Base Camp Design Simulation Training

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Contents

ABSTRACT

By late 2009, the US Army published an assessment of base camp training in TRADOC PAM 525-5-5, declaring "that no comprehensive policy or doctrine associated with planning and design, construction, and deconstruction, nor operations and management" existed with respect to base camps. The Training and Doctrine Command's (TRADOC) proponent for base camps, the US Army Maneuver Support Center of Excellence (MSCoE) echoed the state of base camp training by highlighting this competency as one of the top ten capability priorities for 2009. While the NATO led missions in the Balkans during the 1990s validated the benefit of relying on civilian contracted support in developing and operating base camps, the recent conflicts in Iraq and Afghanistan have highlighted shortcomings stemming from this reliance. In light of the Army's stated desire to reacquire base camp competencies and revolutionary changes in the Army Learning Model, as outlined in TRADOC PAM 525-9-2, the Operations Research Center of Excellence at the United States Military Academy undertook a project to bring base camp design and development simulation support into the classrooms of the US Army Engineer School (one of the three schoolhouses within the MSCoE). By the end of January 2011, a series of simulation exercises using the VBS2™ simulation platform were introduced to the Engineer Captains Career Course. These exercises directly incorporated the Army Learning Concept for 2015 tenets of adaptability, collaborative learning environment, and use of interactive media. The path to reaching learning objectives relied on *turning VBS2™ on its head*, meaning that we formulated our exercises not in the traditional *user* based mode; rather we made the students the *editors*. This paper reports on the progress of these efforts, as well as the pedagogy pursued in educating future Army officers in base camp design and development.

ABOUT THE AUTHOR

MAJ Brian D. Sawser is an Instructor and Analyst for the Department of Systems Engineering at the United States Military Academy, West Point. He was commissioned as an Engineer officer from the United States Military Academy (USMA) in 1999. Upon graduation from Engineer Officer Basic he would serve as a combat engineer platoon leader, executive officer, battalion staff officer, and company commander for two separate engineer battalions over the course of eight years in Germany. He has deployed with coalition forces to Kosovo in 2002 and Iraq in 2005 and 2006. As a combat engineer he has primarily focused on route clearance and assured mobility missions in deployed environments. MAJ Sawser holds Master's Degrees in Civil and Systems Engineering from Missouri S&T and Texas A&M Universities respectfully. He is currently serving as the course director for *Statistics for Engineers* in the Department of Systems Engineering.

EXECUTIVE SUMMARY

The primary mission of this endeavor was to bring simulation support to Army classrooms. Initial discussions between the ORCEN and the Manuever Support Center of Excellence (MSCoE) revealed that the US Army Engineer School (USAES) would not only benefit the most from our efforts, but also provide the most support. The Leonard Wood Institute (LWI) provided the funding for the project assuming the role of project owner.

The initial phase (July-August 2010) of the project involved research into what training programs currently existed within the Engineer Schoolhouse as well as simulation support packages that held potential as training multipliers. The current curriculum for base camp design and development consisted primary of descriptive workbooks and electronic files of environmental assessment products. Base camp design and development was a minor sub-category within the General Engineering block of instruction. After an extensive review of software platforms VBS2™ (Virtual Battle Space 2) was selected as the simulation of choice to support base camp design and development. Blessed as an approved Army simulation platform, VBS2™ had the added benefit of already being installed in numerous MSCoE computer labs. Other than seeing limited use in route clearance, first-person, simulations, VBS2™ was virtually unused across the four USAES courses.

In a subsequent visit to Fort Leonard Wood, September 2010, we demonstrated two sample simulation scenarios on base camp design and development. GTA 90-01-011, *Joint Forward Operations Base (JFOB) Survivability and Protective Construction* Handbook, served as the primary doctrinal source in scenario development. The first scenario dealt with an actual battle near the border of Afghanistan and Pakistan, the Battle of COP Keating in October of 2009, which required the student to perform layout design and consider force protection measures. A more comprehensive second scenario introduced a fictitious base camp (COP Yousel Khel) construction mission that required the student to perform the same tasks as in the first scenario with an additional step of site selection. BG Bryan Watson, the Engineer School Commandant, approved these initial scenarios and provided the required direction enabling us to outline the final simulation support package.

The technical approach utilized for the remainder of the project incorporated tenants of the Army Learning Concept for 2015, facilitator-led simulations based on two previous research studies presented at the *Interservice/Industry Training, Simulation & Education Conference*, 30 Nov – 3 Dec 2009, and Don Vandergriff 's Adaptability Course Model (ACM). The ACM consists of:

1. Case study learning methodology
2. Tactical Decision Games (TDG)
3. Free play force-on-force exercises
4. Feedback through the leader evaluation system (360 degree assessments)

Utilizing this model, in addition to the two comprehensive base camp build scenarios (COP Keating and COP Yousel Khel), we delivered three 'Editor' based tutorials on VBS2 1.32; completed a 600-man base camp design from a TCMS (Theater Construction Management System) blueprint; introduced *Defense of Jisr Al Doreaa*, a recently published, not-for-profit, officer professional development text that includes base camp design and development scenarios; delivered JTCOIC created, Rolla, Missouri themed simulation terrain for integration into existing TEWTs (tactical exercises without troops); and established numerous linkages between USAES and the military gaming community.

In a proof-of-concept exercise conducted in December 2010, at the Engineer Schoolhouse, six captains with no VBS2™ experience were selected to test our scenarios. In less than 30 minutes each of the captains gained sufficient VBS2™ skills to work our scenarios. Subsequently, the COP Yousel Khel exercise was introduced into the Engineer Captains Career Course on a pilot basis.

The most significant results of the project include the introduction of editor (vs. user) based simulation scenarios, the benefits of simplicity (vs. reliance on simulation subject-matter-experts), the creative potential of successive student classes building individual scenarios, the movement from instructor-centric to learner-centric, and the delivery of terrain specific simulations designed exclusively for USAES.

1. NEW TECHNOLOGY USES

As the remainder of the report demonstrates, this project addresses the use of simulation to train Army students base camp design and development. Ultimately, Virtual Battlespace 2 (VBS2^{TM}) was selected to serve as the platform in creating a series of simulation scenarios directed towards students at the US Army Engineer School in Fort Leonard Wood, MO. The primary demonstrations include:

1. Utilizing distinct simulation scenarios to enable learning through case studies, tactical decision games, force-on-force exercise, and facilitator feedback.
2. Providing combat veterans with a platform to recreate real-world base camps from the experiences and share with classmates.
3. Keeping exercises simple, with instructions MS Office-based, in order to preclude the necessity of technology subject matter experts.
4. Facilitating an interactive environment whereby class discussions are driven by simulation viewings rather than the traditional slide show presentations.
5. Creating an iterative learning environment that enables successive classes of students to benefit from the products and lessons-learned of previous classes.

2. INTRODUCTION

2.1 Background

The design, development, and subsequent life-cycle operations of base camps are critical to the success of expeditionary missions. The NATO led missions in the Balkans during the 1990s validated the benefit of relying on civilian contracted support in developing and operating base camps. Camp Bondsteel in Kosovo serves as an example of the benefits gained from private contractor support in design, construction, and operation. Yet as the recent conflicts in Iraq and Afghanistan have demonstrated, serious shortcomings developed from this reliance. As the Army transitioned from larger, centralized base camps (often contractor built and resourced) to smaller, scattered combat outposts, relying on contracted base camp support became impractical and often infeasible. While the Army has

overcome these challenges primarily through the efforts of versatile leaders, the need to better train officers and Soldiers in base camp design and development is evident. The nature of full spectrum operations within a joint, interagency, intergovernmental, and multinational (JIIM) environment requires an Army capable of designing and operating base camps with internal assets. The singular efficiencies gained from contracted support will remain a combat multiplier for US forces in the years to come. Private contractors will continue to have a place on the battlefield. Yet, given the known logistical and security constraints with respect to the use of contractors, the Army will be relying on trained leaders to design and build its future base camps. The Army needs officers and noncommissioned officers with requisite base camp competencies.

The Army's Field Manual (FM) 3-34.400 defines a *Base Camp* as an evolving military facility that supports the military operations of a deployed unit and provides the necessary support and services for sustained operations.[1] The size and scope of base camps can vary wildly; from massive, forward operating bases (FOBs) such as Camp Victory in Iraq to small, platoon sized combat outposts (COPs) in the mountains of Afghanistan. Regardless of size, each base camp is required to support the Army Capstone Concept for Joint Operations (CCJO): combat, security, engagement, and relief and reconstruction.[2]

In light of the obvious need to increase the internal capacity of the Army to handle future base camp requirements, the Army's Training and Doctrine Command (TRADOC) commissioned a collaborative effort, involving subject matter experts from throughout the Army, to produce a detailed study to identify the capabilities required to support the lifecycle management of base camps during the 2015-2024 timeframe. The result of this effort, published in December 2009, produced some startling conclusions. The subsequent pamphlet, TRADOC Pam 525-7-7, outlined a series of current shortcomings in the Army.

[1] Department of the Army. (2008) *General Engineering*. (FM 3-34.400). Washington, DC: U.S. Army Headquarters, 11-1.

[2] Department of the Army. (2009) *The United States Army Concept Capability Plan for Army Base Camps in Full Spectrum Operations for the Future Modular Force, 2015-2024*, (TRADOC Pam 525-7-7). Washington, DC: U.S. Army Headquarters, 8.

This pamphlet states, "base camps have no comprehensive policy or doctrine associated with planning and design, construction and deconstruction, nor operations and management".[3] It went on to conclude that "base camps need DOTMLPF (doctrine, organization, ***training***, material, leadership and ***education***, personnel, and facilities) solutions to address existing gaps".[4]

2.2 Collaboration

The Operations Research Center of Excellence at the United States Military Academy began initial discussions with the US Army Maneuver Support Center of Excellence (MSCoE) late in 2009, focusing on bringing simulation support into their Fort Leonard Wood, MO classrooms. MSCoE acts as TRADOC's proponent for base camps, subsequently delegated to the Engineer School (one of three branch schools overseen by MSCoE). As one of MSCoE's Top 10 Capabilities Development Priorities, the design and development of base camps seemed like an ideal candidate for simulation support. Being a capability development high priority with limited available time (approximately six months), this collaborative project was brought to the LWI (Leonard Wood Institute), a state-led consortium of technology organizations, for financial resourcing, with MSCoE acting as the project owner and primary decision maker.

2.3 Mission

The original mission statement for the project read as follows:

> *Using a systems approach that considers the Soldiers, the environment, and resources available the Operations Research Center (ORCEN) will design a simulation-based training system to* ***effectively prepare Soldiers to design base camps in the expected operational environment****. Considering the broader programs of instruction for the Captains Career Course, Basic Officer's Leader Course, Warrant Officer Basic and Advance courses, and the basic and advanced NCO courses, the ORCEN will make* ***recommendations on how to best integrate the simulation into each course****. A holistic approach will be used to effectively* ***integrate the efforts of the training support community and the gaming community****, in order to develop the best possible training for our Soldiers.*

[3] Ibid, v.
[4] Ibid, 5.

2.4 Structure

The Systems Decision Process outlined in *Decision Making in Systems Engineering and Management* (Parnell, 2011), served as the framework for generating deliverables to MSCoE throughout the course of the endeavor.[5]

3. PROBLEM DEFINITION

3.1 Research

Prior to developing the deliverables discussed in the mission statement, a comprehensive literature review was conducted as part of a complete stakeholder and requirements analysis. Multiple interviews across MSCoE agencies and managers revealed a strong motivation to bring simulation into the classroom. Early during stakeholder analysis the idea of using Virtual Battlespace 2 (VBS2™) was championed by many within MSCoE. While other simulation platforms were investigated, VBS2™ quickly became the chosen platform for two main reasons. First, VBS2™ is accessible throughout classrooms at MSCoE. Second, (and more importantly) as MAJ Atherton and Ms. Holly Baxter, PhD, state, "the Army has moved beyond the debate about whether gaming possesses the potential to be an effective tool (it does) and which gaming tool should be used (it selected VBS2™)".[6]

Fortunately a great deal of research had already gone into the functional decomposition of the base camp problem in terms of training and education. The Base Camp Integrated Capabilities Development Team (Base Camp ICDT), sponsored by MSCoE, published the Functional Solution Analysis (FSA): the last of three capabilities-based assessments, recommending targeted courses of actions in which to address training and education gaps concerning base camps. This analysis served as a spring board, enabling an accelerated transition to the Solution Design.

The Engineer Captains Career Course, one of four major courses offered by MSCoE, served as the benchmark for a current program of instruction. Within the *General Engineering* block of instruction a

[5] Parnell, G., Patrick Driscoll, and Dale Henderson (Eds.). (2011) *Decision Making in Systems Engineering and Management,* Hoboken, NJ: John Wiley & Sons, Inc.

[6] Atherton, Eric and Holly C. Baxter. (2009) Positively Gaming the System: A VBS™ Training Case Study. *The 2009 Interservice / Industry Training, Simulation, and Education Conference (I/ITSEC),* 86.

broad outline of base camp competencies for Engineer Captains existed, yet without supporting practical exercises. Engineer Captains were required to conduct an Environmental Baseline Survey at a local training area, but there existed no practical exercise for base camp site selection, layout design, and force protection considerations. One of the most glaring deficiencies voiced from within MSCoE was the lack of a comprehensive text to base future instruction upon.

3.2 Approach

Given the scope of base camps (from the platoon-sized COP to the massive, joint FOBs) we decided early in the process to target our simulation support efforts to the smaller battalion-sized and below base camps. This decision was predicated on the assumption that the officers, warrant officers, and noncommissioned officers at Fort Leonard Wood could realistically be expected to design and develop base camps of these sizes. Base camps of greater size would more than likely be supplemented with contracted support.

To alleviate the concern regarding the lack of an agreed upon base camp text in which to base instruction upon, *Joint Forward Operations Base (JFOB) Survivability and Protective Construction Handbook* was recommended. This text, as stated in the title, is primarily concerned with assisting Army planners in constructing survivable, protected base camps. In doing so, it covers several foundational topics: risk management, planning, site selection and layout, infrastructure, barrier and obstacles, entry control, compartmentalization, etc. This text, along with the FSA, would eventually form the literary basis from which our VBS^{TM} simulation scenarios would enhance *site selection, layout design, and force protection considerations.* [7]

[7] Department of Defense. (2009) *Joint Forward Operations Base (JFOB) Survivability and Protective Construction Handbook,* (GTA 90-01-011). Washington, DC: Joint Chiefs of Staff.

3.3 Guide

Previous work showcased in the *Interservice / Industry Training, Simulation, and Education Conference (I/ITSEC) 2009,* assisted us in developing deliverables to MSCoE. The idea of promoting "higher feature control" as discussed in *Investigating the Effectiveness of Game-Based Approaches to Training*, seemed perfect for our purposes.[8] The idea that users of the simulation be allowed a greater scope of control seemed logical given the current generation of young officers and NCOs. Additionally, we borrowed three recommendations from *Learning Anti-Submarine Warfare with a Game-Like Tactical Planner*. These included:

1. Instructors develop simple scenarios to illustrate particular tactics in ideal contexts;
2. Students are divided into groups and given these problems in class;
3. Students also utilize a version of Instructor Mode to author new problems.[9]

Our decision to incorporate the preceding articles was reinforced upon the publication of *The Army Learning Concept for 2015*. This document, final publication date of January 2011, would serve as the conceptual base during the construction of deliverables. Specifically we incorporated three of the five critical areas discussed in ALC 2015:

1. Learning strategies, tools, and experiences that engage and empower learners;
2. Learning system infrastructure that enables rapid adaptation to shifting operational demands;
3. Sustained adaptation in an era of exponential change.[10]

We sought to aid in the conversion of classroom experiences into collaborative problem-solving events led by facilitators who engage learners to think and understand the relevance and context of

[8] Engel, Kathryn, Krista L. Langkamer, Jamie L. Estock, Kara L. Orvis, Eduardo Sales, Wendy L. Bedwell, and Curtis Conkey. (2009) Investigating the Effectiveness of Game-Based Approaches to Training. *The 2009 Interservice / Industry Training, Simulation, and Education Conference (I/ITSEC),* 1615.

[9] Munro, Allen, Quentin Pizzini, and William Bewley. (2009) Learning Anti-Submarine Warfare with a Game-Like Tactical Planner. *The 2009 Interservice / Industry Training, Simulation, and Education Conference (I/ITSEC),* pages 1637.

[10] Department of the Army. (2011) *The United States Army Learning Concept for2015,* (TRADOC Pam 525-8-2). Washington, DC: U.S. Army Headquarters, 11.

problems. Furthermore, we understood that the VBS™ platform allowed for virtual and constructive simulations in an adult learning environment. ALC 2015 sums up our primary guide in developing the training by stating,

> *One of the oldest ways of conveying information is through storytelling. It is engaging, memorable, and enhances learning transfer. Virtual scenarios, videos, and other media provide greater opportunities to incorporate high impact stories into learning events*.[11]

4. SOLUTION DESIGN

4.1 Idea Generation

While the previously mentioned articles and the principles established by ALC 2015 gave us a vision, we still sought a concrete template from which to base our deliverables. Introduced in the Atherton and Baxter article was an Adaptability Course Model (ACM) program of instruction championed by Don Vandergriff (2006). His ACM consisted of four curriculum pillars:

1. Case study learning methodology
2. Tactical Decision Games (TDG)
3. Free play force-on-force exercises
4. Feedback through the leader evaluation system (360 degree assessments)[12]

These four pillars assisted us in wargaming the simulation scenarios we intended to present to the Engineer School in December 2010. They constituted the template from which we created the scenarios.

In order to further improve the idea generation process we reviewed the database of simulation products found on US Army sponsored site- Milgaming (https://milgaming.army.mil). One product in particular found on this database was a VBS2™ supported scenario developed at the Maneuver Captains Career Course in May 2010. Using MS PowerPoint, developers outlined an exercise with defined resources and constraints using VBS2™ as the main exercise platform.[13] This idea appealed to us greatly

[11] Ibid, 10.
[12] Atherton, 92.
[13] Maneuver Captain's Career Course, (2010). *Combat Outpost (COP) Tactical Decision Exercise- Part 1*. Retrieved September 13, 2010, from https://milgaming.army.mil.

in that it allowed a facilitator to adapt the exercise quickly and effortlessly without requiring an additional technical expert, referred to as a subject matter expert (SME) henceforth. VBS2™ was effectively used as a canvas while the exercise was painted using commonly understood software. This approach meets the adaptability standard stressed by ALC 2015.

The database on the Milgaming site is dominated by Joint Training Counter-IED Operations Integration Center (JTCOIC) products. In order to gain a better perspective of their work, we visited JTCOIC in September 2010. Over the course of this visit we were introduced to a number of existing simulation efforts along with future projects. In particular was the production of a series of VBS™ machinimas (movies rendered with a gaming engine) that depict a series of combat-related dreams.[14] These dreams are taken from a recently published book, *The Defense of Jisr Al-Doreaa*. This book is a modernized version of the famous, *The Defense of Duffer's Drift*, in which a fictitious British Lieutenant learns critical lessons throughout a sequence of dreams set during the Boer Wars at the turn of the last century.[15] A separately created machinima, COP Keating, caught our interest as well. This product is in the form of a Windows Media Video file. It depicts, with music and voice over, the battle known as Kamdesh or COP Keating that occurred on October 3, 2009. While the video provided numerous after action review (AAR) comments, it allowed for no user interaction. This approach could add value in the classroom, mainly for open discussions, but it neither addressed any of Vandergriff's four curriculum pillars nor allowed for the adaptability desired in the ALC 2015.

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[14] Cianciolo, A. & Pearson, J. (2008) Experience *Without Danger: Digital Storytelling for Developing Individual, Community, and Team Leadership Expertise.* Presentation at the Army Operational Knowledge Management Conference. Fort Leavenworth, KS.

[15] Burgoyne, Michael L. and Albert J. Marckwardt. (2009) *The Defense of Jisr Al-Doreaa*, Chicago: University of Chicago Press.

4.2 Alternative Generation

4.2.1 COP Keating

After receiving permission from JTCOIC[16] to utilize their COP Keating machinima and terrain files, we designed our first scenario to incorporate three of the four ACM pillars. The COP Keating machinima would serve as a case study to generate classroom discussion and reveal the most prominent lessons learned. An additional terrain-only machinima would provide the students with better terrain situational awareness. The focus of our COP Keating effort would be to create a Tactical Decision Game (TDG). In the same fashion as the Maneuver Captains Career Course COP scenario, we utilized a MS PowerPoint file to walk the student through the TDG. Beginning with existing COP, partially shown in Figure 1, students would reinforce existing force protection measures within a resource constrained environment.

Figure 1: COP Keating Base Set

We utilized a simple MS Excel spreadsheet to display the resources available (HESCO bastions, wire, guard towers, etc.). In order to simulate a constrained environment, we assigned "resource points" to each type of available resource. In this fashion a student could pick and choose which resources they would add to the existing COP, forcing them to conduct trade-off analysis in the process.

Once the student had emplaced all of their additional resources to the existing COP, they would load an enemy overlay to emplace enemy units (roughly recreating the positions of the enemy from the actual battle). At this point, the student would emplace the US Army Soldiers into desired positions

[16] Bittel, Jeffery. (September 2010) Personal communication.

(Figure 2 illustrates the given combat strength). The final step would require the student to select the "Preview" function within VBS^{TM}. This allows the student to watch the battle unfold, given their tactical decisions, from an enemy sniper point of view.

Figure 2: COP Keating Manpower & Weapon Set

This COP Keating exercise incorporates four chapters from the GTA 90-01-011 base text. It facilitates the pillars of Case Study, Tactical Decision Game and feedback through the leader evaluation system. Each student can display their work, and subsequent battle, on a display in front of the class, forcing them to defend their decisions. Lastly, the exercise is adaptable. It requires no subject matter expert to run the simulation. Facilitators are free to edit the MS Office files that accompany the exercise.

4.2.2 COP Yousel Khel

Upon completion of the COP Keating exercise, we decided to move forward with an exercise that would incorporate all four of the ACM pillars. Using the commonly acquired terrain set of *Geotypical Afghanistan [25km]* we selected a fictitious town labeled Yousel Khel. This particular town sits in a valley surrounded by mountains with an important road running north-south nearby (see Figure 3). The buildings are mainly mud-clay with walls dividing communal properties. Southeast of Yousel Khel lies a battalion sized base camp, COP Rainier.

Given a simple scenario, the student is then required to select a site, commit to a layout design, and incorporate force protection considerations during the design and development of a base camp. These

three tasks are directly supported in three chapters of the base text, GTA 90-01-011. The scenario itself is described and outline in a six page MS Word document. Another MS Excel spreadsheet is utilized, in the same fashion as our COP Keating exercise, to highlight available resources and subsequent constraints.

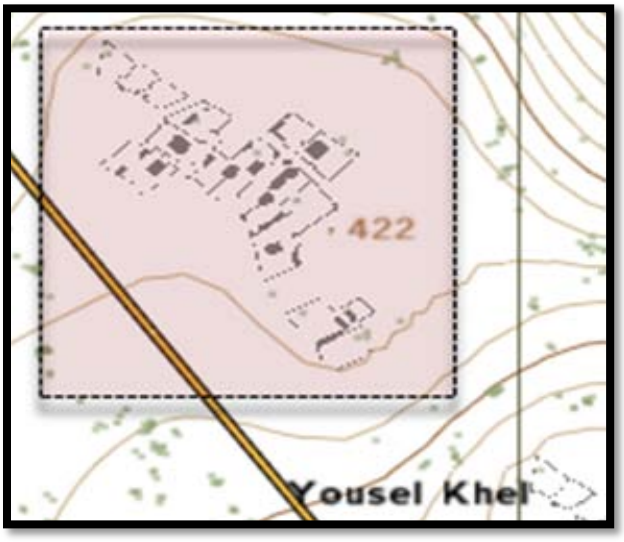

Figure 3: 2D Representation of Yousel Khel

The scenario forces the student to conduct trade-off analysis as competing interests (proximity to a USAID run Veterinary Clinic, local Mulla residence, or Afghan National Army COP) and force protection considerations (proximity to the road, central market, line of sight, etc.) drive site selection (see Figure 4).

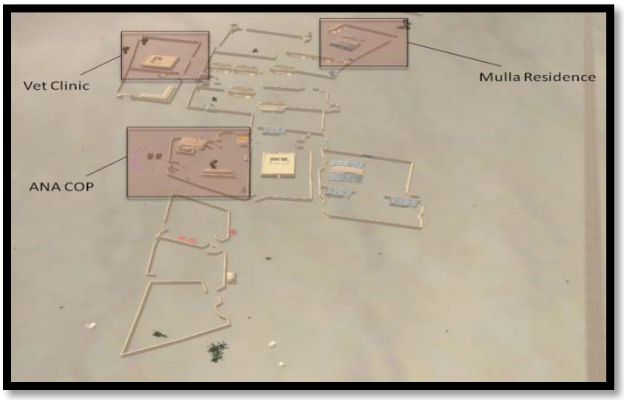

Figure 4: COP Yousel Khel Site Selection Considerations

In this scenario, unlike COP Keating, the student must build the base camp from scratch. Therefore, a more expansive list of resources is available to them. A partial list of resources available to the students

is shown in Figure 5. Students have the ability to incorporate their base camp into existing structures, build completely from the ground up, or a combination of the two approaches. In the same manner as constrained resources, each student has a set amount of US Soldiers and equipment to use in the defense of their base camp.

The process of site selection, layout design, and force protection considerations forms the basis of the TDG. Although a historical case study is not introduced, we do provide an instruction solution to the problem which can be used in its place. The third, as of yet, untouched pillar is Free Play Force-on-Force. Again relying on the merits of simplicity, we accomplish a force-on-force exercise by simply trading student-built scenarios from one student to another or one group to another. The receiving group is then allowed to emplace a set group of enemy fighters and vehicles, with movement commands, directly into the sending group's VBS™ saved file. Collectively the swapping individuals or groups can then "Preview" (the real time running simulation) each file and the subsequent battles that follow. In addition to injecting a dose of fun into the exercise, it allows for further evaluation of the students' effort and incorporation of tenets from GTA 90-01-011.

Available Object	Resource Pts	# Ordered	Total Resource Points
Camo Net- Large	5	3	15
Camo Net- Medium	3	5	15
Camo Net- Small	2	10	20
Fence Concertina- Collapse	0		0
Fence Concertina- Collapsil	2	56	112
Prepare to Stop Sign	1	2	2
Speed Bump	2	2	4
Stop Sign	1	2	2
Turn Around Sign	1	4	4
Barrier- Large	3	17	51

Figure 5: (Sample List) Resource Constraints

As with all of the simulation exercises the greatest value lies in the last of the four pillars: feedback through some type of leader evaluation system. With respect to COP Yousel Khel, the ability to showcase student created base camps, student fought force-on-force engagements, and student led

discussions echoes ALC 2015 in that it is a *learning tool and experience that engages and empowers learners.*

4.2.3 Additional Exercises

The Engineer Captains Career Course brings seasoned Engineer Captains from across the globe back to Fort Leonard Wood, MO for advance studies in Engineer Captain responsibilities and practices. The vast majority of these captains will have at least experienced some type of base camp in a deployed environment. They have practical experience. Yet, newly commissioned Engineer Lieutenants, enrolled in the Basic Officer Leader Course, more than likely will have no experience with base camps. For this reason, we designed a 600-man base camp on VBS2™ from an AutoCAD diagram found on the Theater Construction Management System (version 3.2). Known as TCMS, it is the delivery vehicle of Army Facilities Component System (AFCS) Program AR 415-16. TCMS is managed by the US Army Corps of Engineers. It is a treasure-trove of engineering blueprints, bill of materials (BOMs), and plans. This 600-man base camp, Figure 6, inputted into VBS2™ serves as discussion tool for facilitator-led discussions. Students can "fly through" the base camp to gain a better perspective than previous methods of photos and discussion in prose.

Figure 6: 600-Man Base Camp

While initially created for use in lieutenant classrooms, this simulation found traction in the Construction Engineer Warrant Officer courses. These warrant officers use TCMS and other software platforms during an extensive block of instruction on base camp design and development. The 600-man base camp displayed on VBS2™ could engender higher level discussion on the creation of base camps.

In addition to the COP simulation scenarios and the 600-man base camp we provided three VBS2™ tutorials for facilitators and interested students. These tutorials, authored by LTC Steve Henderson, provided supplemental instruction on the simulation platform itself. Yet, prior to conducting testing and evaluation of our products, we believed that such lengthy and formal simulation training would not be necessary.

5. TESTING AND EVALUATION

Conducted utilizing a US Army Engineer School computer lab, a proof-of-concept exercise occurred on December 16, 2010. Six captains with no VBS2™ experience were selected to test our scenarios. In less than 30 minutes each of the captains were successfully trained on VBS2™ to design base camps. Having a working knowledge of the software, each of officers then executed the COP Yousel Khel and COP Keating scenarios. The purpose of this proof-in-concept exercise was to validate that time spent actually learning the simulation could be minimized in order to maximize student time building base camps. While these captains were undergoing the training and subsequent exercises approximately 30 personnel from various Fort Leonard Wood agencies observed and participated. The results of this exercise demonstrated that VBS2™ editing skills could be taught to students with little to no previous simulation experience in a modest amount of time. This approach to simulation training mirrors guidance in ALC 2015 by enabling rapid adaptation, empowering learners, and promoting collaborative problem-solving events.

Upon completion of the proof-in-concept exercise, the Commandant of the Engineer School, Brigadier General Bryan Watson ordered that our suggested VBS2™ simulation scenarios be incorporated into the Engineer Captains Career Course. As of February 2011, officers in this course began *creating* new base camps and *improving* existing base camps on VBS2™. This process requires

utilization of VBS2™ in a fundamentally different way than in its traditional uses. VBS2™ has traditionally been used across the Army normally in a SME-created, Soldier-executed simulation (IED Defeat scenarios, convoy security scenarios, XM-25 marksmanship, etc.), placing the student in the role of simulation *user*. For these types of first-person, skill based functions, the use of VBS2™ makes perfect sense. Yet, with respect to base camp design and development we suggest *turning VBS2™ on its head*. Therefore scenarios such as COP Keating and COP Yousel Khel are formulated not in the traditional *user* based mode; rather we empower the students to be the *editors* of the simulation. We give them the power to design the simulation. Since in effect they are selecting sites, designing layouts, and allocating force protection measures, the utilization of VBS2™ in the user mode is not practical.

Over the course of successive Engineer Captain Career Courses, the US Army Engineer School will continue to evaluate the use of VBS2™ in this manner. Fortunately, the infrastructure of the Maneuver Support Center of Excellence (MSCoE) supports several computer labs and small group instruction rooms with VBS2™ capabilities. Hence, extensive and repetitive use of VBS2™ in training base camp design and development is supportable. Students can design and build base camps at individual computer stations, which can then be quickly displayed to the entire class through projection or display on a larger screen.

6. RECOMMENDATIONS

6.1 Editor vs. User

The idea of empowering students through enabling them as editors of the simulation is certainly neither new, nor revolutionary. Yet, for many Soldiers and officers within the Army when the word 'simulation' is spoken: large-scale, SME driven, computer war-games occupy their collective thoughts (such as JANUS). Soldiers expect to sit down, learn the simulation with the assistance of SMEs, and then execute their defined role within the scope of the larger exercise. This methodology is currently being used with respect to VBS2™ as well. MSCoE currently uses this methodology to instruct VBS2™ IED-Defeat missions. For many purpose this pedagogy is certainly appropriate in these situations and more.

However, when trying to educate Soldiers and officers on base camp design and development it becomes advantageous to *turn VBS2™ on its Head*, empowering the user to define new scenarios.

6.2 Simplicity vs. SMEs

As stated previously from ALC 2015, "sustained adaptation in an era of exponential change" is critical. We believe achieving this level of adaptability is obtainable given our approach. Rather than being wedded to a complex, simulation platform that requires several SMEs to maintain and train, we recommend (in the case of base camp design and development) a more simple approach. Scenarios, scoped in MS Office, and facilitated using a relatively simple, editor based simulation achieves "sustained adaptability". New versions of VBS2™ will not disrupt our instructing methodology. Our original scenarios were crafted using VBS2™ version 1.32. Version 1.4 is the latest version. Yet, since the scenarios were crafted using MS Office products, the version of VBS2™ available is inconsequential. By keeping it simple, doctrinal tasks such as developing base camps can remain adaptable regardless of the version of software or the availability of SMEs.

6.2 Harness the Power of Numbers

Another advantage of empowering students by making them editors of the simulation is that dependency on SMEs to create, revise, and recreate scenarios is no longer required. As scores of Engineer Captains work through the COP Yousel Khel scenario inevitably high-quality base camps will be successively developed. These could then be utilized in other classes or reconfigured into new scenarios. Given virtually unlimited access to VBS2™, students will become the engine of innovation. The overarching concepts of adaptability, empowerment, and higher feature control are all cultivated using this approach.

6.3 Instructor-Centric to Learner-Centric

The above title is borrowed directly from ALC 2015. As the PAM states, "Instructors will become facilitators."[17] This approach will increase interest among students, allow the number of scenarios to

[17] TRADOC Pam 525-8-2, 21.

rapidly grow, and provide an important feedback loop from new experiences in the field into training for base camp design.

6.4 Terrain Specific Scenarios

Our original simulation scenarios are all based on Geotypical Afghanistan [25km] terrain. Late in 2010, we approached Mr. Jeffrey Bittel and his team at JTCOIC for assistance in creating a 5x5 km terrain build of Rolla, Missouri. This specific block of terrain is the physical location of the offensive and defensive capstones offered during the Engineer Captains Career Course. By February of 2011, JTCOIC published this block of terrain on VBS2™ (available on milgaming.army.mil). Future base camp development simulation scenarios will utilize this terrain build. This provides students with the real-world opportunity of walking on the same ground in which they built their virtual base camp. When feasible, we recommend incorporating familiar real-world training terrain into the virtual environment; thereby providing the student with a reinforcing training opportunity using simulation.

7. CONCLUSIONS

ALC 2015 states, "Instructors will become facilitators who ask probing questions as the 'guide on the side' … rather than dominate the class as the 'sage on the stage'".[18] Furthermore ALC 2015 concludes, "the future learning model must provide more opportunities for collaboration and social learning".[19] Both of these statements reflect the possible outcomes of using VBS2™ in a "learner-centric" methodology as we suggest in this report.

No amount of classroom time can replace *experience*. What simulation allows is for Soldiers and officers the ability to gain *virtual experience*. At the very least those with relevant combat experience will be able to better relate their experiences with classmates (oral communication supplemented with a 3D picture).

Those familiar with base camp training may wonder if VBS2™ facilitated scenarios will replace traditional base camp training using a CAD (computer aided design) system. CAD software is currently

[18] Ibid.
[19] Ibid, 7.

utilized in the Engineer Warrant Officer courses. Any introduction of VBS2™ facilitated scenarios would serve to complement CAD training, not replace it. VBS2™ does not simulate the technical proficiencies required in the construction of base camps. There are no blue prints or bill of materials included in the training. Yet, VBS2™ does challenge the student to address resource tradeoffs, defensibility of selected sites, suitability of layouts, and more. These types of learning objectives are not directly addressable with traditional CAD based instruction.

We do not provide a dictated means of assessing student performance. The instructor, or facilitator, is free to subjective grade the effort or quality of work as he or she sees fit. Yet, in a resource constrained environment, as is the case in each of our scenarios, those students that best utilize their given resources to construct defensible, mission-focused base camps should be given a higher score or grade. The quantifiable means of conducting this type of grading was not the focus of our work.

Further evaluation of the base camp development simulation scenarios must take place at the conclusion of the pilot testing. Certainly further refinement of the current scenarios will take place. The assessment of learning objectives at the end of course will require additional research.

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APPENDIX A: COP KEATING (partial adaptation from student handout electronic files)

COP Keating VBS2^{TM} machinima is shown to recreate the historical events

General Situation:

Coalition forces have established two outposts (COP Keating and OP Fritsche) in a valley near the small Afghan village, Kamdesh, about 20 miles (32 km) from the Pakistan border.

Isolated and exposed to higher ground on all sides, COP Keating, the larger of the two small outposts, is manned primarily by US soldiers with ANA Soldiers manning primarily checkpoints. All roads to the COP are vulnerable to ambush. Attach aviation assets require at least 30 minutes notification until 'time on station'.

The mission of OP Fritsche, manned with a mix of US and Afghan personnel, is to provide overwatch for COP Keating.

In recent months both outposts have received word of their impending closure. This information has become common knowledge to US and Afghan personnel.

Coalition forces have recently received intelligence reports indicating that insurgents are planning an attack on the outposts.

COP Keating Overview:

COP Keating lies at the intersection of three values with excessive increasing slopes in all directions. The outpost is dominated on all sides with direct line of sight into its perimeter accessible from multiple angles. The terrain itself is mountainous with sparse vegetation (although tree lines allow for decent concealment along the slopes). The COP has two primary entrances, one from the west and one from the south. The southern entrance is the most direct path to the nearby town of Kamdesh and the most direct route to OP Frische. On the western side of the COP exists a creek bed that has the potential to flood during the raining season, currently it is dry. Along with the surrounding elevated key terrain exists a Mosque S/SW of the COP.

Terminal Learning Objective:

TASK/ACTION: Enhance Force Protection Posture of Existing COP

CONDITIONS: Bravo Troop, 3rd Squadron, 61st CAV, is conducting counterinsurgency (COIN) operations near the town of Kamdesh within the Nuristan province in eastern Afghanistan. Bravo Troop, along with additional squadron assets, occupies two fortified positions- OP Frische and COP Keating. For months rumors have swirled that COP Keating was destined for closure. While the enemy often engages in probing attacks, they seldom stay to fight, and seem to prefer small unit operations (squad sized elements). Recent intelligence suggests that the enemy may mass into a battalion sized force for an upcoming attack. These reports of eminent massed enemy attacks are not new.

STANDARD:

1. Conduct a Risk Assessment of the current Force Protection posture
2. Evaluate current Perimeter Security Considerations and highlight concerns
3. Assess and reinforce a COP Defense

Enabling Learning Objective A:

TASK/ACTION: Conduct a Risk Assessment of the current Force Protection posture

CONDITIONS: Given the VBS2 file of COP Keating, GTA 90-01-011, and previous knowledge and/or experience with risk management.

STANDARD: Communicate in writing the first 3 steps of the risk management process

1. Identify Hazards
2. Assess Hazards
3. Develop Controls

Enabling Learning Objective B:

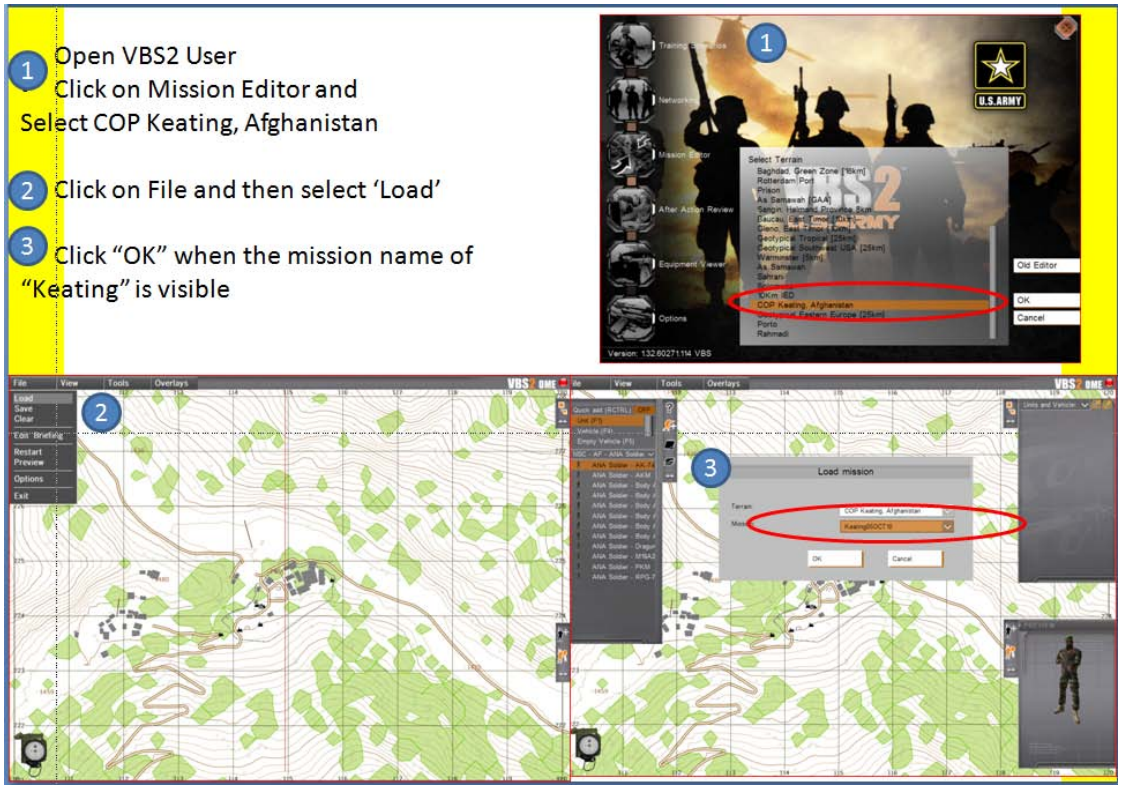
TASK/ACTION: Evaluate current Perimeter Security Considerations and highlight concerns

CONDITIONS: In a classroom / take-home environment, acting as the Commander of Bravo Troop, utilize the VBS2 file of COP Keating, GTA 90-01-011 (page 6-7), and previous knowledge and/or experience to address existing perimeter security considerations.

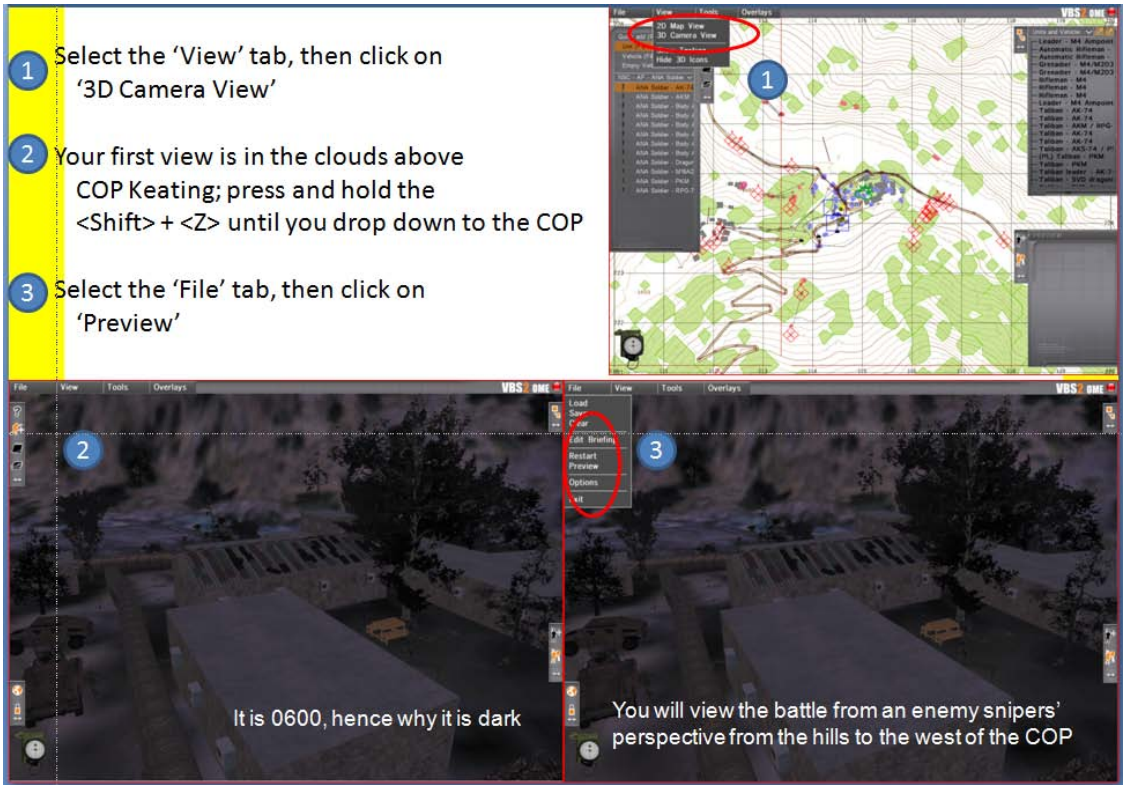
STANDARD: Begin with the perimeter security considerations itemized in the GTA, develop a Priority of Work plan which prioritize your most pressing concerns, then briefly outline the steps you would take to address each concern. Do not limit yourself those concerns offered solely in the GTA.

COP Keating VBS2™ machinima is shown to highlight a simulated attack

Simulation Instructions:



Scenario Instructions:



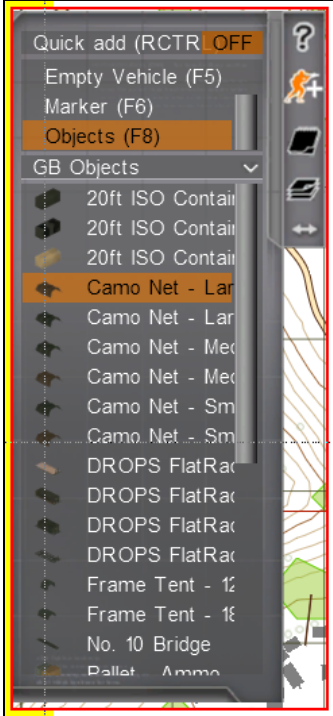
Enabling Learning Objective C:

TASK/ACTION: Assess and reinforce COP Keating's Defense

CONDITIONS: In a classroom / take-home environment, acting as the Commander of Bravo Troop, utilize the VBS2 file of COP Keating, GTA 90-01-011, and previous knowledge and/or experience to modify the existing defense plan. You cannot affect the current location (site selection) of COP Keating. Restrictions to additional Class IV items follows.

STANDARD: Adjust positioning of personnel and emplace additional force protection devices in order to improve COP Keating's ability to repeal enemy attack. Rerun simulated attack and make improvements as necessary.

Class IV Constraints:



Due to transportation (lack of lift/haul assets) and material (barrier types, locally procured materials) you are resourced constrained in your efforts to improve COP Keating's force protection posture.

To model these resource constraints, each "allowable" object is assigned resource points.

You will have a total of **250 resource points** in which to improve COP Keating's force protection posture (see Excel attachment).

You are additionally constrained to specific VBS2 Objects Categories and specific objects within those categories.

"Allowable" Object Categories include:

GB Objects

Objects- Traffic Control

Scenery- Barriers

Scenery- Furniture

Scenery- Military

Scenery- Misc

TCW Scenery

Partial Listing of Resource Constraints:

Available Object	Resource Points	# Ordered	Total Resource Points
Camo Net- Large	5		0
Camo Net- Medium	3		0
Camo Net- Small	2		0
Fence Concertina- Collapsed	0		0
Fence Concertina- Collapsible	2		0
Prepare to Stop Sign	1		0
Speed Bump	2		0
Stop Sign	1		0
Turn Around Sign	1		0
Barrier- Large	3		0
Cement box - single	5		0
Cement divider - single	2		0
Gate - raising bar	5		0

---------- continues----------

Hesco Barrier- Row 12m	24		0
Hesco Barrier- Row 6m	12		0
Hesco Barrier- Row Tall 9m	27		0
Hesco Barrier- Single	2		0
Hesco Barrier- Single Tall	3		0
Plastic Barrier- 1	2		0
		TOTAL	0

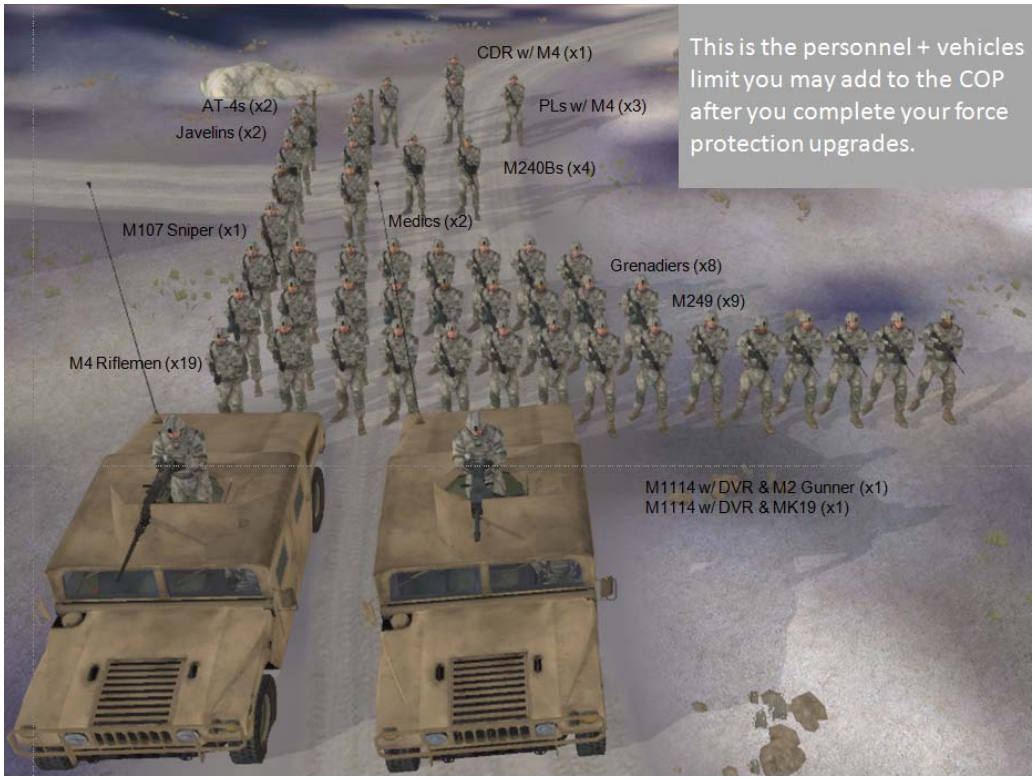
You are limited to **250** resource points!!

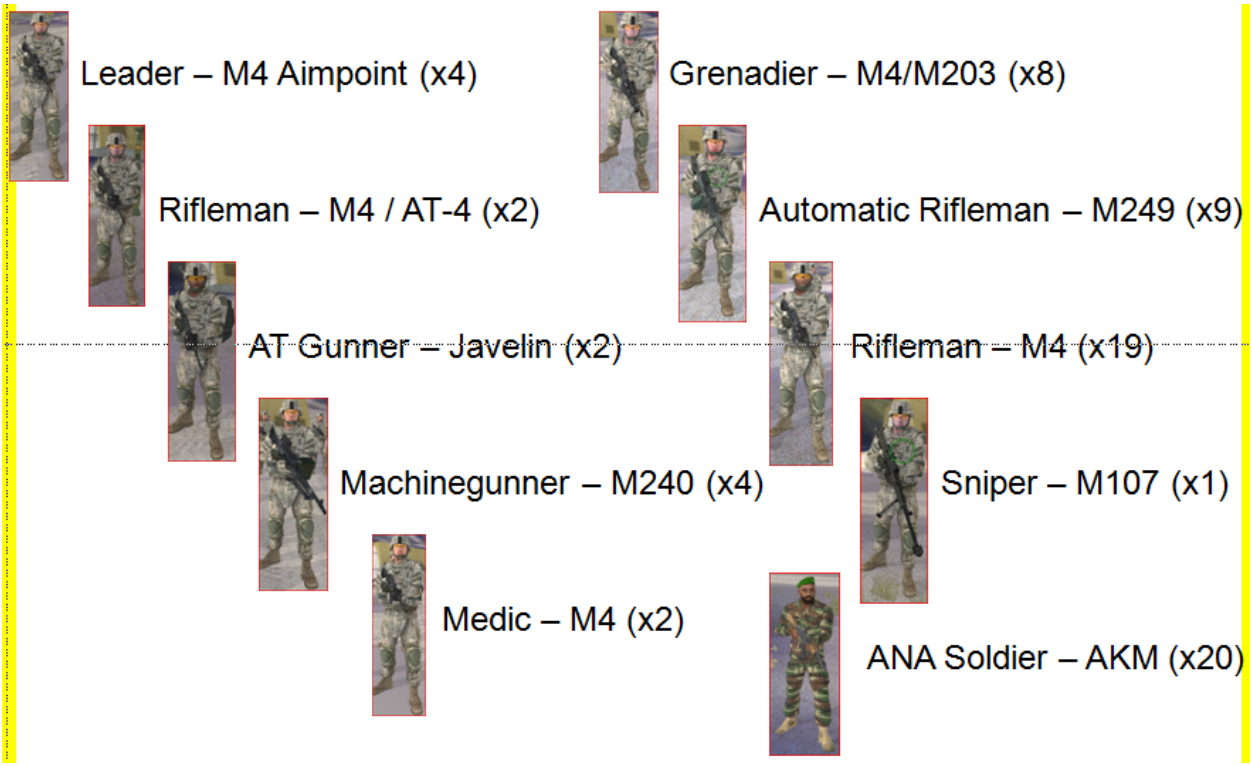
Initial Posture:

The force protection posture for COP Keating includes the existing barrier systems along with 8 non-occupied M114s.

This is your starting 'set', you may move the vehicles, but you cannot occupy with Soldiers and/or weapon systems.

Personnel & Equipment:





APPENDIX B: COP YOUSEL KHEL (actual student handout)

US ARMY ENGINEER SCHOOL

COP Yousel Khel

Site Selection and Layout Design

ECCC

DATE ( )

COP Yousel Khel is a simulation based exercise that allows the student to select a base camp location (site selection) and commit to a layout design given external and resource constraints. Follow on exercises include a force-on-force event that evaluates force protection and perimeter security.

Introduction

In recent efforts to reestablish collation presence in the volatile Nuristan Province, your company received orders from your detached Task Force Headquarters (Task Force Athena) to construct and man a Combat Outpost along a critical trade route within the Bargi Matal District. Your current location at FOB Rainier, while great from a defensive perspective remains somewhat detached from the local population. This village, Yousel Khel, is approximately 2km from your current location at FOB Rainier.

Task Force Athena, your immediate command, is located at FOB Warhorse. Collocated at FOB Warhorse is an 81-mm mortar platoon. Other friendly locations exist at FOB Maragha and FOB Bohemia. FOB Maragha contains a sister Task Force Athena company, while FOB Bohemia contains your commanding brigade headquarters. Collocated at FOB Bohemia is one battery of M109A6 Paladins. Attack aviation assets require, at a minimum, 30 minutes until time on station.

Adhering to ISAF guidance, your CO(-) element is to partner with a ANA (Afghan National Army) detachment in establishing presence within the village. Without consultation the ANA detachment moved in overnight and occupied a position within the village.

Background

Historically, Nuristan cultivates a rebellious streak. This region of Afghanistan was the last to convert to Islam (occurring at sword point in the late 19th century). Acknowledged as one of Afghanistan's poorest and most remote provinces, Nuristan remains as one of Afghanistan most under-developed regions. As recently as 2009, this area of Afghanistan was virtually abandoned by coalition forces due to an extreme Taliban presence (the battles of Wanat and Tamdesh occurred in Nuristan). Yet, due to its critical position along the Afghanistan / Pakistan border it remains key district terrain.

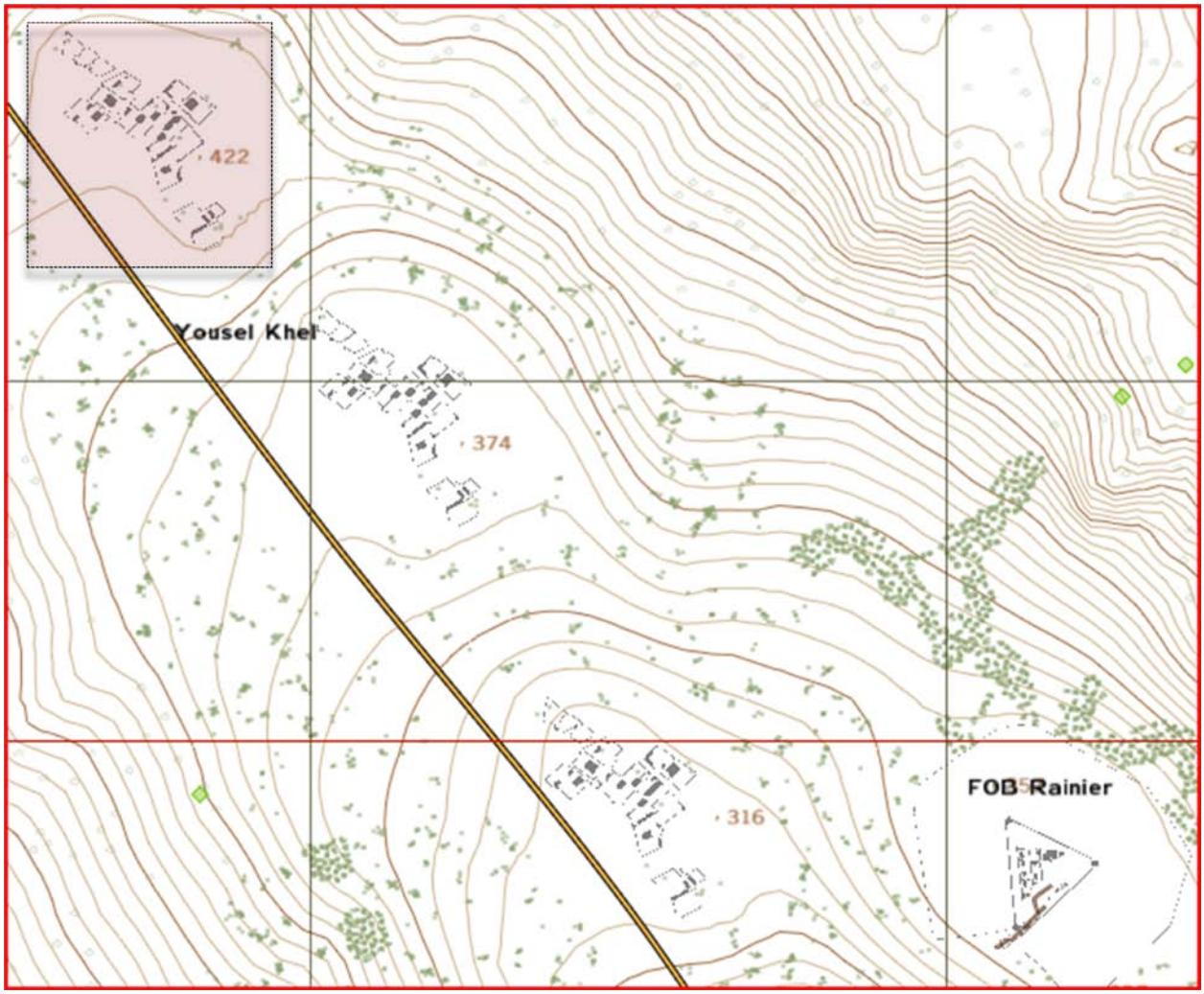
Mission

Your mission is to select a site and design a layout for a CO(-) Combat Outpost. You are limited as to the amount of Class IV available and time is short. You need to have this COP built in less than 3 days. Additionally, you have special considerations:

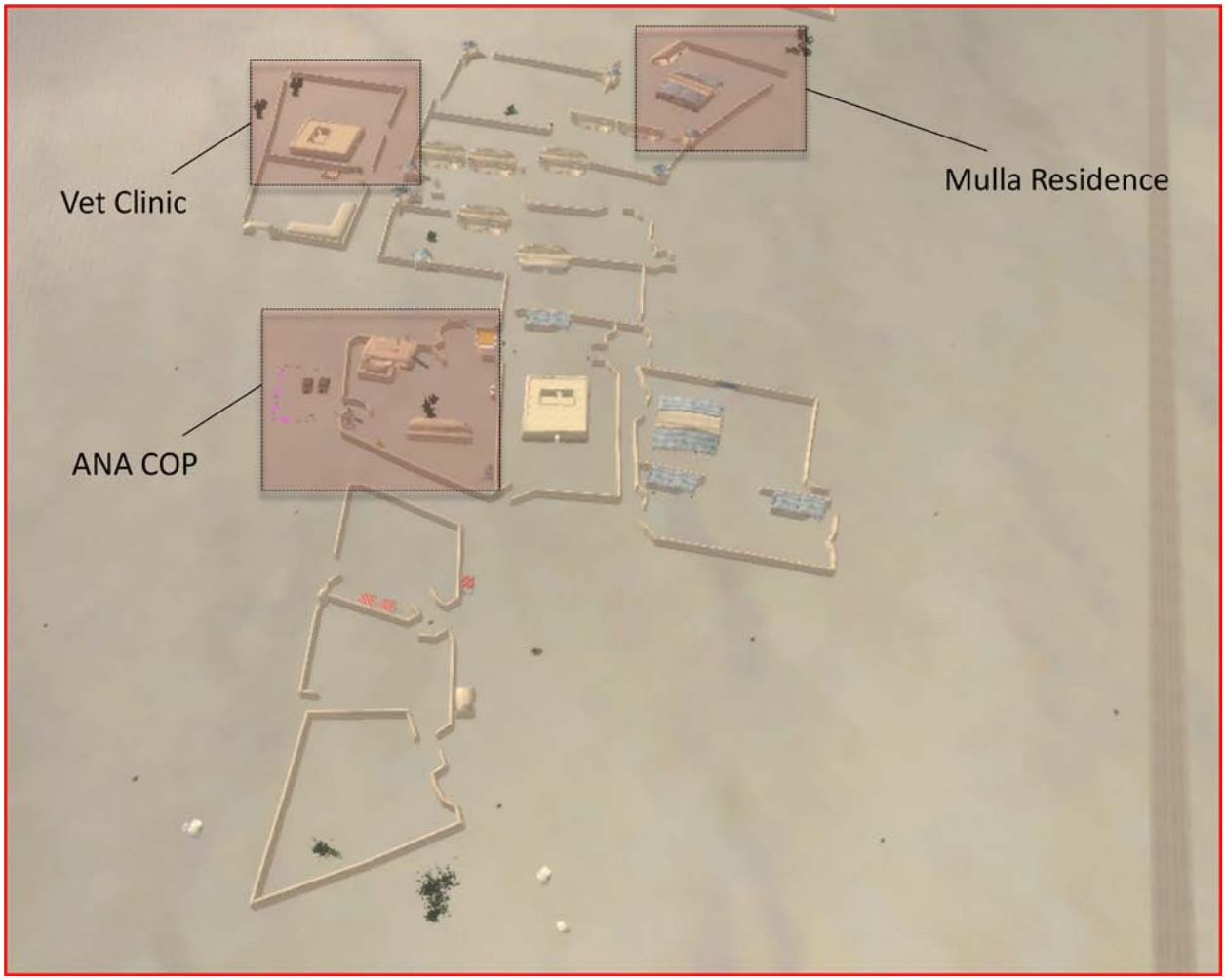
a. Recently one of the local Mullas has decided to throw his lot in with fragile Afghan government. Intel believes him to be very influential in the area with familial ties to leaders within the local Taliban command. Maintaining his support and protecting for his well-being are critical to your Task Force mission.
b. USAID (US Agency for International Development) has recently funded a new Veterinary Clinic for the village of Yousel Khel. This project has high visibility. Recently a crew from *60 Minutes* produced a 15-minute video highlighting the cost/benefits of USAID projects. This Veterinary Clinic was highlighted in the segment. While immensely popular with local herders and farmers, this clinic also proves to be a low threat/high payoff target for Taliban forces.
c. All real estate and land within the village is available for use. The lofty rental payments to locals is looked favorably upon, therefore if you deem a location appropriate, it is available.

Location

2D Map View (note you are to select a location within the NW region of Yousel Khel)



3D Camera View



Assignment

a. Design and build a CO(-) COP on VBS2 within prescribed constraints:
    a. Adhere to attached Resource Constraints (primarily Class IV)
    b. You must identify via inserted objects a trash disposal site, latrines, living areas, and a TOC
    c. You must identify via inserted objects Class I, III, and V storage sites
    d. You have US Army Soldiers and Vehicles at your disposal- emplace them within your COP to bolster your force protection, breakdown as follows:
        i. M240- Machinegunner (4ea)
        ii. M249- Automatic Rifleman (4ea)
        iii. M4/M203- Grenadier (4ea)
        iv. M4- Rifleman (8ea)
        v. M4- Medic (1ea)
        vi. M1114- with M2 gunner and driver (1ea)
        vii. M1114- with MK19 gunner and driver (1ea)
    e. You must emplace 5ea parked M1114s (with no crews)
    f. You may insert additional objects to provide a more realistic portrayal (bunk beds, tents, computers, etc.) of your COP as long as they do not improve force protection outside of the resource constraints
b. In a two-page write-up defend the site selection, layout, and force protection measures of your COP. Specifically address the following (as referenced in GTA 90-01-011):
    a. Political Considerations
    b. FOB Mission
    c. Defense in Depth
    d. Vantage Points
    e. Access Points
    f. Occupancy Requirements
    g. Use of Available Space

VBS2 Instructions

a. Select Mission Editor / Geotypical Afghanistan [25km] / OK
b. File / Load / "CO(-) COP Initial Set" / OK
c. Right click on NW corner of Yousel Khel / Default Camera
d. Utilize the insert object features of VBS2 while adhering to Resource Constraints
e. Save completed COP- "LASTNAME_FIRSTNAME_DATE"

Force-on-Force Instructions

Groups swap saved COP Yousel Khel files. Each group then assumes role as OPFOR. You are restricted to nine enemy dismounts (armed with small arms only- no RPGs). Additionally you have six IQ insurgent cars (substitute with Taliban cars if available). You may emplace as many movement commands as required.

By sure to 'Preview' the battle while both groups watch.

Instructor led AARs may follow.

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14. ABSTRACT

By late 2009, the US Army published an assessment of base camp training in TRADOC PAM 525-5-5, declaring "that no comprehensive policy or doctrine associated with planning and design, construction, and deconstruction, nor operations and management" existed with respect to base camps. In light of the Army's stated desire to reacquire base camp competencies and revolutionary changes in the Army Learning Model, as outlined in TRADOC PAM 525-9-2, the Operations Research Center of Excellence at the United States Military Academy undertook a project to bring base camp design and development simulation support into the classrooms of the US Army Engineer School (one of the three schoolhouses within the MSCoE). By the end of January 2011, a series of simulation exercises using the VBS2TM simulation platform were introduced to the Engineer Captains Career Course. This paper reports on the progress of these efforts, as well as the pedagogy pursued in educating future Army officers in base camp design and development.

15. SUBJECT TERMS

Base Camp Design, Simulation based training,VBS2, Adaptability Course Model, COP Keating

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