An Engagement Area Primer

by Lieutenant Colonel Ben Santos

"Command means visualizing the current and future state of friendly and enemy forces and then formulating concepts of operations to accomplish the mission." – FM 100-5

While the the weapon systems of the Armored Force become increasingly sophisticated, the art and science of war still boils down to simply synchronizing all we have against the attacking hordes.

Building an engagement area is a critical component of synchronizing the maneuver battlefield during a defense. However, engagement areas too often tend to be developed by drawing goose eggs on maps or by digging fighting positions before we have decided where we plan to kill the enemy. Developing the engagement area should be a logical sequence used to mass and synchronize combat power at a decisive point on the ground. It melds art and science by combining the commander's vision with "Battlefield Calculus."

While it is easy enough to state that building an engagement area is a seven-step process, each step presumes that commanders have an in-depth knowledge of friendly and enemy capabilities and can read terrain. The seven steps discussed below are a method to develop an engagement area:[1]

- Visualize where the enemy will attack
- Select where to kill the enemy
- Position direct fire systems
- Position obstacles to support direct fire
- Plan fires to support direct fire and obstacles
- Drive the engagement area
- Rehearse

Visualize where the enemy will attack. The commander must visualize how the enemy will attack, but to do this, he must know his enemy, know the terrain he is to fight on, and finally, know his units' capabilities. It is not enough for a commander to picture a doctrinal template in his mind; he must envision a situational template. Remember that the enemy can think too, and he will know your capabilities and probably will not come driving through the middle of an obvious engagement area in perfect march formation.

For instance, if a battalion task force is defending a sector six kilometers wide and an opposing force regiment can attack on a frontage of about three to eight kilometers, how many avenues of approach does that present into the sector? Which avenues will the enemy take? Get into the enemy's head. If you were him, where would you go?

Select where to kill the enemy. Once the commander visualizes where the enemy will go, then he can do the second and most critical step in developing an engagement area – he must decide where to kill the enemy.

Deciding where to kill the enemy is not a matter of placing tanks and infantry into a half circle oriented on the enemy's avenue of approach. Find terrain that negates the enemy's stand-off range. In order to lessen the effects of range superiority, find areas in the sector that afford you maximum range advantage. Generally, there are intervisibility lines (IVL) which provide a defender or an attacker an advantage. Find the IVLs that provide the defender an advantage and see if a reverse slope defense will maximize your weapons' capabilities and minimize his. The enemy may have AT-5s or AT-8s with a range of 4,000m or AT-10/11s with a range of 5,000m.[2] Besides IVLs there are choke points, defiles, and other folds of terrain that will provide the astute commander a significant advantage.

Position direct fire systems. Once the commander determines where to kill the enemy, he must do some math. It's called "Battlefield Calculus" – or, determining how many weapon systems are needed in an engagement area to kill the enemy. It goes a little beyond just stating that the defender can defeat an attacker three times its size or that a company should kill a battalion.

Building an engagement area entails knowing how many vehicles can physically fit into the EA. Can an attacking regiment fit into the EA drawn on the map? Do you want a regiment to fit into that EA? If so, does the defender have enough combat power to mass against the attacking force? Given the width, depth, and speed of the attacker, how many rounds will it take to destroy/defeat a regiment if you are a defending task force?

Knowing that an M1A1 carries 40 rounds is not enough. You need to know that only 17 rounds are available before the crew needs to redistribute ammunition to get to the rest of the rounds. Or, that although the Bradley carries 900 rounds, the crew can only fire 300 rounds before they have to reload, i.e., disassemble the Chain Gun.

Is the EA too large, too long? Can all your weapon systems range the EA? Are there mutually supporting fires between companies? How many defending companies can shoot into the engagement area if each company occupies about a kilometer of space with about 400 meters between companies?

Following is an example of Battlefield Calculus. The calculations are done with direct fire to determine the obstacle and/or indirect fires needed to enhance fire power and increase force protection. While the staff may have to crunch the numbers, the commander should be able to visualize the calculus in his mind's eye.

A balanced task force is defending a sector that is approximately 6km wide bordered on the north and south with steep terrain. The task force commander has visualized that the enemy will probably not want to come straight down the middle but will opt to hug the north wall or the south wall. He has found two IVLs in sector that are approximately 2,800 meters apart.

The regiment will probably attack with two motorized rifle battalions abreast and one MRB trailing. This will mean that the regiment will have about a 3km frontage. Knowing enemy doctrine, the commander knows that the enemy regiment will normally go into battalion pre-battle formation approximately 6km from the defender, into company pre-battle approximately

	Start	Loss/1min	Remaining after 1min		Loss/2min	Remaining after 2 min	
Blue	42	13	29	70%	7	22	52%
Red	101	38	63	63%	26	37	36%
		Loss/3min	Remaining after 3min		Loss/4min	Remaining after 4min	
Blue		3	19	44%	0	19	44%
Red		20	17	17%	17	0	0%

Assumptions:
a. PK for Blue is 90%
b. PK for Red is 20%
c. Attacker continues to move unimpeded

Figure 1. Losses over time when 3 companies defend against 2 MRBs attacking abreast before commitment of reserve or the trail MRB entering the EA.

	Start	Loss/1min	Remaining after 1min		Loss/2min	Remaining after 2 min	
Blue	58	24	34	59%	18	17	29%
Red	171	52	119	69%	31	88	51%
		Loss/3min	Remaining after 3min				
Blue		15	2	4%			
Red		15	73	43%			

Assumptions:
a. PK for Blue is 90%
b. PK for Red is 20%
c. Attacker continues to move unimpeded

Figure 2. Losses over time when a battalion defends against an MRR without combat multipliers such as obstacles, fires, and smoke.

3km, and finally into attack formation up to 1km from the defender.[3]

If the engagement area is 2800m in depth, the enemy regiment will probably be in company pre-battle formation the first time the defender could engage. In company pre-battle, the regiment is in platoon columns. If the regiment is attacking with two battalions up/one back, then there could be a maximum of 24 platoons in column. Each column is about 150m in depth with the entire frontage being about 3km (approximately 100 combat vehicles). The normal march speed is 20-25kph or 1km/3min. If the defender fires at the edge of the EA, he will be able to kill the lead vehicles but not the trail. If the defender waits one minute, the formation will travel 300m farther into the engagement area, allowing the defender to engage the entire depth of the formation.

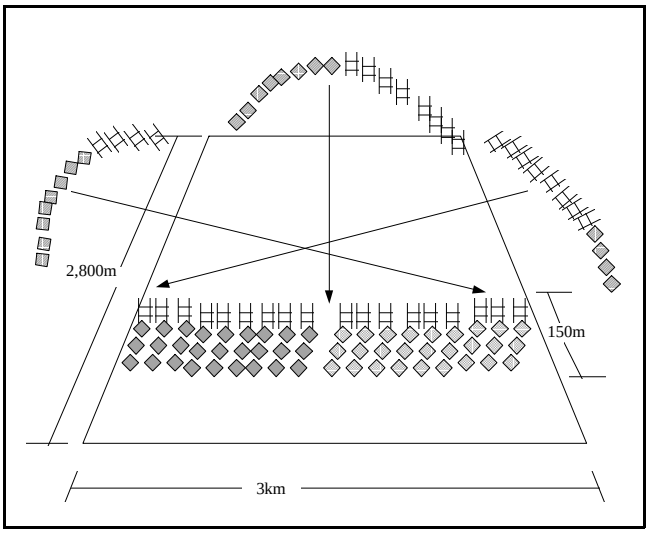
A friendly company/team normally occupies about 1km with a separation of about 400m between teams.[4] Spacewise, not more than about three teams could occupy the regimental avenue of approach. If the three teams are at 100%, then available systems could be 42. (For purposes of this example, we will assume two mechanized teams and one armor team with the second armor team as a reserve or out of position: 14 tanks, 28 BFVs). Each tank can fire approximately 6 rounds per minute and can fire 17 rounds before having to redistribute rounds into the ready rack. Each BFV can fire either TOW or 25mm; it will take approximately 8-9 seconds time-of-flight for the TOW and the 25mm can fire 300 rounds before having to reload. Historically, destroyed vehicles have had multiple tank holes in them, so those 17 rounds per tank you were counting on are halved to 8. Have you considered resupply?

Now the math. In a perfect world, 42 defenders could fire and kill 42 attackers in the first volley. However, the 14 tanks would fire and 8 seconds later the TOWs would impact. If the first volley has a 90% success, that still leaves 64 combat vehicles [(42x.90) - 102 = 64] in the first echelon to return fire. Surprise is now gone. If the attacker is really terrible at gunnery and can only hit 20% of the time that means now 13 defenders are destroyed but more importantly many of the defenders are suppressed. If the remaining 29 defenders fire and kill with a 90% hit rate that leaves 38 attackers to return fire. During this time the attacker has probably moved about 500m bringing it to within 2000m of the defender. In another minute, the trail MRB will enter the engagement area and be able to engage with approximately 51 combat vehicles.

If the remaining 38 attackers fire with a 20% hit rate, they will destroy 8 defenders leaving 21. The 21 defenders fire with 90% PK (Probability of Kill) that leaves 19 attackers; the attackers return fire with 20% PK destroying 4. Another 500m has been traveled and 51 combat vehicles from the trail MRB enter the engagement area and fire with a 20% PK, destroying 10 defenders and leaving 11 (Figure 1). The commitment of the reserve may not halt the enemy's advance. However, if the defender is successful, it will still only have less than 30% combat power remaining. 30% is not exactly the MTP standard[5] and is far below the American public's expectation for casualties.

Battlefield calculus will help the commander visualize what assets he needs to use in order to increase his firepower and force protection. He needs to fight the regiment one small bite at a time. If the commander does not know the enemy, then he may try to build a very large EA with all four teams shooting into the EA without mutually supporting fires. The attacking regiment could then use its small attack frontage to isolate one or two teams. An MRR attacking a battalion that wasn't using any of its available combat multipliers could easily destroy that battalion (Figure 2).

As you do the calculus, either during the Commander's Estimate or during



Visualizing "Battlefield Calculus"

the staff's Course of Action development, it will also help determine when, where, and for what purpose the reserve should be committed to reinforce, counterattack, or otherwise stop a penetration.

Proper planning of obstacles, indirect fires, and smoke can disrupt the movement of the regiment, allowing the task force commander to engage only one battalion at a time. While one of the lead battalions is negotiating an obstacle, it can receive indirect fires as well as direct fire that would further increase the attacker-to-defender ratio.

Position obstacles to support direct fire. Obstacles need to be emplaced after weapons systems are positioned. This may sound overly simple. However, too often, maneuver commanders tend to do two things when planning obstacles: draw them on a map and then let the engineer site in the obstacle; and either not know the intent for a particular obstacle or not convey the intent for an obstacle to his subordinates.

Obstacles do not have to kill the enemy to be successful. Many times, the only needed effect is to make the enemy change his direction of attack, or pause long enough to suffer the effects of direct or indirect fire. As the following paragraph will illustrate, your plan may require fixing an enemy unit in place long enough for combined direct and indirect fires to destroy it. The obstacle plan can disrupt the enemy formation by slowing one unit long enough to engage the other unit piecemeal.

Planning for obstacles should have four intents: fix, disrupt, block, or turn.[6] Proper planning of obstacles will be critical in enhancing the direct fire fight and enhancing force protection.

Siting the obstacles is a commander's business. If the commander decides where to kill the enemy, he should site in the obstacles. The commander may have his S3 or a company commander site the obstacle but only after the task force commander has personnally walked the ground. This of course means that time management is critical to the commander in order to allow him to get to the battle positions.

Plan fires to support direct fire and obstacles. Once the direct fire fight has been planned and supported with obstacles, indirect fire planning can occur to enhance the force protection, increase the firepower, and assist in the attacking force's destruction. "Within the EA, fires should be planned to reinforce obstacles, to provide better shots for direct-fire weapon systems, and to cover dead space."[7]

When you plan fires in the engagement area, don't assume away any part of the problem. If you need to destroy an MRC, how long must you hold it in place for the destruction to take place?

What does it take to destroy an MRC? Apply some more "Battlefield Calculus." At the NTC, it would take 396 rounds to destroy the MRC. (54 rounds DPICM per tank + 18 rounds per BMP = 396rds). A DS FA battalion can fire a sustained rate of 24 rounds per minute. 396/24 = 17 minutes. What will you have to do to keep that MRC in place 17 minutes?

Make sure the intent for fires is clear.

Drive the engagement area. It does not help to have a perfect plan on paper if the maneuver systems cannot "see" into the EA. Have someone drive through the engagement area — before emplacing the obstacles. This will help in positioning the direct fire systems to kill the attacker, in siting in the obstacles, and in identifying the dead space that needs covering with direct and indirect fires.

Rehearse. Rehearse. Rehearse! The last piece in synchronizing the engagement area is rehearsing the plan. There are many rehearsal techniques available, from map rehearsal to full dress rehearsal.[8] Determine the best technique by the amount of time available and what the commander intends to accomplish with the rehearsal.

It is important that the rehearsal is planned. Someone has to be in charge – the executive officer/S3 or a trusted agent needs to run the show and not waste valuable time. The rehearsal is not a wargame, nor is it time to develop a course of action. If new courses of action result from a rehearsal, then the Deliberate Decision Making Process was not completed properly. Know before the rehearsal the critical tasks that need rehearsing. Establish a time limit, and stick to it.

In summary, developing the engagement area requires a logical sequence in order to synchronize firepower at a decisive point on the commander's chosen ground. The seven steps depend on the competence of the commander in visualizing the fight and deciding where to kill the enemy. In order to kill the enemy, the commander must have an in-depth knowledge of his units' capabilities, the enemy's doctrine and capabilities, and he must be able to see how the terrain can become a combat multiplier for the unit.

It also takes a little "Battlefield Calculus" to ensure you have plenty of firepower and fires focused into the engagement area.

Additional information on developing engagement areas is available at the Center for Army Lessons Learned, Fort Leavenworth, Kansas.

Notes

[1]CALL videotape, *Engagement Area Development*, April 1995.

[2]FM 100-2-3, *The Soviet Army: Troops, Organization, and Equipment*, June 1991.

[3]FM 71-123, *Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company Team*, September 1992, p. 4-44. (These are approximations. Battalion pre-battle is 4-6 km; company pre-battle is 2-3km; and attack formation is 300m-1km).

[4]ST101-3, *Battle Book*, U.S. Army Command and Staff College, June 1996, pp. 2-103, 2-104.

[5]ARTEP 71-2, *Mission Training Plan for Tank and Mechanized Battalion Task Force*, Oct 1988, p. 5-33.

[6]FM 71-123, p. 4-32.

[7]FM 71-123, p. 4-65.

[8]CALL Newsletter, *Rehearsals*, April 1991.

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