The paper discusses the development of a game-based simulation for emergency response scenarios. Specifically, the simulation is a modification (mod) of Unreal Tournament 2004 that approximates the problem space of emergency responders. Our first game mod, called UnrealTriage, simulates emergency response to a mass casualty plane crash at a regional airport. Despite the recent push for improved emergency response technology in support of homeland defense, few civilian organizations have access to the kind of computer simulations that have proved their worth in the military context. The high cost of this technology and the expense of customizing it are two obvious reasons. Unreal Tournament (UT), a "first person shooter" game from Epic Games, costs very little, runs on commonly available computers, and comes with a suite of tools for modifying and creating game components. The question driving our research is whether game engines such as UT, developed for entertainment, can serve as platforms for useful low cost simulations for emergency response.

UnrealTriage involves multiple emergency response players (firefighters and emergency medical technicians) at the scene of a small airplane crash with 30 casualties. The player objectives developed thus far consist of fire suppression and primary triage. Players must locate and categorize the casualties into one of four treatment categories. The victims are tagged as red (immediate), yellow (delayed treatment), green (walking wounded), or black (fatally wounded). For the game environment, a terrain model (map) based on a real-world airport was created from digital elevation data, satellite imagery, and local engineering data. The Karma physics engine, which is part of the Unreal distribution, was used to define object behaviors such as fire hose dynamics. Simple artificial intelligence (AI) for non-player characters was done through internal scripting, but more sophisticated behaviors may require interfacing with external AI engines.

The armed forces use synthetic environments for mission rehearsal exercises, training, and virtual prototyping, and the same needs for simulation exist for domestic emergency response organizations. Such organizations conduct regular exercises at the local, regional, and federal levels to prepare for catastrophic events such as terrorist attacks, natural disasters, or large accidents. Synthetic environments such as UnrealTriage can enhance tabletop and command post exercises by providing an objective, dynamic, real-time virtual world containing simulated but adequately realistic people, objects, and events. The same technology could be used for training, although UnrealTriage is not intended to be a pedagogical training tool. Emergency response technologies such as critical incident management software (CIMS) could be prototyped and evaluated using synthetic environments as well. Some of the benefits of using game engines for simulation include low user cost, impressive graphics and sound, an external application interface for simulation interoperability, and built-in scorekeeping for after action review. While improvements and extensions to the game mod are necessary to create a richer space of actions and consequences, we have demonstrated through UnrealTriage that game engine technology is a promising vehicle for emergency response simulation.