Temasek Defence Systems Institute

AN OPERATIONAL EFFECTIVENESS ANALYSIS ON SMALL ARMS SHOOTING PRECISION IN CLOSE QUARTERS BATTLE

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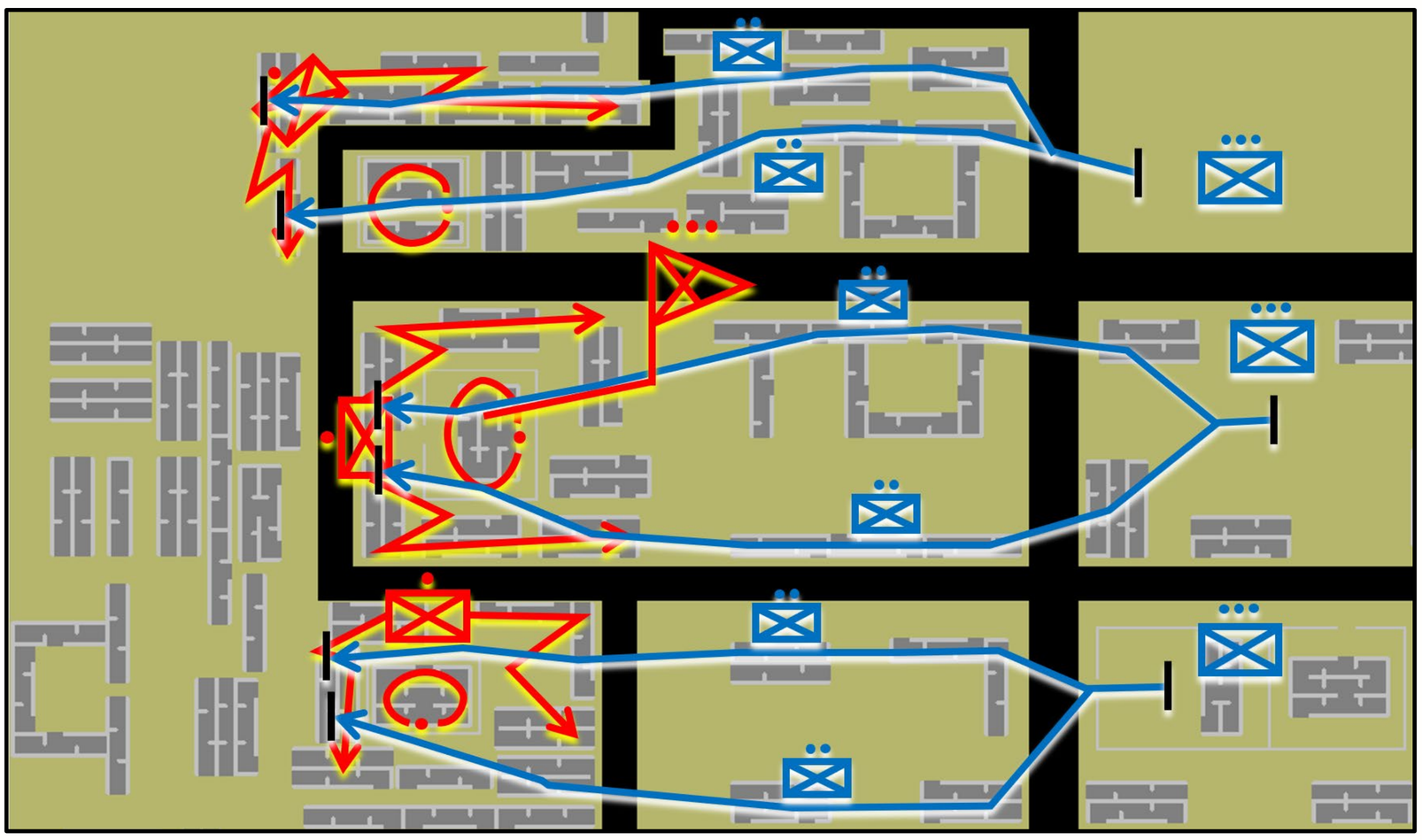
Thesis Objective:
To determine how improvements in shooting accuracy may (1) increase the probability of mission success, (2) reduce own forces' casualties, and (3) potentially reduce the manpower or ammunition (soldiers' load) mission requirements.

Agent-Based Modelling and Simulation Scenario:
Coalition Blue Force Company (24 Squads) assault on a Red Platoon of insurgents (8 Squads) defending an urbanised area (size of 186 m × 165 m with 100 single-level buildings).



Research Methodology:
A full factorial design of experiments was used to generate data, the analysis of which supports the research goals.

A sequential analysis campaign was devised involving a base case analysis, followed by three sets of experiments. Each experiment set in the analysis campaign was designed to inform subsequent experiments. This was done to funnel the huge combat possibilities manageably into valuable insights.

Insights from previous experimental sets were taken into consideration when designing the next set of experiments to focus the desired scenario and reduce the design space.

Insights / Findings:
After more than 250,000 simulated battles conducted using a model developed with the Map Aware Non-Uniform Automata - Five (MANA-V) software, it was determined that an improvement in Blue Force individual shooting accuracy in close-quarters combat has the potential to attain a 50% reduction in manpower requirements and a 50% reduction in blue casualties.

With the reduced manpower, however, the time taken for the smaller combat force to cover the same area of operations would be tripled. Ammunition requirements would also increase, as the smaller combat force would need to focus fire to cover maneuvering team members.

When considering the requirements of unmanned or artificial intelligence-enabled weapon systems to support future close-quarters combat, it will be ideal to include the shooting accuracy of up to P-hit 0.9 as one of the requirements. Additional resources should be put to better use and not be invested in trying to improve the shooting accuracy beyond P-hit 0.9.

Benefits & Potential Applications:
Establish clear expectations and requirements for the design of (1) next generation force structure, (2) individual marksmanship training, (3) shooting accuracy requirements of unmanned systems, and (4) artificial intelligence-enabled weapons equipped to aid shooting accuracy improvements.

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