

The synthetic training environment

Bringing reality to fire support training

By Maj. John Morris and Victor Bond

During my (Maj. John Morris) 10 years of service as a field artillery officer and Victor Bond's 28 years of service as an infantry and Special Forces officer, we realized the Army lacks the ability to replicate the effects of fire support during training.

This revelation was cemented when I served as the senior artillery/fire support observer controller trainer (OCT) at the Joint Readiness Training Center's Live Fire Division. At JRTC we wanted to provide rotational units a realistic understanding of the devastating effects of fire support. We were limited by multiple constraints such as minimum safe distances and surface danger zones. We partially mitigated these constraints by using full-range training rounds (non-explosive rounds), but this work-around failed to provide the rotational unit a full appreciation of fire support munitions and effects. Understanding this is critical for combined arms live-fire exercises, as commanders must truly understand and master how to effectively synchronize maneuver forces with the effects of fire support munitions. Understanding these effects allows maneuver commanders to effectively plan and assess risks, which cannot be fully achieved in training with existing training aids, devices, simulators and simulations.

Joint fire support personnel have limited ability to experience realistic training for multi-domain operations in diverse, complex operational environments. A potential solution to these shortfalls is the capabilities the Synthetic Training Environment (STE) Cross Functional Team (CFT) is currently developing.

The intent of this article is to explain the potential of the STE CFT's Soldier/Squad Virtual Trainer (S/SVT) (which will replace the Call for Fire Trainer, or CFFT, and Engagement Skill Trainer) to enhance joint

fire support training. The Army and Marines are developing S/SVT together. The STE CFT is also working to enhance joint fire support in the live/virtual training environment and capture data points in training to apply in lessons learned. The STE CFT is also working to build the One World Terrain (OWT) capability for both rehearsals, training and support operations. The STE may also have the potential to augment the targeting process in both training and operational environments.

Fire supporter's individual and team training will be dramatically improved by the STE and S/SVT. Currently, the CFFT has two transportable configurations (1:4 and 1:12), a classroom fixed configuration (1:30), and one Immersive Training System available only at Fort Sill, Okla. Additionally, there is a mobile training team configuration developed for the Joint Fires Observer School. These systems represent legacy technology that will not provide for the joint fire supporter's future training requirements. Emerging technology requirements provided by S/SVT include new target locating devices; Lightweight Laser Designator Rangefinder and Joint Effects Targeting System; Precision Fires Warrior Dismounted; Precision Fires terrain databases; improved fire support coordination measures and airspace coordinating measures; and new Advanced Field Artillery Tactical Data System (AFATDS). The STE, through OWT, heads up display systems (HUDs) and other technologies are going to provide a robust joint Fires training capability combined with geographical terrain developed by OWT. By employing HUDs and OWT, Soldiers will be able to train in virtualized, realistic terrain from any part of the globe. The five terrain databases found in CFFT will be replaced with terrain of the user's choosing or deployment

locations. This allows Soldiers to tailor the terrain to their upcoming operating environment (OE) prior to deployment. In addition, the depiction of patterns of life for civilian, friendly, neutral, coalition and enemy forces as well as updated vehicles and structures will provide more accurate representations of the OE. As the STE matures, HUDs will offer the potential to employ target acquisition capabilities — magnification and target recognition capabilities. The S/SVT will be more mobile due to its software-based technology that is primarily contained in a heads up display. The last leap for the HUDs will be the jump from the training environment to the battlefield being developed in conjunction with the Soldier Lethality Cross Functional Team at Fort Benning, Ga.

The S/SVT has the potential to make the combat training center "fire markers" a distant memory. The STE is improving joint fire support effects in the training environment with a two-pronged approach. The first approach is the previously mentioned S/SVT. Within this training capability are HUDs that project an augmented reality allowing Soldiers and Marines to view joint fire support effects which better replicate the live environment. This capability can potentially be achieved through integration of the HUDs and the Precision Fires Dismounted, which is the upgraded Pocket-Sized Forward Entry Device used by forward observers in acquiring and transmitting target data. This can be achieved by sending the templated point of impact and projecting the effects into the HUD. Other considerations that may be included are fuze/shell combinations, and proximity of the Soldier to the point of impact, which can assist to further bring reality to the live training environment.

The second prong of this effort is haptics which replicates the feeling of shrapnel. Haptics is a maturing technology currently constrained to a suit that is too bulky to wear in a field environment. The STE CFT is working with industry partners on this to allow Soldiers to “feel the heat” prior to touching the fire of combat. Haptics can replicate the effect of shrapnel raining down on friendly forces. When combined with HUD technology, it provides the disorienting effects associated with fire support munitions.

Currently, the lessons learned from training are typically compiled into a PowerPoint presentation, burned onto a CD, and then stored in a Modular Lightweight Load-Carrying Equipment or computer bag until ... forever. As an OCT in a tactical environment, the capture of data is largely left to the naked eye, memory, the accuracy of notes, clear communications and luck. The STE CFT is working to change this by capturing data points during training while it is happening. Subjective observations will be combined with quantitative observations captured by the STE. The STE intends to use equipment to capture biometric data. There is potential to capture differences in the optical perception as the FO becomes fatigued. In addition, the STE has the potential to automatically incorporate accuracy details for joint fire support mission data into a feedback mechanism available to both Soldiers/Marines and their leaders.

During the Field Artillery Captain's Career Course I remember consistently being told by instructors pitching classes on mission command systems (MCS) such as Command Post of the Future, or AFATDS that each system is “the Army's mission command system.” Unfortunately, my experience revealed a myriad of MCSs with different maps. The discrepancies in the systems' maps, their lack of transportability, availability and classification issues forced me to rely on paper maps or terrain tools to conduct planning at home station. While some of the issues are mitigated, we still lack a common virtual, interactive map of the world that is easily accessible and frequently updated. The solution is the STE's One World Terrain. This will allow fire supporters to plan complex training events, assess risk (range bearing tools, range circles, etc.), and analyze terrain using the same

platform. This can facilitate collaborative planning, and assess the recent effects of munitions on both terrain and structures before arriving on the battlefield. During my time deployed and at JRTC it was difficult to review plans with fixed wing pilots prior to execution. The 30-45 minutes spent reviewing de-confliction measures and targeted areas of interest saved immense time and resources. In my experience, the time spent discussing this information allowed pilots to engage targets with little guidance after their initial check-in. Our primary issue was the inability to discuss topics such as de-confliction measures/targets with a common set of maps that could easily be shared. Employing a common set of maps allows personnel to synchronize operations from multiple locations using the same information. This capability will not be limited to training, but can be used operationally. OWT will be used in a classified up to secret, or unclassified level.

The combination of HUDs with OWT can revolutionize the targeting process through automation and greater fidelity. HUDs will eventually be employed operationally. The potential to apply facial recognition software to HUDs with augmented reality capability allows for increased target acquisition accuracy based on the target characteristics. Tying this capability to targeting priorities, target selection standards, and OWT can lead to automation of the targeting process. OWT allows recently acquired images to be imported into a common operating picture while simultaneously being analyzed by a computer using target selection standards and the maneuver commander's targeting guidance. The interactive capability of OWT allows those conducting the targeting/collateral damage estimates the ability to better forecast effects on the battlefield. The increased fidelity can be used to analyze the effects of munitions on different building types, ground surfaces, and more. When OWT is incorporated with drone mapping, recent changes to the operating environment can be incorporated and shared almost immediately. Furthermore, it can allow fire supporters to adjust observation posts and de-confliction measures based on weather or geographic changes to terrain, to include target areas located in micro terrain such as narrow mountain valleys. OWT replicates actu-

al munitions effects when applied to the training environment. This increases accuracy for standard and precision munitions and allows for battle damage assessments and collateral damage estimates based on detailed target characteristics.

The STE with S/SVT can revolutionize the fire support effects in the live training environment and provide many other advantages. This capability is going to give maneuver commanders and fire supporters a true understanding of fire support prior to combat. It also has potential to bring greater collaboration, detail, fidelity and speed to the targeting process.

Maj. John Morris is a Synthetic Training Environment Cross Functional Team operations officer who previously served as a field artillery officer. He is a graduate of Texas A&M University (College Station) and holds a Masters of Military Arts and Sciences from the Command and General Staff College at Fort Leavenworth, Kan. He has served three tours in Afghanistan. His assignments include the 82nd Airborne and 101st Airborne divisions where he served as a company and squadron fire support officer, targeting officer, executive officer and battery commander. At Joint Readiness Training Center, Morris served as the Live Fire Division Fire Support/Battery observer coach trainer.

Victor Bond is a retired Special Forces officer with 28 years of service. Currently, he is a Department of the Army civilian, who serves as the Army and Special Operations capability developer for Joint Fires and Joint Medical. He holds a Master of Arts degree in Human Resources Development from Webster University in St. Louis, Mo. and Masters of Military Arts and Sciences in History from the Command and General Staff College at Fort Leavenworth, Kan. Bond served in numerous command and staff assignments in the infantry, Special Forces and the United States Special Operations Command. Additionally, he served as an advisor in Central/South America and Africa. Bond worked extensively with the Fires Center of Excellence and the Army Special Operations Command on the Call for Fire Trainer Program. He is the Joint Fires capability developer for the Soldier/Squad Virtual Trainer, Line of Effort, as part of the Synthetic Training Environment Cross Functional Team.