**TaRGeT: Tactical Route Generation Tool for Determining an Off-Road Route**

**Background**

The U.S. military has troops stationed overseas in areas of conflict. In these areas of conflict, the U.S. uses checkpoints to provide security against insurgency. Insurgents avoid these checkpoints by going off-road. The military uses several training techniques to prepare for future missions. The U.S. Army has training centers within the U.S. that are able to replicate foreign lands, including one at Fort Irwin. The military also conducts virtual simulations using Virtual Battle Space 2 (VBS2) to carry out training exercises. VBS2 is software that the military uses to simulate missions using artificial intelligence.

**Goal:** To identify plausible off-road routes to be displayed in the VBS2 software.

**Study Area**

Fort Irwin Military Reservation was used as the study area. The training ground at the reservation was set up to replicate Iraq by using five Military On Urban Terrain (MOUT) Sites.

**Methodology – Model Design**

TaRGeT was developed in ArcGIS Desktop 9.3 software. Within the ArcGIS environment, the ModelBuilder application was used to automate tasks through the use of creating a model.

Three general steps were taken to achieve the output. The first step was to create a cost surface. The DEM, roads, water, and checkpoints were each converted to cost surfaces based on how each variable affected travel. Then weight sum (overlay) analysis was used to create a cumulative cost surface. The second step was to use least cost path analysis with the MOUT sites for the start and end points. The final step was to make the output compatible with VBS2 software. Each of these steps required several geoprocessing tasks.

**System Overview and Data**

Five different datasets were used. The info dataset contained the MOUT sites. The road dataset contained the existing road network. The TCP dataset contained checkpoint features. The WaterBodies dataset contained water areas that were impassible. The DEM raster dataset was used for elevation data. The data was inputted into a model that generated routes that avoided checkpoints. That output could then be used with the military VBS2 for training purposes.

**Results**

The map on the right illustrates routes that avoided the checkpoints by at least 300 meters. The map on the left illustrates routes that avoided the checkpoints by at least 1000 meters.

Testing was conducted on other possible scenarios that affected the cost surface and least cost path analysis. TaRGeT was also successfully tested using data from a new geographic location.