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

Integrating Situation Awareness With Mission Analysis Of Cb Protection At The Tactical Level

Ryan Hafer Applied Research Associates **Ashley McGuirk** Applied Research Associates **Andrew Hachtel** Applied Research Associates **Anthony Sagardia** Draper

CB protection is a fundamental principle of passive defense. It consists of measures taken to keep threats and hazards from having adverse effects on personnel, equipment, and facilities. Protection of personnel (the warfighter) comes at a cost. The use of individual or personal protective equipment (IPE/PPE) and/or collective protection (COLPRO) involves placing a physical barrier between personnel and the airborne or liquid hazard. IPE/PPE imposes an increased level of physiological and mental stress. Physiological factors include heat stress, a reduced ability to communicate, decreased visibility, difficulty breathing, and an impeded tactile capacity (including task efficiency and range of motion). Commanders must perform situation-based MOPP (mission-oriented protective posture) analysis to improve the probability of mission success. This involves a tradeoff between risk of casualty due to exposure to a CB agent and risk of IPE/PPE induced heat stress and performance degradation.

With limited knowledge of the threat, the tendency is to take a conservative approach (e.g. immediately mask and assume MOPP 4). This inflicts a heavy burden on personnel when performing critical tasks. MOPP analysis uses all available data concerning hazards, the mission, environmental conditions, and time constraints. The prototype CBRN Personnel Protection Tool (CBRN PPT) analyzes these considerations and presents actionable information that improves decision making and dissemination of protective guidance throughout the force. Features include direction (by the commander) of automatic masking rules and triggers for increasing or decreasing protection levels. The protective status of individuals is broadcast to nearby units, along with cumulative time spent in MOPP. Graphical display of the hazard via ATP-45 plots and/or contours from realistic models (e.g. Effects and CBRN Routing) are used in combination with weather and activity level to predict CB effects and heat strain, respectively. In turn, MOPP levels can be adjusted as CBRN risks and mission priorities change.

Implemented as a combination of Android Tactical Assault Kit (ATAK) and browser based TAK (WebTAK) plugins with multiple roles (e.g. commander, CBRN specialist, and soldier), CBRN PPT leverages the TAK ecosystem, a geospatial collaboration platform with a growing community of 250,000 users. Command directives and protection status are easily transferred between distributed teams and across echelons. Connection to a TAK server provides additional features such as TLS 1.3 encryption, mission packages, and additional computing resources. An extensible plugin architecture enables rapid development of capabilities that would otherwise be deployed as standalone applications without the common infrastructure provided by TAK.

The Defense Threat Reduction Agency funded this research under CWMD Other Transaction Agreement No: W15QKN-18-9-1004. The authors would like to thank the project sponsor, Dr. Chris Kiley (DTRA-CB), and Drs. Adam Potter and David Looney (USARIEM) for their guidance and support.