Title: A Strategic Planning and Simulation Tool for Counter-Terrorism Using Agent-Modeling and Virtual Environment

Author(s): Andrew J. Park, Department of Computing Science, Thompson Rivers University
Herbert H. Tsang, Department of Mathematical Sciences, Trinity Western University

Contact: apark@tru.ca and Herbert.tsang@twu.ca

WP Number: 14-09

Research Question:
Can agent-based modelling and virtual environment technologies be used to create a decision support, response planning and risk assessment system for emergence preparedness?

Importance:
Public safety has been an important concern over the years. When a public event is held in an urban environment like Olympic games or soccer games, it is important to keep public safe and at the same time, to have a specific plan to control and rescue the public in the case of a terrorist attack. In order to better position public safety in communities against potential threats, it is of utmost importance to identify existing gaps, define priorities and focus on developing approaches to address those.

Realistic computer simulation plays an important role in mitigating the above mentioned risk to public safety by provide training to the law enforcement personnel. Through the simulation, an assessment of the overall impact of the risk event can be examined.

Research Findings:
By using state-of-the-art agent-based modelling and virtual environment technologies, we have built an affordable, flexible and powerful system for decision support, response planning and risk assessment. This system allows the user to explore the spatial-temporal features of the environment and for risk analysis through analyzing different potential scenarios. In this simulation system, we not only easily can create crowds with over 10,000 members. We also allow the user to immerse themselves into the crowds via the virtual environment technologies.
To validate our system, we have created simulation for a) the Boston Marathon Bombings, b) the Westgate Shopping Mall Attack, and c) Emergency Response Plans for Escaping from High-Rise Buildings. Through experimenting with different scenarios, we have gained insight into structuring different emergency response plans and protocols.

Implications:
Virtual environments play an important role in the study of human behaviors and the training of first emergency responders. The system we built is modular, and it is easily reconfigurable to different cities and events.