Being A Terrain Visualization Expert

By Colonel Edwin Arnold

In 1995, the Commandant of the U.S. Army Engineer School directed the merger of the Topographic Engineer Officer specialty (21C) with the Combat Engineer Officer specialty (21B). Nearly coincident with this decision, the Commandant began delivering the message that engineer officers, regardless of specialty, are the terrain visualization experts for the organizations in which they serve. These two pronouncements have met some resistance within the engineer community—from captains in the Engineer Officers Advanced Course, who believe instruction on topographic products and terrain visualization processes may be a waste of their time, to topographic engineer warrant officers, who see this as a move to take their jobs. Let me take a few minutes of your time to explain my twist on this issue.

First, you need to understand that I am not some "topo guy" trying to sell his career pursuits. I once attended the Mapping, Charting and Geodesy Officers Course, but that was many years ago and I have never served in a topographic assignment. I am a combat engineer with more than eight years of service in three divisions, both in the United States and in Europe, as a field grade officer. My thoughts on the subject of being a terrain visualization expert have their roots in that experience and the combat engineer education and experiences that preceded those assignments.

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Why Me?

Is being the terrain visualization expert within your organization important to you as an engineer, and should every engineer officer be able to perform that role? I strongly believe the answer to that question today is "yes." I also believe that the answer becomes a more emphatic "yes" as we move the Army into the 21st century. But, before I progress too far in that discussion, let me clarify some points that partially address the warrant officers' concerns that we commissioned officers are out to steal their jobs.

In this short discussion I am talking about *terrain visualization,* not *terrain analysis.* There is a difference. Terrain visualization is the process through which a commander sees the terrain and understands its impacts on the operation in which he is involved, both on friendly and enemy elements. It includes the identification and understanding of those aspects of the terrain that can be exploited by the friendly commander to gain advantage over the enemy as well as those aspects most likely to be exploited by the enemy. It is a subjective evaluation of the physical attributes of the terrain as well as the physical capabilities of the vehicles, equipment, and people that must cross over or occupy the terrain. Terrain visualization is closer to military art than to military science.

Terrain analysis, on the other hand, is military science. It is the study of the properties of terrain and how those properties change over time with use and changing weather. Terrain analysis is the basic science of the study of terrain. It starts with the collection, verification, processing, revision and, in some cases, the actual building of available source data. In short, terrain analysis turns basic data into usable information. Terrain analysts then synthesize the data to produce products that portray the effects of terrain. These products are basic tools that facilitate the terrain-visualization process. Terrain analysis is a very technical process and requires the expertise that topographic warrant officers possess.

Terrain Experts

With that clarification, let's return to the basic discussion—the importance of being a terrain visualization expert. We, the engineers, are the mobility and countermobility experts for the Army. We do other things also, but our role as members of the combined arms team is largely comprised of mobility and countermobility operations.

We cannot effectively do either of these functions without a comprehensive understanding of how terrain affects the movement of friendly and enemy forces. In our beginning education as young engineer lieutenants, we are taught how to site obstacles for the greatest effect. You could call this "Terrain Appreciation 101." No other member of the combined arms team receives such education. They may receive the basics in how to identify key and decisive terrain, but the nuances of how terrain affects the movement to and from that decisive terrain is taught only to engineers.

In reality, we practice our terrain visualization expertise every day, generally without giving it a second thought. Every time we advise a commander on the correct placement of an obstacle or obstacle belt to achieve the desired effect, or recommend shifting a battle position to achieve better engagement area coverage or gain increased survivability, we are using our terrain evaluation skills to assist the supported commander in "visualizing" terrain effects. In support of the offense, we help define where the enemy might set defenses based on the limiting effects of the terrain, or where he might emplace obstacles to create advantage from the opportunities afforded by the terrain. We do this throughout our careers at every level of command and staff. As a division engineer, both as a battalion commander and later as a brigade commander, the division commander expected me to study the area of operations and to advise him of the opportunities it offered for us to gain advantage over the enemy.

So, the idea of being the "Terrain Visualization Experts" for the Army is really nothing new. It is something that we, as well-trained engineers supporting our maneuver commanders, have always done, and it is an important contribution to countless successes on the combined arms battlefield. As the Army moves to the 21st century, this contribution will grow in importance as dispersed, noncontiguous operations and greater reliance on increased mobility expand the battlespace and increased tempo reduces the time available to see and understand battlespace effects. Maneuver commanders must know they can turn with confidence to their engineers to assist them in the critical function of "visualizing" the terrain. As the tempo of operations increases, our ability to modify the terrain to our advantage decreases.

Moving Ahead

On future battlefields, we will be forced to rely heavily on wielding terrain as it already exists as a combat multiplier. We can do this if we clearly understand the terrain and its effects on the men and machines that move on it.

The transition to digital topographic data and the increasing capability of our terrain-analysis tools will permit the technical experts (the topographic engineer warrant officers) to provide increasingly complex analysis products. These products will increase our understanding of the terrain and its effects. When coupled with our knowledge of friendly and enemy capabilities and intentions, these products will help us identify the terrain effects to be exploited. Then we must impart this knowledge to the commanders we support. We must help them visualize the terrain early in the planning process so our forces can exploit its effects to our advantage. That is the engineers' role. After all, we (the topographic engineer warrant officers and the combat engineers) are the experts!

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project, and ensure that they understand why something is done a certain way. When you must work on weekends to maintain the time line, be creative in your efforts to keep up morale. These are a leader's obligations.

- When planning a project, try to anticipate events or factors that may impede progress. Weather and terrain may influence construction projects dramatically. Building a road during the cold, rainy winter in North Carolina is not a good idea. The ground may be solid and dry during the summer, but it is muddy and flooded in winter. Be aware of training and deployment schedules. It would not be wise to begin a project and then lose half of the unit to a deployment.
- As a leader you must set the example. You must do anything that you ask your unit to do. You must be a teacher, a counselor, and a role model. You must earn their trust and confidence.

No one can control all of the factors that affect a construction schedule. During the construction of Ordnance Point Road, I had daily operations meetings to attend, formations and inspections to conduct, and concurrent projects to oversee. There will always be some resource constraints in any construction project. Personnel, time, and equipment are your most valuable resources. The success or failure of the project depends on how well you use these resources.

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