# West Point Military Education Simulation: interview with Dr. Gordon Cooke

## *A Simulação no Ensino Militar de West Point: Entrevista com o Dr. Gordon Cooke*

**ABSTRACT**
The interview with Dr. Gordon Cooke, Director, Researcher and Associate Professor of the Simulation Center of the United States Military Academy West Point (USMA) provides support for a greater understanding of the importance of simulation for military education. The interview was conducted by videoconference and later via email in the ping-pong mode by Jerson Geraldo Neto and Efísio Alves Rolim Neto, edited and approved by the editors of the Journal, João Freire Junior and Arlindo José de Barros Junior. Throughout the interview, Dr. Gordon presents the structure and conception of the Simulation Center of the West Point Military Academy, addressing the simulators employed by the institution, its methodology, as well as the future perspectives regarding technological evolution in military education.

**Keywords**: Simulation. USMA. Military education. Methodologies for the use of simulation.

**Jerson Geraldo Neto**
Universidade Federal do Rio Grande do Sul - UFRGS, Porto Alegre, RS, Brasil
Email: neto.jerson@eb.mil.br
ORCID:
https://orcid.org/0000-0002-7612-5630

**Efísio Alves Rolim Neto**
Academia Militar das Agulhas Negras - AMAN, Resende, RJ, Brasil
Email: efisioneto2@gmail.com
ORCID:
https://orcid.org/0000-0001-5673-2567

**João Freire Junior**
Academia Militar das Agulhas Negras - AMAN, Resende, RJ, Brasil
Email: freire.jo@eb.mil.br
ORCID:
https://orcid.org/0000-0001-5068-0751

**Arlindo José de Barros Junior**
Academia Militar das Agulhas Negras - AMAN, Resende, RJ, Brasil
Email: barros.arlindo@eb.mil.br
ORCID:
https://orcid.org/0000-0003-0625-6835

**RESUMO**
A entrevista com o Dr. Gordon Cooke, Diretor, Pesquisador e Professor Associado do Centro de Simulação da Academia Militar dos Estados Unidos West Point (USMA) traz subsídios para uma maior compreensão a respeito da importância da simulação para o ensino militar. A entrevista foi realizada por videoconferência na modalidade pingue-pongue por Jerson Geraldo Neto e Efísio Alves Rolim Neto, editada e aprovada pelos editores da Revista, João Freire Junior e Arlindo José de Barros Junior. Ao longo da entrevista, o Dr. Gordon nos apresenta a estrutura e a concepção do Centro de Simulação da Academia Militar de West Point, abordando os simuladores empregados pela instituição, sua metodologia, bem como as perspectivas futuras a respeito da evolução tecnológica no ensino militar.

**Palavras-chave:** Simulação. USMA. Ensino Militar. Metodologias para emprego da simulação.

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## 1 Introduction

> Developed countries credit their Armed Forces with maintaining the integrity of their people, their territory and their heritage. For this, they seek to train their human resources with the utmost realism, encompassing the concepts of environmental preservation, economy, respect for human integrity, seeking both to instill technological ability and to improve the abilities of the individual, which is mandatory in today's volatile and dynamic world. Thus, simulators have assumed great importance in the world context as training tools to meet the demands of preparing human resources for possible armed conflicts. (FILHO, 2018, own translation)[1]

Simulation is now a reality within the armed forces and is used both for training troops and for training command tasks. It is divided into three types, the first of which is live simulation, in which real agents are involved operating real systems (weapons, equipment, vehicles and supply aircraft) in the real world. This is performed with the support of sensors, laser pointing devices and other instruments that allow the actions of the agents to be monitored and the effects of the engagements in which they are involved to be simulated. The second type is virtual simulation, in which real agents are involved operating simulated systems in computer-generated scenarios. Finally, the third type is constructive simulation, which involves troops and artificial elements operating simulated systems controlled by real agents, usually in a situation of established commands (BRASIL, 2020).

Today, the Brazilian Army has simulation structures spread across the national territory, such as the South Training Center, located in Santa Maria-RS and the East Training Center, located in Rio de Janeiro-RJ. These centers are aimed at training the troops of the high-readiness forces. In addition to these structures, the *Academia Militar das Agulhas Negras* – AMAN (Agulhas Negras Military Academy) has a Simulation Department, created in 2011, which has a Fire Support Simulator (SIMAF) and a Battle Simulator (SIMBAT) equipped with virtual simulation software.

At AMAN, the main focus of the Simulation Department is military education, mainly with the use of SIMAF for practice linked to the use of indirect fire, such as mortars and howitzers, and SIMBAT for the execution of techniques, tactics and procedures of mechanized and armored troops.

With regard to military education, the West Point Military Academy (USMA) has a Simulation Center, whose mission, according to its institutional video, is to educate, train and inspire

[1] Original text: *Os países desenvolvidos creditam às suas Forças Armadas a manutenção da integridade de seu povo, de seu território e de seu patrimônio. Para isso, buscam treinar seus recursos humanos com o máximo de realismo, atendendo aos conceitos de preservação ambiental, economicidade, respeito à integridade humana, buscando a capacitação tecnológica e das pessoas, mandatórios da atualidade volátil e em constante dinamismo. Assim, os simuladores assumiram grande importância no contexto mundial, como ferramentas de treinamento que atendem às demandas impostas pela preparação de recursos humanos para possíveis conflitos armados*.

the Corps of Cadets to face the challenges of modern combat through the design, development and application of simulation training programs based on broad spectrum technology. Within its teaching staff, the Center has Dr. Gordon Cooke:

> Dr. Cooke is a 2000 graduate of the US Military Academy. He served 6 years as a Combat Engineer Officer in the 11th Armored Cavalry Regiment, including a 12 month deployment to Mosul, Iraq. After leaving active duty, Dr. Cooke spent 12 years as a Research Engineer and then Scientist at the US Army Armaments Research, Development & Engineering Center (ARDEC). As a researcher in the Tactical Behavior Research Lab, he led projects investigating the effects of non-lethal weapons on human targets, as well as how soldiers/users interact with weapon systems. Many of the projects in the lab involved the use of simulators as well as the creation and building of their own custom simulation system for the lab. While working at ARDEC, Gordon completed his Masters Degree as well as Certificates in Ordnance Engineering and Biomedical Engineering. He was selected for an Army Fellowship by ARDEC and completed his Doctoral work collecting empirical data and modeling the relationship between impact forces and the chance of a person falling to the ground. In 2013 Dr. Cooke became one of the inaugural faculty members for the US Army Armament Graduate School teaching classes such as Statistics, Research Design, and Interior Ballistics. Dr Cooke has received a number of awards, including the US Army Research & Development Achievement Award twice (2013 & 2015), the Military Operations Research Journal Award (2018), the Kurt H. Weil Award for Masters Candidate (2009), and a Best Paper Award at the 26th Army Science Conference (2008). He has presented at conferences throughout the United States and Europe; has authored more than a dozen peer reviewed papers; and written over 50 government technical reports. (COOKE, 2022).

In order to understand a little more about how the USMA uses simulation in military education, its methodologies, resources and prospects for the future, we talked to Dr. Gordon Cooke, who kindly granted us this interview. It should be noted that the opinions expressed during the interview represent his personal views on the subject without any connection with the US armed forces or with the West Point Academy.

**Image 1:** Capt Neto and Dr Gordon Cooke

**Source:** the authors

## 2 West Point Military Education Simulation: Interview with Dr. Gordon Cooke

**Interviewers:** Combat simulation means have evolved considerably over the last few years, from the development of new software to equipment that provides the use of virtual and augmented reality. With this structure, it is possible to carry out experiments in order to bring the cadet closer to the reality of combat, either by simulating the engagement of targets in a virtual firing range, where only the elements of ammunition trajectory and target engagement are simulated, or even the command of complex combat groups, such as a squad of tanks, using equipment, vehicles and weapons simulated in software such as Virtual Battlespace Simulator and Steel Beasts. In this context, which equipment and software does the United States Military Academy currently use in military education in order to carry out combat simulations?

**Dr. Gordon Cooke:** We use a variety of simulations. The US Army has what we call the program of record systems. Those are the systems that the Army, as a whole, has invested in and provides across the entire Force. Things like our Marksmanship training is what is called the engagement skills trainer, which is a small arms weapons Simulator: the physical rifle and we also have the machine guns and the 84s and then a projected screen with the virtual targets, you can shoot at the screen from about 20 ft away. So, that is it, a program of record system. We use it and the whole Army is using also. The Army provides that to us. As one example, we use the Marksmanship training as part of our rifle training program. we also use it sometimes in the classroom. It was meant to learn how to operate the weapon, but we use it for when the cadets have to learn direct fire weapons control or machine gun theory. So, they are not learning how to operate the actual weapon per se, but as the leader, how do you direct these different weapons? Where should the machine gun be directed versus the rifles? How do they interact with each other? What do you do when the machine gun has to reload? It is a way to put the cadets in that scenario and stick through those tasks.

Another program of record systems, the VBS3 from Bohemia. We have that software and that's through the Army. The Army uses that for collective training test and simulation centers all over the Army. We get that provided to us that way. We use that for a whole variety of things. The first time that cadets use the land nav training with it. They get their character, no weapons, but they have a compass and, in front of the computer, a physical paper map. But it gives them a 3D view of the world, so they can practice how to associate what is on the map against what they can see to find where to go, using the compass Azimuth to get there.

It's nice because if they get lost, the instructor can see it on the master screen and we come over and help them move back to the last known point. You're not actually going to spend the night in the woods if you get lost, right? They can build skills before we put them in the actual forest. We

did use the Army's program of record for a call for fire. Observing artillery impact and then making the adjustments to get on target when you watch artillery. We stopped doing that because those programs of record systems tend to be around for a decade or more, and the Army spends a decade developing them, so they can be very antiquated by the time technology is updated. Instead of using the dedicated system, one of our workers in the Sim center took VBS and built out that same capability using it. Which ended up being an easier system for the instructor interface. That is just an updated newer set of graphics. It runs on standard computers and doesn't need specialized equipment.

We still train that task, but we developed an in-house solution using VBS to do that. We also have a commercial off-the-shelf software, things we purchase just to meet our needs. We are training cadets coming from civilians into being officers to do an officer's task. They don't necessarily know how to do and we don't have soldiers around. You know, we're planning platoon tasks, but you don't have a platoon. They barely see a lower enlisted soldier and there are very few sergeants to interact with them. That is a need that we have but the rest of the Army doesn't, because no one else is training new officers.

We recently started working with is a software called Combat Mission Professional. It's made by a company called Battlefront (that's the developer). You also see it through Matrix Games. There are other names over the UK as Slitherine. The Matrix/Slitherine is the company that is selling it. Battlefront is the one making the software. If you look on *Steam,* you'll see Combat Mission Shot Force 2, which is all based in a notional Syrian conflict. There is a combat Mission Black Sea, which takes place in Ukraine and actually released before the invasion of Crimea, like two days before… and those two are kind of modern era 21st century militaries. They also have a variety of other ones that are historical based on the commercial side. World War II… they recently released a Cold War-era one, with kind of a 1980s 1990s technology, a notional NATO vs. Russia conflict. But the Combat Mission Professional, we're working with it and the UK is working with it. It's kind of new. They basically took the game engine and then set it up so that it's all modern forces, and there are different levels of the license for how much capability you want. The UK is using it for analysis type simulations. We're using it for teaching Cadets as a training tool. The professional has that, under the higher-level license, you can add to it all kinds of things the commercial games can't. Like, changing the make-up of the formations so that your squad has a different number of people, or the weapon system as a different capability to, then, run the analysis on it. What it is, I guess should describe it, so VBS, you familiar with that, I assume.

**Interviewers:** Yes.

So, each user behind the computer is one soldier. If you want to run a platoon operation, you need a platoon of people involved. And half of them are going to be Rifleman. So, if you are trying

to train Cadets out how to be a Lieutenant, half of them being Rifleman doesn't get after it. Combat Mission is: each user in front of the computer is in charge of the entire force, so we set it up as a platoon mission, they are in control of the entire platoon and you're directing squads. You click on a squad and tell the squad where to go instead of individual soldiers. You're not going to reach down to the level of telling one soldier to move over behind a certain tree. You're going to tell a squad to go to a certain location on that side of the hill, which is more realistic, right? And then it has some AI behind it: when you tell a squad to do something if they get ambushed on in the route, they will react to the Ambush. The squad leader might throw smoke to help with that, they'll decide they might retreat out of it or they might attack into it based on how large the ambushed force is. Those kinds of things, in the real world, a Lieutenant doesn't do. A Sergeant makes calls for you and you didn't tell them to do that. The game does that too. Sometimes things will happen, you didn't tell them, but you also don't have to tell them all those minor details.

We also have a CAVE system, a Computer-Assisted Virtual Environment, it's large-scale visualization. First, I would prefer to be with the curved screen thing but, but we got three very large screens, like 12 ft at a 45-degree angle to each other, so in the corner of the room you get a curve. You can bring in the entire class and see this big wall of video. We use that in several ways. One of the things we've done with it: have a couple licenses of VBS 4, which just came out, just got higher and Graphics to it. It also comes with one world terrain so there's an entire planet Earth that you can take any location and it will have a terrain already in there, in terms of, at least, the shape of the ground, and the mountains and what not. And also, where the forests are and things like that. Not necessarily every building and road, but the terrain is there. We can put that up on the whole wall and have another projector pointed down like a table a whiteboard table, so we put a map for you on the table and then the wall is showing what you would see if you were standing in that location.

The instructor has an Xbox controller and can move the camera around, it's a good way that we can use that. It's kind of a virtual terrain walk. Instructors could just talk about the terrain: if you're talking about the machine gun´s theory, you could look at that terrain and say where should we have the left and right limits? How do we overlap the fires? Where's the dead space? what do I identify? We've used it for weather discussions because you can go in the software and make it rain, you can make it rain harder, you can make it snow, you can go through the light cycle from dawn to BMNT or BNT, and twilight, and daytime, and talk about the effects of that. We´ll put a scenario: there's some enemy in a little camp with some soldiers patrolling on foot. We go through the weather, how well you can see those guys in different conditions? what´s that means? what do they have to do differently?

We've also used it for situations when early Cadets have to learn what an infantry formation looks likes in a wedge or in a column. We have a scenario where there are just these little lanes and one of them has got a platoon in column the other ones, in squad wedges platoon column. So, the instructor can show that. You can take the camera down to the ground level view and you can to take it up, so you can see the entire formation walking across the grass and then you can show them what that looks like, what are those different formations. It's a little more visual and engaging for the cadets.

We've also used it during the pandemic, we couldn't go on staff rides. Normally, staff rides would be: you take a group of officers and you go to some battlefield and you're physically on the battlefield. To talk about the history of that or how, when, a kind of an AAR (After Action Review), and it could be a historical battle from the Civil War or the Revolutionary area. Army units take their officers and do that kind of thing all the time, based on what battlefields are near their base. As you move to the Army, you go to different places. During the pandemic we couldn't travel, so they did a virtual staff ride. One of the courses usually goes down to Gettysburg and talks about the Battle of Gettysburg on the actual terrain. We were able to use that big visualization and bring up virtual images of Gettysburg and they can go to the different locations around the battlefield and have that same talk and look at the ground that way. That one, I think we used, instead of a game engine, 360 photos, because it's a historical site. If you go online, the park system had made 360 photos of all the different historical places that we would want to go, the different views from both sides of the battle. So, we will pull those up but then they're like basically life-size on the screen is so big, it's photos of it, so they use the data way.

Sometimes in class, maybe in VBS when they're going to execute a mission, we will take the platoon, a platoon leader and squad leaders, and they'll do their leaders Recon, we will bring them into that CAVE and they have to see objective beforehand or some instructors will take them into that set up after the simulation and do their after-action review on it, because they get the whole class around see one big view of the battlefield. It's just a large-scale visualization screen, but there's all different ways to use that capability.

We were just rolling into the virtual reality and augmented reality space, we have a couple augmented reality systems. We're working with a vendor who has a prototype, we are checking it out and giving them feedback on what kind of that technology is coming, and we want to be positioned when it turns into something better, we already know how to use it, so we're working with some of that.

We have multiple VR headsets, so to look at the different vendors. We've used them in a kind of a small, very small scale. We're adjusting on the cusp of going into making them part of a more formal program. Every Cadet who comes through the course uses VBS. Their headsets are not there

yet but we're about to be there. We've been looking into the different software that are out there, or what we have to do to make it work, what are the challenges. We were trying it out.

The one application we did use for VR for several years is now actually working with the therapists and counselors. One of the graduation requirements for our Cadets is to walk off the 10-meter board into the pool, in full Combat Uniform. To stand up there on the 10-meter platform and walk off it and drop in. Some Cadets, when they first come, they don't even know how to swim. Swimming is a mandatory class, they'll have to learn how to like it. The lowest level is just survival swim, that's what they call it. They have to learn how to not die in the water. So, you can understand it's a difficult thing for some people, and to a graduation requirement. For those who have very much difficulty with that, there is a center for performance. That's basically, psychologists and therapists, they also work the sports teams just on sports psychology, helping him perform better, it's all about performance. But for those Cadets who are at risk of not graduating, they do cognitive behavior therapy, and we work together with them. You can put on the VR headset and have a Cadet take a 360 camera, and basically, just go off that thing, we have got a lot of footage of how the task goes. So, these Cadets are having trouble with it, and put the headset on, and they're in that like "this is what it is". As they walk upstairs and as they get up to the platform and then jump off, and the therapist just gets into the whole (idea), that's their job in terms of how the therapy works with that, but they're sitting there right next to them in the room, as they go through it virtually, and get all that sensation of seeing, "*Oh my God I'm so high*", and talking to them, "how do you deal with that stuff? How do you overcome that?" And that's a whole series, out of my realm of how the therapy works. But they do a whole series of things, first, they just start out and working with them with something like walking up the stairs, visually being at that height and looking down, and then finally get through being used to actually seeing that site as you walk off and drop before they got in the pool. That was kind of an application would be doing VR for a while.

I built out a different call for fire trainer. I built some things that I've got to run over the web. I'm really excited to do this, if you're not aware there's a technology out there now like *webgl*, so, we can do kind of like 3D gaming over the web interface. You don't have to install anything on the local computer, which is nice, because you don't need specialized equipment. For some of these, you can get your cell phone put a QR code up on the screen. The cadets go to it and the right end of the software, you can deliver a simulation that way. I can work on one's kind of round call for fire scenarios, you could do the observe fire here where the AC targets try and figure out the grid coordinate and call in the rating of the artillery on that position. When you see the first round land at, you know shift left 10 drop 100, or shift and right at, whatever, it is you got to do to get the rounds on target. I'm looking for other tasks (like land navigation), I just like the idea that it's if you have a

web browser you have the software. That's something we can use across the entire country. For example, if some Sergeant who needs to do his pocket training, they got some spare time with his soldiers sitting under the tree can do that.

**Interviewers:** For training troops, there are fire support simulators for different training purposes. In the design of these simulation software, there are companies that use existing tools to produce a simulator, such as ESG Elektroniksystem that used VBS 3 to make an Artillery Observer simulator integrated with air support. Other companies produce simulators made specifically for a certain military unit that cannot be found on the market, such as Oesia, which made the fire support simulator specifically for AMAN. In this context, what was the design of the West Point Simulation Center simulators?

**Dr. Gordon Cooke:** A mix. The EST system, that we use for rifle marksmanship training, is a system for kind of development specifically for the Army, not necessarily the Academy. They probably do commercially sell it to other militaries, but the original designs were done by the military before they went to a company and then spent it all further. That wasn't developed necessarily for the Academy. We do have, like I said, Combat Mission is what we're using and we've just purchased commercial software and use that, or even open-source software. We use Vassal for a little while to support some courses. And then we do also have things that we've developed in-house a little bit, or what we're doing right now for artillery Observer fire. I mean, we didn't build VBS from scratch, but, building out the artillery simulation capability with all what an instructor can do and just input what's needed to be input it in and having that interface. So, you are not working directly into VBS with something we've built in house. There are some things we've developed and flushed out in-house. Some things we bought off-the-shelf and some things the Army has provided to us because we're an army unit and we can get it.

**Interviewers:** Our Simulation Department, which can be divided into two parts, the Fire Support Simulator, focused on training indirect fire groups that employ artillery means, such as howitzers and mortars, using a structure based on an observation post , a structure made in order to simulate that the soldier was on the ground conducting fires, the real calculators, which perform the necessary calculations to carry out the fire on the target, and the sensorization of the weapons to verify if the calculated data referring to trajectory was entered correctly by the gun operators. As soon as the shot is carried out by the assigned group, the shot is simulated by the computer and reproduced at the observation post. In this case, there is an interaction between the modalities of virtual and live simulation. Does the West Point Simulation Center have any structure in order to carry out indirect fire training, similar to the AMAN Fire Support Simulator? Or is there some kind of interaction between different simulation types?

**Dr. Gordon Cooke:** Yes. We train all the cadets on how to adjust fire. They all have to fire a cannon, and fire mortar. So, over their second summer with us, we will have a battery come up, and set up a battery of artillery, and some mortar systems, so they will get a couple of artillery training. They're not all going to be an artillery officer´s, but to all of them understand the systems. They get some classroom training. We go into simulator in which they actually put the simulator into a building that's right behind the gun line. They do it on the same day and they can just walk right around the building and there's too physical cannons sitting right there. They all rotate through the addition, they get to load and fire a cannon, then they go out to the hilltop to observe fire with live rounds also. They also have a lot more reps in using the simulator than they do live rounds. They also get to do that with a mortar, but we don't get into the fire direction control center of how you calculate the fire mission, how you calculate the elevation of the gun, or do all that math. They don't get into that. They have to experience loading and firing a cannon once, twice. The main task is: when you're requesting artillery, how do you do that by Grid or by polar coordinates? And then when you see rounds impact, how do you use the binoculars to adjust fire to get it on target?

**Interviewers:** In order to get a correct use of simulation equipment without what we can call negative training, where the simulated elements end up generating effects contrary to those expected, what are the precautions and methods used for the preparation of exercises involving the use of simulation? Is there a manual that guides how the activity should be conducted, or any document that regulates this methodology?

**Dr. Gordon Cooke:** We don't have a specific regulation policy manual about that. It's more how do we do it. So, what we do with the Cadets is: the instructors that want to incorporate something into their lessons will come to the Simulation Center and work with our Personnel to build that out. And our instructors are not experts on what the capability of the Sim systems are, or how they get built to what is there, but they're the experts in the Tactical task that they want to teach. So, they'll get together with our developer and (work on) what's the scenario? What are we trying to get? And then we'll look at where we can put these forces into or (decide), do you want the enemy to come in on a tank, you want them to have pickup trucks? That kind of things.

Generally, what ends up happening is: we have some of the instructors who just have ideas; and like one instructors is going to do something to try out with just their one class - because most of these military science classes, every Cadets takes them. There are lots of sessions with different instructors. And one instructor wants to try something out, other instructors will see it, they might start doing it too. And at some point, if it's working well, the course lead might incorporate it into the actual course and then it becomes something that every instructor is going to do. So, we have a number of simulations that, in a certain lesson, every instructor and every Cadet from that lesson is going to

come in and run that particular simulation. And they'll all run in the same scenario. That started out with this thing (situation) where some instructor had a good idea and wanted to try something out, and they do it with their one class. Sometimes, with that first one (attempt), things aren't quite right, and we are okay with that. They experiment, they try things out and it helps us improve, because they see what parts of it work well and what didn't, and they make the adjustments make it better.

**Interviewers:** Do you think that after the inclusion of simulation mechanisms in teaching, there was an improvement in the performance of cadets in terms of absorbing knowledge and adopting new practices?

**Dr. Gordon Cooke:** Yes, we see that. It's what I noticed. I've polled my class (to check) what they think. The use of simulations is much more engaging, especially when the alternative is to sit down in a classroom and show your PowerPoint slides. It gets them involved, it gets them to practice things. I've noticed they internalized they're learning better and faster when we stand in the classroom and tell them: you need to do this thing because here's why it's important. They might memorize that, so that they can write it back out on a test, but they're just parroting back the way that we said it. They don't necessarily understand it. When we run in the simulation, they really get it, then they understand it in a more in-depth way for the comprehension. We're dealing with Cadets that are fresh out of high school that never been in the military before and we're turning them into officer. Some of those things they have to learn are very low-level, I mean, if you've already been a Cavalry officer for a number of years and you're a captain, it's going to sound like really basic stuff. But for them, they just understand like: "indirect fire is really powerful", or , " if I go out of the wood line and they've got enemy helicopters with 30 mm gatling guns, I'm going to lose an entire squad". We can tell them that, but when they're in a simulation and they send a squad out of wood line in the whole squad goes away in 2 seconds, then they get it. That's what I think it really brings to the table. They get to experience things and then they really learn it.

**Interviewers:** The simulation platform of the Simulation Department was created based on the requirements and weapons existing at the time it was implemented, in 2011. However, new weapons emerge, as well as the doctrine of their use in the field. For example, last year we had to include the firing table of the 81 mm mortar so that it could be used in the virtual simulation. How does the West Point Simulation Center deal with this issue of including new weapons in the simulator and what would the process be like?

**Dr. Gordon Cooke:** For us it doesn't come up often, because we focus on the standard, example: here's the weapons and an infantry platoon. And until the Army changes that, we don't really need to adjust this. This not a frequent problem. Like when the Army moved from M16 to M4 carbines

as the standard weapon, if the Army is doing that, then the Army as a whole is thinking about training simulators and integrating the main. When the Army switched from M16 to M4, they had to do that across the entire Army, and we were on the fielding plan to eventually get sent M4 to replace the M16. Now, in that case, how to operate the two of them is not that different, and we were at the bottom towards the bottom of the list on fielding, because they needed the active units to get them first. So, we could train with the M16 until the M4(s) were delivered.

If we talk about something like VBS, that's going to get integrated into that software. They're updated, it's already there. We can just start using it If it's not. A lot of those gaming simulations (we are using), we can just look for analogs: what's the closest thing to it? The way I look at it, for the Cadets, I think, it's more important to think about the weapon systems in terms of its kind: is it a rifle, a light machinegun, a general-purpose machine gun, an anti-tank rocket? Then getting into the specifics, for example, of an AK-47 vs. an AK-74 vs. a QBZ-95 on the enemy side. It's a rifle! Pretty much every small-arm which was a standard small arm when I was a Cadet is no longer in the inventory, is no longer the standard. They're around but we replaced the rifle with a new rifle, we replaced the general-purpose machine gun since I started it out, we've replaced the grenade launcher, we've replaced the pistol, the mortars have been severely updated.

Understanding the specifics of that weapon system is not as much as to understand how to employ that combinations of capabilities that you have, in a more general sense. But then again, we're also not doing that, like the mortars, we're not training a specific mortar system, because they're not going to be mortar men. Whereas I tell you that there might have a little bit of that going on. That's part of it too, I guess.

**Interviewers:** The Fire Support Simulator has real terrain virtually modeled in order to train a troop before live firing on the same terrain. Despite this, there are new training needs for troops, and new ones need to be modeled. The software used for this terrain creation is TerraTools, which is operated by trained military personnel who use georeferencing information acquired by the army itself. How does the West Point Simulation Center produce the terrain that is used in the simulators and how is the modeling done? Would it be the army itself that performs or does it depend on some company?

**Dr. Gordon Cooke:** A mix. It depends on the system. As for VBS3, to build an entire new terrain, we don't do that in-house. If we needed something specific, we reach out and have that made for us and sent in. But across the US Army, we have a library of terrains to pick from, all ready. I guess the one custom, when we first got it years ago, was the West Point terrain. We can go back and forth between a lot of things that are conducted just on the West Point terrain. So, we've been using that same terrain over and over again. And we do that because we have the maps, and it helps the

Cadets because they have physically been on that spot. So, for classroom discussion, they all have a common picture of what that terrain is like. Most of our Cadets have never been in a jungle, so talking about jungle things gets a little bit harder. And some of them are from the Midwest and have seen the desert, some of them have never seen that. Some of them never experienced snow before they got the West Point, some of them grew up that way. But they've all been on the West Point terrain and they know what our terrain looks like, when they look at the map, they're familiar with it. So, they can associate to what we're talking: "*hey, remember when you out there, in the summer, and we came up black cap Mountain...*?"

We have some other courses that we do things (like that). We suppose that we don't want them to only understand this one map sheet because all we have is Northeastern, Deciduous Forest, Rolling Hills with rocks all over the place, because it has the glacial Valley. That's all we've got. And we can't have them only know that. We'll pull map sheets from around the world and give them other terrains to consider for their homework assignment.

Let's say we're on a test: it might be a map sheet from Korea, it might be from Germany, it might have other maps to pull from.

On the Combat Mission, I built all the maps that we used, it easy enough for the system to do that. And now, the VBS 4 has got one world terrain, so we can just click on it and go anywhere on the planet. I guess it was provided to us. We'll do some internal editing, so, things like placing building in certain spots, rotate the building, or make it look a certain way, we can do that in-house.

We are working with our Geography Department, because it's part of the geography discipline to look at how to create maps and Geo Data. They do things like flying a drone over an area to try and turn it into 3D terrain meshes and point clod data and things like that. And we do work with them. They will then generate things to pull into the simulations. And some of that (they're looking at) can be a little cutting edge. That's happening too.

**Interviewers:** Here at AMAN, we have a study group with the aim of verifying the possibilities of including new simulation resources with the use of virtual and augmented reality in teaching and there are also works being developed with the purpose of developing new simulators. Is there anything similar being done at the West Point Military Academy?

**Dr. Gordon Cooke:** A small bit, so, I'm the one PhD (on it). We've done it a few small things looking at it, like I said, we did a little small study: if we did the marksmanship training with a different method, do they do better when they get to the firing range? That can guide our internal, should we change up our Training Method? What we've also done, we support one of the army level simulation programs that are going on. The Army, as a whole, has an entire group that works on developing simulations and research for simulations for Army. You've probably seen things about the

IVS program for the augmented reality headset for the entire Army, that's been talked about publicly. There's a replacement for the EST Marksmanship trainer that's being developed. We'll work together with those groups. So, if they have a prototype, that will bring it up to us, so we get some of our Cadets who can get the experience of seeing this new technology and helping out working on it. We get a look at it before it is actually available for everybody else. The developing team, which is external to the academy, get access to some people to try it out and get Hands-On and give feedback and see how it works. They take it out to our training area and take it out of the lab and get it to a real environment. We have some of that going on, we support that kind of effort. We're not in the lead on the research and development, but we work together with them to help make the research development happen. We're very interested, internally, in looking at what would be a better simulator, or, as we get new technologies, new softwares, trying it out and seeing how it works. Does it work better for the instructors or not? It is a low-level thing, but we do that.

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