Temasek Defence Systems Institute

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An Operational Effectiveness Analysis on Manned-Unmanned Teaming using Weaponized Unmanned Vehicles in Urban Terrain

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<u>Aim</u>

To explore the effectiveness of Manned Unmanned Teaming (MUM-T) through the employment of unmanned ground vehicles in an offensive urban environment.

Benefits

This study will gain deeper insights on: (1) future MUM-T force structure development; (2) the operational perspective to support future CapDev efforts; and (3) strengthening concepts of MUM-T in an offensive scenario. These insights can serve to support future force MUM-T force structure review and CONOPS development.



Methodology and Approach

- Development of a combat model on operational scenarios for UGVs through agent-based simulation.
- Development of complex and operationally relevant design of experiments to study different scenarios.
- Conducting technical and statistical analysis on results.

Design of Experiments

- **DOE #1 MUM-T**: One factor with two levels DOE.
- DOE #2 Manpower: One factor with four levels DOE.
- DOE #3: NOB DOE.

Results of Analysis

- Loss exchange ratio improvement of up to 300%.
- Significant reduction in mission completion time.
- Importance of evaluating technical capabilities of combat system to improve efficiency.

Recommendations and Future Works

 Other Scenario Testing: There is scope to dovetail alternative concepts such as swarming, land-air linkages, and introduction of unmanned armored platforms of CapDev interest. The use of a different simulation could be explored to capture behaviors or metrics that this software could not.





Figure 2. Comparison of Different Types of DOEs. Source: Sanchez and Wan (2015).



Real World Testing: Field tests could be conducted using similar platforms and proxies. Similarly, experiments could be embedded within part of military exercises and training courses to enhance realism.

Figure 3. Graphs of MOEs against UGV Capability

MUM-T has proved to improve the lethality and survivability of combat forces. Regardless, it remains paramount that force structure be optimized to prevent capabilities from being outweighed by future operational risks.



