such as the one in Skövde or Kvarn. Still, they operate at varying levels of command and training. For example, the centre in Kvarn hosts a smaller course, studies equipment development for handheld systems, and trains for combat in urban terrains (STA MOUT). The one in Skövde focuses on Command and Control (CC), tactical courses for the army, explicitly educating company commanders, tank and truck drivers, the development of units and hosts the main training facilities. The dedicated training needs three years to allow a future officer to become a Lieutenant and part of CC. However, the process they undergo varies from region to region. Soldiers usually select the location to train themselves, but they must be qualified and referred to the chosen facility.

Even the training has its hierarchy. Every training unit is managed by the Commander of the Training Unit. Below there are the Training Commander and Planning and Evaluation. This unit is then further divided between planning and evaluation, while training is divided into Command Post Training (LTA), Tank crews (BTA), Combat troops (STA KOMP), and Combat in Urban terrain (STA MOUT). LTA, BTA, and STA KOMP were present in the facility the author visited in May. LTA is responsible for time-critical decision-making. They take care of the planning, the implementation, and the time-critical decisions that can be made at the moment of the simulation. The plateau of scenarios used for the training is remarkably diverse. From attacks from the coast to parachuting, they can also consist of full-scale invasions. Nevertheless, all the scenarios train only for defence operations against other countries. These commanders teach from the personal level to the unit/platoon level, but not above that. The exercise is highly energy-consuming. Therefore, each unit undergoes them for only four or five days, once or twice a year.

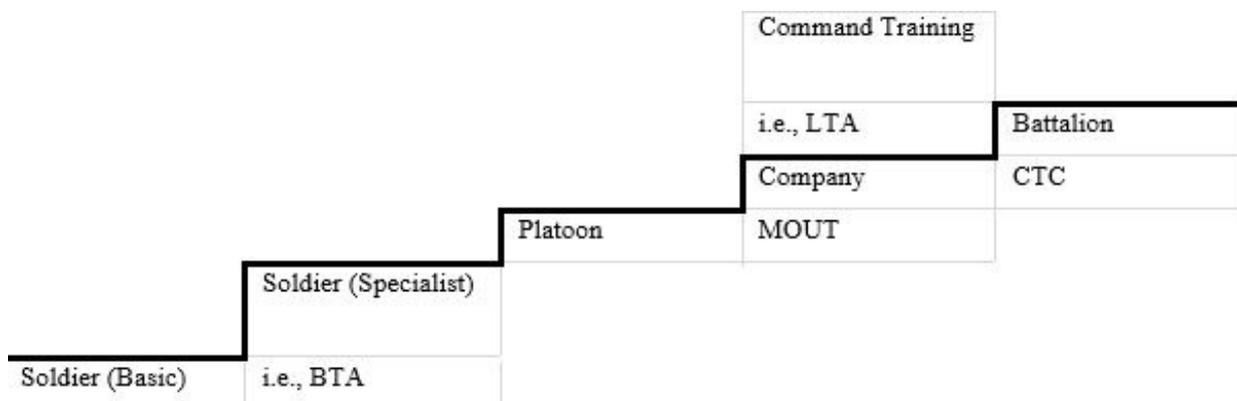


Table 1 - Training stairs



Figure 1- A tank (Leopard model) during the simulation

The Tank crews (BTA) undergo their training to be able to operate Leopard tanks of the latest generation comfortably. Because of the costly nature of their equipment, simulators at this level are not only helpful but also allow to save a lot of money. In the pictures can be noted the blue cartridges for the blank shots and the sensors and laser pointers that allow for a simulated battle with real tanks. The training simulators permit the soldiers to train in distinct roles of a tank's crew: the shooting, the driving, the tank command up to the company commander. In addition, training on a simulator allows the training commander to quickly provide feedback in the briefing room shortly after the training session. To feel how a real shot work, there are seldom live shooting sessions, but in the direction of the sea.

The training simulations of STA KOMP or Combat troops can involve up to three thousand players. The simulators can recreate the fire of other soldiers and the presence of mines and indirect fire such as bombings or artillery shooting and grenades. The soldiers that undergo this type of training with a simulator are dressed in their standard equipment and weapons. They are also made to wear a special vest and helmet covered with sensors which detect where and how they are hit, if that's the case. Furthermore, they are given a radio that communicates with them through sounds and vibrations information such as where they got hit, how bad, whether they are dead and even lets them feel if a bullet nearly missed them. After all, on top of their weapons, such as guns or assault rifles, even for long-range weapons, they install a laser pointer that fires their simulated shots while the gun is loaded with blank cartridges. Finally, a set of cameras is placed where the simulation takes place. All the ballistic information, soldiers' performance, their position, radio traffic, and behaviour on the battlefield are sent through 4G communications to the training centre for analysis. In our case, it was located on a truck equipped with very powerful antennae.

STA MOUT receives similar training. However, they usually operate in smaller groups, which are company size. They always train in urban terrains that are equipped with cameras and sensors as well. In this sense, Sweden offers one of the best-equipped training platforms in Europe, able to simulate fires, blackouts, indirect fire, and other adverse conditions. Another feature is the possibility of using houses of different types and even materials with a diverse set of weapons. For these reasons, they can boast about being visited and hosting the training of military and police of other countries.



Figure 2 - Example of STA movable trailer

Full-scale exercises such as the one the author had the opportunity to witness, hold immense value also for the Command-and-Control units. They experience similar levels of stress and pace as they would in actual operation. The trainers that prepare the exercise may, in fact, make them work with less information or wrong information, as it can happen in real life when the data collected is imprecise, lacking, or incorrect.

More information was provided directly on the site by Kristin Gadeberg (STA). Once the simulation is over, the team is placed in the trucks to coordinate and control the exercise and prepares a presentation with the highlight to be shown to the various units on what went well and what did not. In addition, more detailed feedback, up to the soldier level, can be sent during the exercise to the training commander on the field, which can brief a soldier or a platoon. The videos or data needed are sent through 4G to the battlefield. Smaller trucks or jeeps (STA trailers) are used to do this and extend the range simultaneously (see figure 2). Each trailer can support up to 15 movable trucks that fill in the blank spots of the bigger unmovable trailers. Alternatively, they can support up to 300 hundred players each. These smaller vehicles can be moved around in the field, to extend the network as needed and to the platoon to show the information they need, or for feedback and planning.



Figure 3 - A semi-movable trailer used to host CC

Due to this multiplatform system that connects trailers and smaller filler vehicles, the Swedish AF can use the entire country as a battlefield for their simulations.

Thanks to the technology in use, Sweden does not depend on the line of sight for information about the battlefield, both for training simulations and in case of war. Additionally, the training directors can replicate the shoots and provide the units with ghost fire support through the computer, but without additional personnel on the field. This allows them to set the training and manage it from a different part of Sweden, with great possibilities of saving money and keeping the personnel when needed the most. The trailers usually host around ten people who manage the local-sized exercises. When a battalion-size exercise (a battalion is composed of 600 people) takes place, they can host even 25 people. Brigade-level simulations need ten more people. Anyway, the Swedish military is not stopping innovating: new trailers that are even bigger, with the capability of two currently deployed ones should arrive soon.



Figure 4 - Stations in the simulation room

Finally, to design scenarios, operate the computers, and take care of great-scale simulations, the Swedish AF mostly rely on civilians as they can specialise more and for a longer time. Before being involved in battalion and brigade scale exercises, soldiers are trained personally and at the platoon level. In addition, the special forces need to try specific, more forces need to try specific, more expensive equipment such as Next generation Light Anti-tank Weapons (NLAWs), or drive tanks and other vehicles. The facility we tested hosts at least a room with 12 spots for soldiers, some of which can be vehicle drivers or gun operators (see figure 4). The systems are quite versatile as they allow the training commander to choose the settings, equip the soldiers in different ways, weapon and vehicle-wise, and set the session on other maps, with civilians or enemies dressed differently.

Another room is dedicated to training the overmentioned NLAWs, where five of these anti-tank systems, with the scope adapted to be synced with a monitor, help future special forces learn how to mount, point, and shoot them. The computer then displays the data of the shot, among which is the precision score (figure 5).

As seen above, the large-scale simulations and exercises, take place more rarely. In this setting, all types of ground units, most notably the ones listed above, are deployed together in a great area enclosed to the public. The territory is very diverse, between woods, plains, and hills. This grants the recruits to be ready for every situation and environment. All the tanks and armoured vehicles are covered in sensors that detect the simulated fire and give feedback to the training officials. Besides having the laser pointer for their weapon's simulated fire, each soldier is made to wear a vest that receives the inputs. These vests are capable of automatically detecting and switching between weapons systems. They are a new version of an outdated vest that lacked a sensor on top of the helmet. This additional sensor provides further precision in assessing the suppression of fire, bombing, tank shrapnel or direct fire when the soldier is lying down. Each one of these vests cost SEK 60'000 (€ 5'785).



Figure 5- the author trying an NLAW modified for training

There is also a bracelet that soldiers can use to stop the bleeding clock on themselves (if the injury is of a small entity) or on another soldier.

The judges of the exercise are provided unique pistols which can send different kinds of signals to the vest (suppression fire, wounded in a body part, dead, etc). The Swedish AF purchases these for SEK 40'000 (€ 3'857) each. In line with the price, this equipment is very resilient as none of them broke for almost ten years, needing just minor repairs. They can be cleaned dry with a brush; this has to be done even if they are covered in mud. One of the instructors indicated, however that while user-friendly, this technology does not recognise the difference between materials. Therefore, leaves protect just as much as a concrete wall in these training. For this reason, the vigilant eye of combat judges is still needed on the field.



Figure 6 - Soldiers wearing the vest covered in sensors during the simulation

Concerns and future endeavours

For the near future, several upgrades have been wished for by the training personnel. One of the main worries of the questioned soldiers was the need to manage the simulations at the lowest level possible to free up people in the command and control at the top. Otherwise, CC will grow bigger and bigger until the whole system will depend on them for the more minor task. Another frustration is that these simulators are built remotely at scale, with little room for tailoring them to the educator's needs. However, I believe the space for personalisation will improve soon. Moreover, the software in use at the Skövde base, Bohemia interactive simulations - VBS3 for military, for how versatile, is not complete. After testing it personally, it can be said that the graphics are the same ones in several years old video games. However, they implemented the same commands that are present on the actual vehicles, also regarding the weapon systems. Also, bombing effects are added manually; the same is true for close air support.

The normal soldier is still bound to use a keyboard and mouse to move, which is in line with the purpose of the training. Soldiers are there to learn how to work together towards an objective, not to test weapons, which happens on the field, with the systems mentioned at the beginning of the paper.

In the interest of Finabel's aim, all Nordic countries but Iceland and Denmark have 4G-based communication systems, which means they are potentially interoperable. Therefore, countries could extend the area of their simulations even beyond Sweden. Still, this is not possible since the systems' research, planning, and answers are different and uneven among these nations. Consequently, these technicalities need to be fixed before a joint training exercise can occur with these new simulation systems. Similarly, there is little information on when the 5G network will be utilised as the Swedish AF need to have it implemented nation-wide before considering relying on that infrastructure.

According to the author's observations, this system has further expansion potential. As of May 2022, the implementation of small quadcopter drones is just planned for an indefinite future. These could have a double use, simulating unmanned enemy systems and being an implementation for judging units. This adjunct would also serve the need for the modern armed forces to start training with UAVs too.

Finally, the framework of computers and antennae currently in place can potentially support more and more sensors, even on aircraft. However, there are no antennae, nor have they been tested.

Conclusions 150

In conclusion, Sweden appears to be at the forefront of investing in simulation systems and related technologies. The country can cope with the major NATO European armies in terms of capabilities. This does not come as a surprise since they had to work towards an autonomous defence until a few months ago. Another paper could find interesting the evolution of the relationship between Sweden and the US, its neighbours, and other European countries.

Through the years, Sweden developed a competent army and training system together with strong cooperation with NATO countries. This is exemplified by the Partnership for Peace (PfP) and Operational Capabilities Concept (OCC), programmes of which Sweden is a member of. Through these and their political far-sightedness, they achieved bonds of intelligence cooperation, similar sense systems and methods and a leading industry that fulfils most of their military needs. This paper tried to portray how far ahead the simulations technology is today in Sweden, assessing its potential and the most critical shortcomings. This kind of “on-the-ground” evidence-based research is becoming rarer for the academy in this field. The author tried to share his experience and observations with the ones that did not have the same opportunity.

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