Adversarial Risk Analysis for Enhancing Combat Simulation Models

Juho Roponen*
Unaffiliated
Finland
juho.roponen@gmail.com

Ahti Salo
Systems Analysis Laboratory
Dept. of Mathematics and Systems Analysis
Aalto University School of Science
Finland
ahti.salo@aalto.fi

*Corresponding author

Abstract

Adversarial risk analysis (ARA) builds on statistical risk analysis and game theory to help analyze decision situations which involve two or more intelligent opponents who make decisions under uncertainty. During the past few years, the ARA approach–which seeks to model the decision making processes of a rational opponent–has been applied extensively in areas such as counterterrorism and corporate competition. In the context of military combat modelling, however, ARA has not been used systematically, even if there have been attempts to predict the opponent's decisions based on war-gaming, application of game theoretic equilibria, or solicitation of expert opinions. Against this background, we argue that combining ARA with military combat modelling holds significant promise for enhancing the capabilities of current combat modelling tools. Even if the ARA approach can be challenging to apply, it can be very informative because relevant assumptions about the resources, expectations and goals that guide the adversary's decisions must be clearly explicated. We identify some promising ways of combining ARA with combat modelling and present an illustrative example of how ARA can provide insights into a problem where the defender needs to estimate the utility gained from hiding its troop movements from the enemy.