LVC Training in Korea:

The Army's Training Vision for the Future, In Execution Today

BRIGADIER GENERAL JOHN D. JOHNSON

The 2nd Infantry Division's experiences using live-virtual-constructive (LVC) training techniques to train Core METL (mission essential task list) contains the seeds for the future of training in Korea, and may portend Core METL training methods for the rest of the Army.

The environment provided the ideal vehicle to perpetuate this Army-level initiative while achieving the battalion-level readiness necessary to fight and win any future conflict in defense of the Korean peninsula. The **live** portion of the LVC concept includes Soldiers training on real equipment in order to familiarize them with their individual and crew-level skills using their weapons and C4I (command, control, communications, computers and intelligence) systems. The **virtual** portion of the LVC concept includes Soldiers training on simulated equipment. The **constructive** portion of the LVC concept is defined as computer-generated and controlled units and systems that are tracked and commanded by the live and virtual components.

The fundamental challenge facing us was the capacity of the training areas. (See Figure 1). For those who don't know, South Korea is an incredibly dynamic place to be stationed. With the tenth largest economy in the world, the country is awash in construction and modernization. As a predominantly mountainous country, level land is at a premium for construction of homes and businesses and for agriculture. As a result, there is ever-increasing development in what has historically been the primary training area along the Demilitarized Zone in South Korea.

The prime maneuver training area is a Republic of Korea Army controlled site called Twin Bridges Training Area (TBTA). The training area is approximately 2 kilometers by 5 kilometers. Very representative of Korean terrain, it equates to a company-sized maneuver corridor. Traditionally, battalion operations in this training area were limited to employing only portions of the battalion at any one time. Additionally, like any small training area, the Soldiers and leaders are inevitably led to the "approved" tactical solutions for how to fight at TBTA.

A second key training area in Korea, and one managed by the Eighth Army G3, is the Rodriguez Live Fire Complex. This complex holds the most modern and digitized ranges in Korea and supports up to Bradley and tank platoon live-fire qualification training. The usable maneuver training area due to terrain limitations and live-fire impact area restrictions is five square kilometers. The complex also holds a $27 million, state-of-the-art urban training area, the Combined Arms Collective Training Facility (CACTF). The CACTF has 29 buildings of every shape and size, is fully equipped with the best of video and audio capture capabilities, and many other training enhancements.

Common to both Rodriguez Live Fire Complex and Twin Bridges Training Area

Photos by Private First Class Antuan Rofe

Soldiers with the 2nd Infantry Division participate in the live portion of and LVC training exercise.

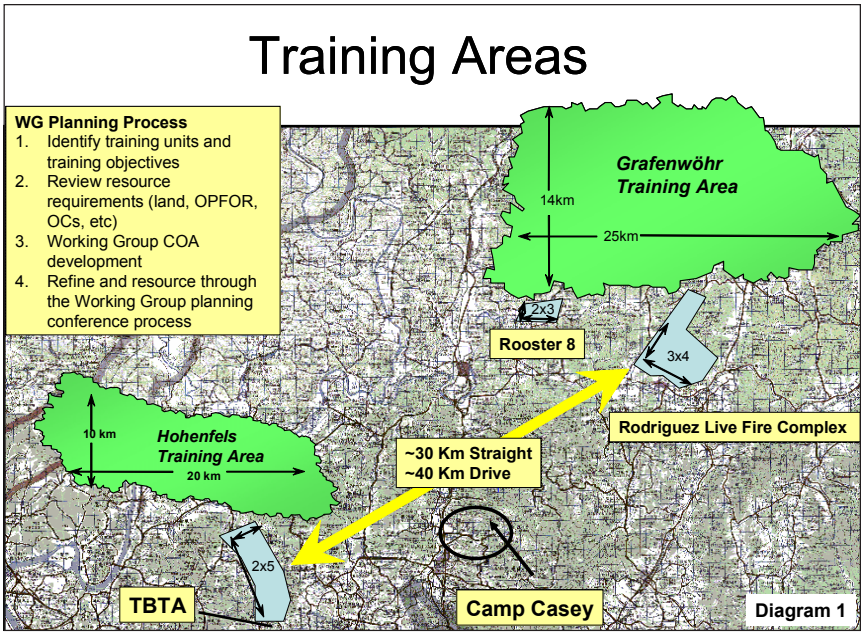


Figure 1

is the close proximity of small towns and farmers' fields which limit any staging areas for combat training short of the actual battlespace. This further limits battalion-level training and tactical scenario options.

To compensate for the limited ground maneuver training areas, Eighth Army has an impressive suite of virtual and constructive training systems. For virtual training systems, located at Camp Casey, we have the Close Combat Tactical Trainer (CCTT) with 14 Bradley, 14 M1 tank, 2 Semi-Automated Forces (SAF) workstations, and other assorted support simulators. At Camp Humphreys, we have located the Aviation Combined Arms Tactical Trainer (AVCATT), with the ability to train up to six aircraft in any combination of AH-64 Apaches or UH60 Blackhawks. The AVCATT is situated in trailers that are contracted to be repositioned within Korea up to twice a year.

For constructive training systems, in addition to Corps Battle Simulation (CBS), we are supported by the Entity Resolution Federation (ERF), with its centerpiece — Joint Conflict and Tactical Simulation (JCATS) (also located at Camp Casey). JCATS is the primary training tool for battalion and brigade command post training in the constructive environment.

It is worth noting here also, that we had access to an amazing new training device called Initial-Home Station Instrumentation Training System (I-HITS). The I-HITS system is essentially MILES 2000 with a mobile instrumentation package that provides CTC-quality battle tracking and training feedback for use in home station training. I-HITS includes real time tracking of each instrumented entity (soldier or vehicle), training unit communications capture, firing vectors and portrays and adjudicates obstacles and indirect fires.

During exercise design, it became apparent to us that we could mitigate some of the training area challenges for battalion-level training in Korea by integrating virtual and constructive environments into our live training. We were familiar with some of the Army initiatives to combine these training environments and began to explore how we could bring the systems we had available into concert together to achieve a near-seamless training experience for our battalions.

There were some aspects of the training that occurred to us as imperatives. First, we were focused on training our battalions for combat, so there had to be complete harmony among the tactical scenario, the Core METL-driven training objectives, and the training resources we had available — we would not sacrifice achieving our training objectives for the sake of integrating a training device.

Second, each of the live-virtual-constructive environments had to be integrated so as to appear as one fight to the battalion commander, his staff, and his subordinate commanders. This meant that the live instrumentation (I-HITS), the virtual simulators (CCTT and AVCATT), and the friendly and enemy units in the battalion's area of interest portrayed in the constructive environment (JCATS) all had to have a shared and realistic common picture of each other, without a discernable difference between training environments.

Third, the training feedback had to portray the fight back to commanders and staffs as one integrated fight. This was a particular challenge, since each of the training systems we used (I-HITS, CCTT, AVCATT, and JCATS) have their own stove-piped after actions review (AAR) support tools. (See Figure 2).

This common picture for a commander and his staff in his command post required that the LVC systems combine to populate the battalion's Army Battle Command System (ABCS) command and control systems with an integrated reflection of the LVC fights — again, without discernable distinctions.

Units fighting on the virtual battlefield (CCTT and AVCATT), had to not only have access to the battalion's common operating picture (COP) —Blue Force Tracker — but they had to be able to physically "see" any of the adjacent friendly or enemy vehicles or Soldiers that were within their field of view from their battlespace. This was a tall order, especially for the helicopters due to their extended range and ability and requirement to move between supporting different units in the fight. Units in the virtual fight had to be able to track and engage enemy in the live fight with direct and indirect fires.

However, the requirement for virtual fighters to be able to "see" their live counterparts was absolutely necessary to ensuring that both the live and the virtual forces participated in one integrated fight. It was imperative to generating the cross talk and coordination among companies and specialty platoons.

For the virtual fight, we achieved this by first causing AVCATT and CCTT to "talk" to each other, allowing participants in one simulator to see the friendly and enemy vehicles/aircraft being fought/portrayed in the other simulator. In this way, Soldiers fighting a Bradley or tank in the CCTT could look into the virtual sky and see the Apaches flying over the battlefield. Also, both systems could see, engage and kill in the other system. In this way, Apaches could engage and kill enemy ground systems generated in CCTT. Likewise, ground systems could see, engage,

and kill air systems generated in AVCATT.

Second, to cause the virtual fighters to be able to see the live friendly and enemy (OPFOR) on the ground, the I-HITS digital data packages for each entity (vehicles or Soldiers) were shared with the CCTT and AVCATT. This was a major breakthrough, and allowed the virtual fighters (CCTT and AVCATT) to not only see each other, but to see the live fighters as well. In CCTT and AVCATT, live fighters were portrayed as friendly and enemy tanks, personnel carriers, and dismounted Soldiers on the virtual terrain.

We achieved this same effect with the Tactical Engagement Simulation System (TESS - the helicopter-mounted MILES training system designed for live force-on-force training). By causing the TESS data to be shared with CCTT and AVCATT, virtual fighters were also able to see live Apaches in the virtual battlespace as they executed live missions in the training area.

This sense of one contiguous battlefield was reinforced by ensuring that the live units' BFT icons and graphics were shared in the CCTT's Force XXI Battle Command Brigade and Below (FBCB2) systems, and vice versa. No matter whether a leader was in a virtual combat vehicle or live on the ground, when he looked on his BFT/FBCB2, he saw the entire battalion's icons and any obstacles, enemy positions, or messages that were input during the fight.

The live-virtual linkages were so realistic that in one instance, a virtual company led a battalion night attack, breaching an obstacle on terrain that was not actually in the live training area, then "passed" a live follow-on company through them to continue the attack. The virtual unit could see the live Bradleys and tanks deployed along the Korean roads and waiting to make passage, and "talked" them onto the live enemy vehicles they could observe on the live company's objective.

The intensity and detail of the coordination between the virtual and the live company commanders about the obstacle breach location and passage point was as real as it gets. It became so real in the battalion commander's mind, that later when we were trying to determine the cause of some real-world maneuver damage, the battalion commander initially believed it was caused by the virtual unit!

For the constructive fight, we achieved this by causing the live (I-HITS and TESS) and virtual (CCTT and AVCATT) to be replicated in JCATS. JCATS, in turn, populated the units' ABCS systems (BFT, MCS-L, ASAS, AFATDS and others in the brigade command posts). This allowed the training battalion and the brigade command posts to see the live and virtual units on their ABCS, and also to see the flank battalions we had created and portrayed in JCATS. These constructive units were also portrayed on BFT to provide the situational awareness of a brigade-level fight.

The integrated live, virtual, and constructive portrayal in JCATS also allowed us to use a commercially made virtual unmanned aerial platform (Meta-VR) . By transmitting the Meta-VR picture into the brigade tactical command post, we were able to simulate the unit's own UAV systems and facilitate intelligence collection, targeting, and battle damage assessments.

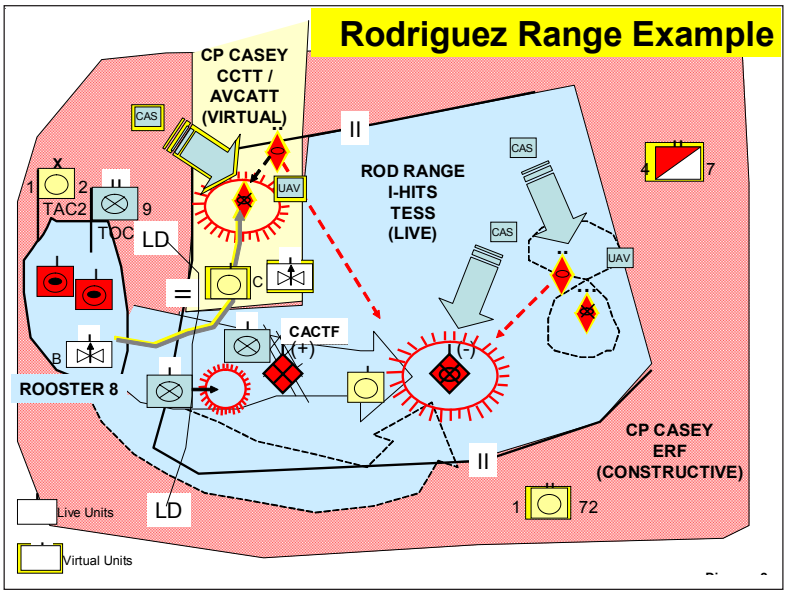
This was especially important for training the brigade's cannon artillery battalion, which was being externally evaluated at the same time as the maneuver battalion. The portrayal of the other units in the brigade on the constructive battlefield allowed us to place a realistic brigade-level demand for indirect fires on the evaluated artillery battalion. This stressed the artillery battalion's systems and caused the training maneuver battalion to integrate indirect fires in the context of the larger brigade operation.

Portraying indirect fire effects across all three training environments was also key to providing a near-seamless experience for the battalions. The exercise design included a Fire Marking Control Cell (FMCC) that was represented in each of the training environments. On the live battlefield, fire markers used the traditional training method of marking fires with pyrotechnics, while I-HITS portrayed where and when the fires occurred and assisted in adjudicating losses. On the virtual battlefield, the FMCC transmitted friendly and enemy indirect fire missions to CCTT controllers, who then triggered the fires for the virtual fight. On the constructive battlefield, as indirect fires were executed, the FIRESIM system caused the effects to be portrayed in JCATS. Fires in JCATS thereby enabled firing vectors to appear on the MCS-L systems and in AFATDS and JDOCCS in the training units' command posts.

The toughest requirement was to design the exercise so that the live forces, friendly and OPFOR could "see" as much of the virtual and constructive fights as possible. We've already described how we enabled the leaders who were live on the ground to "see" their virtual and constructive counterparts via ABCS systems, but this was not entirely sufficient to create the effect we desired.

In subsequent missions, we gave the mission to the battalion commander with several options for where the virtual company could fight. Once the battalion commander had formulated his scheme of maneuver, we selected the company who would fight a virtual fight. This ensured that the virtual fight played a decisive part

Figure 2



in the battalion commander's plan.

We also rotated the virtual unit every mission. The companies would stay in the field to receive orders, plan, rehearse and inspect the readiness of their soldiers. Only when the preparations were complete and the battalion prepared to conduct the operation, did we park the units' equipment in the field and bus the company to the simulation center. This ensured that the majority of each company's training experience was on their equipment, fighting a live OPFOR in the field.

The majority of each company's training had Soldiers using their equipment, fighting a live opposing force in the field.

One last technique we used to portray a realistic flank fight for the live units was to place reserve OPFOR units on cross mobility corridors at the edge of the live training area. In the event the OPFOR commander wanted a virtual enemy force to cross over from the virtual fight into the live fight, the reserve live OPFOR would be activated and enter the live fight at the time the virtual enemy was crossing the boundary. The same effect was possible from live to virtual because the virtual units could see the I-HITS instrumented OPFOR and the CCTT controllers would create virtual enemy icons that could continue the attack beyond the live training area and into the virtual maneuver space.

To help us in our April exercise, we enlisted the assistance of observer/controller-trainers out of the Joint Multi-National Training Center (JMTC) at Hohenfels, Germany. JMTC has developed a deployable OC package, and we brought parts of that package to Korea to assist us in achieving CTC-quality training feedback. The team consisted of a senior OC for each training battalion, some specified subject matter experts in key areas (Paladin combat trainers), and training analysts.

In the end, the AARs achieved our goal of CTC-quality training feedback. The I-HITS feedback product formed the basis of the AAR, with CCTT and AVCATT screen captures used as if they were video captures of live maneuver. For the big picture, we used the VISION 21 AAR suite, fed by JCATS, to show the training unit's maneuver in relation to other adjacent friendly and enemy forces. Training feedback required the most energy and innovation because the training systems are not designed to interoperate. More work on this for the future will enhance the training value.

What does our experience portend for the future?

In Korea, the LVC framework offers significant options for expanding our training options. By formalizing the integration mechanisms and techniques, an LVC exercise template can be easily adapted for units stationed on the peninsula, training units transiting Korea or future rotational units. Having a system in place alleviates some level of the commander and staff energy and training resources that must be applied to achieve the desired effect. This is an especially important aspect because of the high turbulence rate in units assigned to Korea, and because rotational or units on the peninsula for discreet training events cannot bring together all the participants needed in a timely or effective manner. Eighth Army is now looking at models for how to source this type of training for the future.

With few exceptions outside Korea, the Army is focused on training for the fight in Iraq and Afghanistan and the directed METL required for operations there. As the Army is allowed to one-day scale back the commitment to these fights, there will be a requirement for units to train both core and directed METL in the context of the ARFORGEN rotational model. Resourcing training for both sets of METL will be a challenge, with directed METL probably taking precedence. To maintain the Army's full spectrum capabilities, LVC training methods may be a resource effective way to train to some level of Core METL proficiency during the ARFORGEN training cycle, something that deserves additional thought.

A final thought. Creating a training environment that combines live, virtual and constructive domains has been portrayed as a Venn diagram of three intersecting circles, with each circle representing one of the training environments. The ultimate goal is to have the three circles overlap to the maximum extent possible — this is the point of achieving the fullest training realism. Future embedded training systems that are integral to our combat systems will allow us to approach this most realistic training.

Maybe the greatest compliment with respect to this LVC training was the comments from leaders and Soldiers who experienced the training. All felt that they had been challenged above and beyond any previous exercise and had gained valuable insights in how to better fight and win on the contemporary battlefield. This surely is the mark of success. Continued investment in training systems that are embedded in our combat systems will result in more realistic training with even greater realism and relevancy.

Brigadier General John D. Johnson served as the Assistant Division Commander (Manuever) of the 2nd Infantry Division. This article was written based upon his observations and work during the execution of the LVC initiative within 2nd ID.