Temasek Defence Systems Institute

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A SYSTEMS ENGINEERING APPROACH TO ALLOCATE RESOURCES BETWEEN PROTECTION AND SENSORS FOR GROUND SYSTEMS FOR OFFENSIVE OPERATIONS IN AN URBAN ENVIRONMENT

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Objective of Thesis

To determine conventional and asymmetrical factors that are significant for armoured vehicles' survival during offensive operations in an urban environment.

Main Research Ideas

Using simulation and design of experiment to determine the relevance and significance of 7 armoured vehicles design factors.

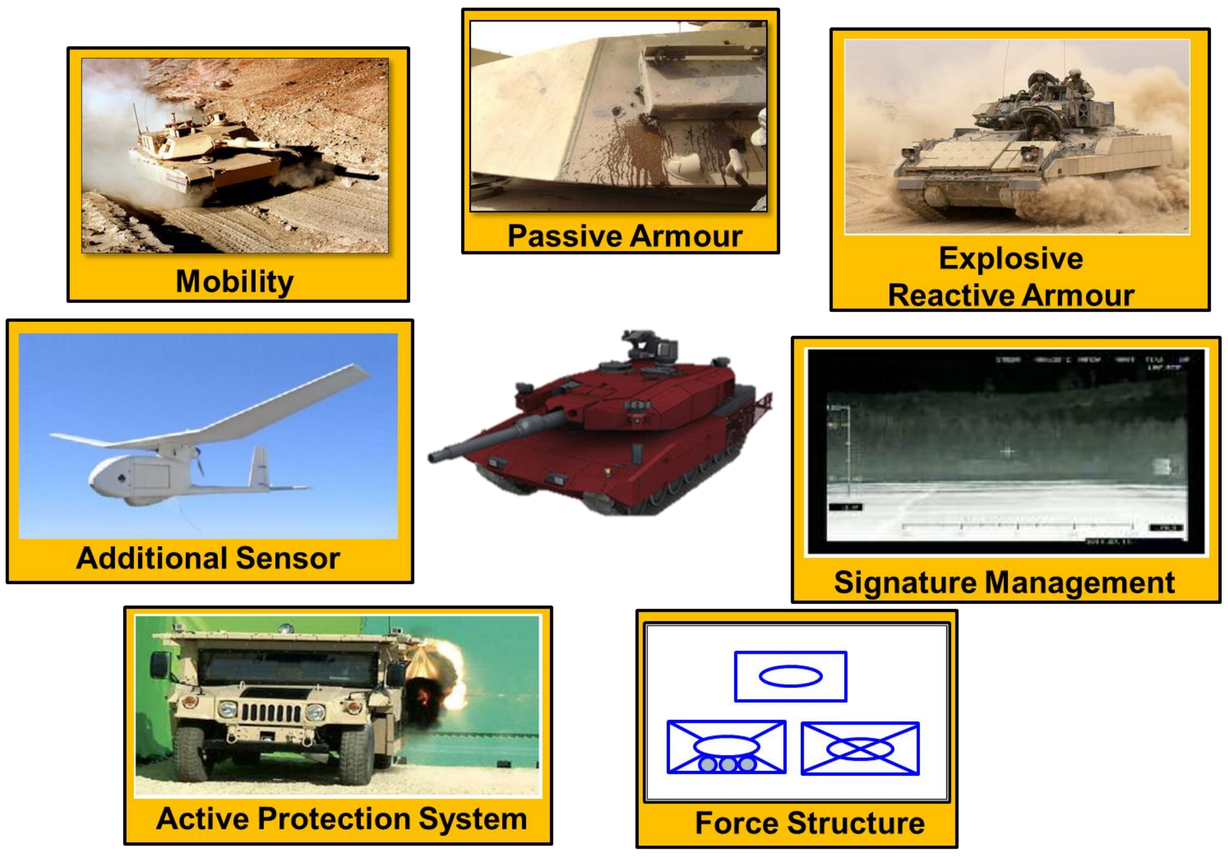

Fig 1. 7 Design Factors

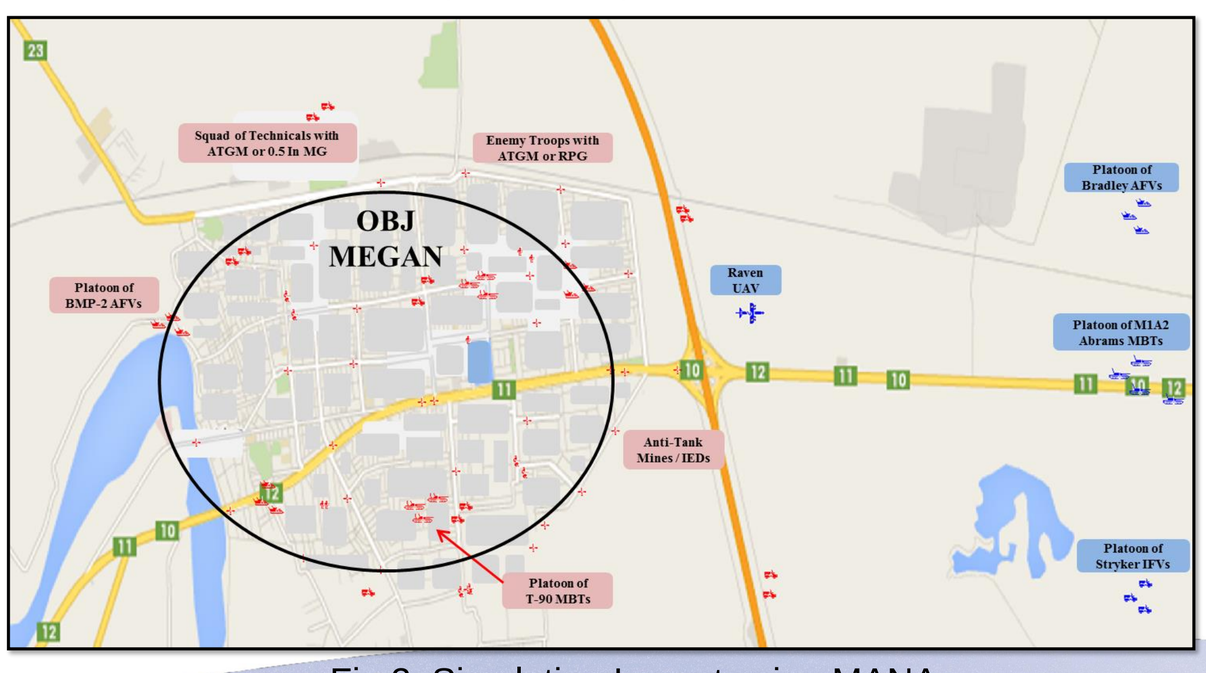

Fig 2. Simulation Layout using MANA

Research Results

12,850 simulations later, 5 factors and their respective interactions are determined to be significant:

- Armour Thickness
- Mobility
- Presence of Explosive Reactive Armour
- Presence of Active Protection System
- Force Structure

		MOES			
		% BLUE Casualties	FER	Prob of Completing Mission	Time Steps taken to Complete Mission
FACTORS & THRESHOLD VALUES	Most Important	Presence of ERA	Force Structure Value ≥ 8 (3 MBT Platoons)	Presence of ERA	Mobility ≥ 78% of Orginal
	2nd Most Important	Presence of APS	Armor Thickness % ≥ 126	Force Structure Value < 5 (1 MBT Platoon + 2 Bradley Platoons)	Force Structure Value < 4 (3 Bradley Platoons)
	3rd Most Important				Presence of ERA
	4th Most Important				Mobility ≥ 90% of Orginal

= Most Important Factor = 2nd Most Important Factor = 3rd Most Important Factor = 4th Most Important Factor

Table 1. Relative Importance of factors to the 4 MOEs

- Equation for each MOEs were also developed to predict the respective outcomes.

Benefits / Applications

- Prioritization of resources for armoured vehicle designs based on the relative importance of design factors
- Allows military commanders to have a reasonable estimation of outcomes of the MOEs prior to committing troops to combat

Way Ahead

- Study into other Combat Environment and Operations
- Use actual (Classified) values for agents properties in simulation

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