

INNOVATIONS IN NEXT GENERATION CB THREAT CHARACTERIZATION AND ASSESSMENT FOR DECISION SUPPORT

Supporting Mission Planning And Course Of Action Evaluation Using Meuriads And Demasq

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During military operations under potential chemical threats, automated decision support tools (DSTs) empower key decision-makers and their staff to define, evaluate, and select courses of action that reduce hazard exposures and increase the likelihood of mission success. When used during mission planning, DSTs have the potential to provide planners with critical insight into the operational risks and logistical burden associated with candidate courses of actions. In the aftermath of chemical strikes, DSTs stand to enhance the survivability of targeted forces by enabling assessments of hazard exposure risks for different response actions. Under the sponsorship of the Warfighter Integration Division of the Defense Threat Reduction Agency (DTRA), MIT Lincoln Laboratory (MIT LL) developed two prototype decision support tools as part of its support to the Resolute Dragon Advanced Technology Demonstration (ATD) series. This submission describes the development background, the design principles, the functional components, the analytical outputs, as well as warfighter feedback for the two prototypes.

The first prototype, the Marine Expeditionary Unit Risk-Informed Assisted Decision Support (MEURIADS) tool, is a full-stack simulation software designed to quantitatively inform courses of action comparison and selection during the Marine Corps Planning Process prior to operating in a potential chemical or biological threat environment. The tool integrates an entity movement model with hazard plume simulation capabilities, allowing users to enter simulation inputs regarding potential friendly and enemy actions via a simple, map-based graphical interface. The MEURIADS prototype enables rapid evaluation and comparison of multiple candidate courses of action by generating quantitative estimates of such metrics as chemical or biological wounded-in-action or killed-in-action, protective gear consumption, or movement completion time.

The second decision support prototype, the Diminish Exposures via Multi-Agent Simulation and Quantification (DEMASQ) tool, is designed to address operational needs for a decision support capability that enables post-attack exposure risk assessment. Leveraging the same software infrastructure as MEURIADS but utilizing a distinct set of analytics, DEMASQ serves as a proof-of-concept for an automated capability that computes and displays timing information related to the subceedance or exceedance of military exposure guidelines for various positions near chemical strikes in order to inform protection or avoidance decisions.

In June 2022, both prototypes were made available to warfighter participants of the Resolute Dragon 2 (RD2) ATD during the event's mission planning wargame. By utilizing MEURIADS and DEMASQ along with other tools during mock mission planning, RD2's warfighter participants were able to provide feedback on the prototypes' potential operational utility as DSTs, observations on existing limitations, and recommendations on future improvements. This submission will summarize warfighter feedback received during RD2, as well as their implications on potential future developmental directions for MEURIADS and DEMASQ.

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