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**Title: Assessing Options to Enhance Force Protection for Mobile Forces**

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# Assessing Options to Enhance Force Protection for Mobile Forces

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Abstract

Over the past decade there has been increased interest in options to enhance force protection for forces in operations other than war (OOTW). This was highlighted by actions taken in the Former Republic of Yugoslavia (FRY) where actions to enhance force protection (e.g., mandated use of protective gear; use of multiple vehicles in traveling through the theater) were stressed heavily (Reference 1). More recently, the mission has become a major political-military issue in Iraq where attacks on coalition forces and International Organizations have become common place.

In view of this increasing interest, the Army Science Board was directed to undertake a summer study to identify and assess options to enhance force protection effectiveness and efficiency (Reference 2). Consistent with that direction, the study identified an array of vignettes as a context for exploring promising force protection options. These included four hypothetical vignettes associated with the protection of fixed installations: a biological attack against the Norfolk, VA, area; a chemical attack against the Kandahar airport in Afghanistan; a high explosive attack against a forward operating base in central Asia; and a high explosive attack against a Forward Arming and Refueling Point (FARP)). Furthermore, two hypothetical vignettes were formulated to explore the challenges associated with the protection of mobile Blue forces: a logistical convoy of trucks protected by escort vehicles and small teams patrolling in a market place. This paper describes the analyses that were performed to illuminate the issues associated with the protection of mobile Blue forces. Particular emphasis was placed on assessing the potential impact that C4ISR options would have on force protection effectiveness.

Methodologically, the analyses adhered to the principles articulated in the NATO Code of Best Practice for C2 Assessment (Reference 3). This included the assembly of a multidisciplinary team (e.g., individuals with operational experience, operations analysts, systems experts) and the iterative selection and refinement of alternative scenarios, measures of merit, and the treatment of the human element. As a context for the analyses, a baseline was established drawing on the results of prior studies by Rand (Reference 4) and Sandia National Laboratories (Reference 5). Those earlier studies employed JANUS, a constructive simulation. However, in light of the nature of the problem and the limited time available to perform the analyses, the study team elected to employ Mana, an agent based model developed by the New Zealand MoD (Reference 6).

The convoy vignette envisioned a mix of trucks carrying logistical products (e.g., food, petroleum), escorted by armed Humvees, that was subject to a dismounted armed ambush by Red forces. It was assumed that the attack was initiated by the detonation of a land mine. The objective of the analysis was to assess the potential impact of proposed options

to mitigate the effects of the attack. These options included modified tactics, techniques and procedures (TTPs), and enhancements in C2 (i.e., enhanced C2 intra-convoy and between the convoy and the home base), ISR (i.e., unmanned aerial vehicles (UAVs); armed unmanned ground vehicles (UGVs)), and other materiel actions (e.g., use of obscurants; application of ballistic appliques to harden the convoy vehicles). Based on technology assessments, these options were analyzed for near- and far-term timeframes. To calibrate Mana, the analysis team first demonstrated that results could be generated that were consistent with Rand's earlier JANUS-based studies. Subsequently, the potential utility of the Blue options was assessed using Mana to evaluate the average number of convoy casualties that would be sustained in the attack. Those analyses revealed that several options are particularly promising. These include the addition of UAVs with mine detection capabilities, an armed UGV, and the use of "designer" obscurants (i.e., obscurants that are relatively transparent to Blue forces with their aided vision devises and opaque to Red forces). A follow-on portfolio analysis is required to select the most cost-effective mix of options.

The small unit operations analysis envisions a small Blue force patrolling a market place containing a large mix of non-combatants. However, a few members of the crowd are hostile and they will opportunistically engage Blue forces with small arms. The analysis team again employed Mana to evaluate a variety of MoMs: losses (kills, injuries) sustained by Blue forces, Red forces, and neutrals; and the time that Blue forces required to traverse the market place. The analyses revealed that promising options included enhanced situation awareness, enhanced body armor, and the use of non-lethal weapons. Again, follow-on analyses are required to develop the most cost-effective portfolio of options in the timeframes of interest.

These analyses demonstrated the ability of an interdisciplinary team to gain rapid insights into the potential contribution of C4ISR and other materiel and non-materiel options to enhance force protection effectiveness using agent based models. However, it must be emphasized that these analyses should be viewed as exploratory and that additional, rigorous analyses must be performed (employing a broader set of tools) to confirm and extend these preliminary conclusions.

References

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