UNIFIED QUEST 2018 ROBOTIC AND AUTONOMOUS SYSTEMS APPLICATION WORKSHOP SUMMARY REPORT

Overview: The Army Capabilities Integration Center's (ARCIC) Future Warfare Division conducted the Unified Quest 2018 (UQ18) Robotic and Autonomous Systems (RAS) Application Workshop from 5-9 March 2018, at Fort Eustis VA. Participants in the event included Multinational partners, leaders within ARCIC, and RAS subject matter experts from both the research and development community and Training and Doctrine Command's Centers of Excellence. During the workshop, the participants examined the employment of RAS in the Strike Battalion of a next-generation brigade combat team (NxGen BCT), utilizing a tactical operations scenario with specific mission tasks, in order to better understand the concept, capabilities, and organizational design implications of RAS technologies in the 2035 timeframe.[1]

Background and description: The RAS Application Workshop examined 18 specific RAS capabilities developed during the Future Force Design IV Seminar held in December 2017. The workshop included academics to inform participants on the operational design and capabilities within the NxGen BCT, with specific emphasis on the Strike Battalion which they will examine during the Deep Future Wargame (DFWG) in May 2018. Acting as the Strike Battalion's staff, participants used four mission specific situational training exercises to develop the concept of operations (CONOP) they will employ during the wargame. The event met all four desired learning objectives: (1) understand how to deploy, employ, sustain, and recover the Combined Arms Battalion's (Strike Battalion) RAS; (2) understand the organizational design and capabilities of the Strike Battalion (and its RAS); (3) develop the CONOP for the assigned mission; and (4) identify RAS employment implications for concept development, capabilities determination, and force design.

Observations:

Artificial Intelligence (AI) to manage the battlespace: AI is critical for the future force to effectively manage the vast amount of data collected and distributed by sensors for effectively employ combat systems. While AI is envisioned to supplement (not replace) human management, AI systems could make critical decisions, based on parameters and guidance provided in its programming. Key task areas requiring AI include: airspace management, electromagnetic spectrum and network management, and sensor-to-shooter data exchange. The AI systems must be networked to share time-sensitive information with other systems.

Tactical forces will require RAS to improve protection: RAS will be instrumental in protecting manned and unmanned formations. RAS can reduce detection of friendly forces and serve as inexpensive, light-weight decoys to overwhelm enemy sensors with potential targets. Additionally RAS can advance ahead of manned forces to clear mines and others obstacles and thereby reduce human casualties.

Effective utilization of RAS will improve sustainment: RAS can improve the effectiveness of providing resupply to forces closest to the line of contact, but will require some changes to tactics, techniques, or procedures. Supplies will need to be packaged in standardized containers, similar to an ammunition magazine or fuel cell, to expedite rapid off load and pick up by RAS. Resupply convoy operations may use tethered-RAS vehicles only as far forward as a battalion's combat trains due to the dispersion of RAS-enabled companies and platoons in 2035. AI can assist in tracking supplies as they are expended. AI-enabled tracking will allow rapid resupply within the battalion and transporting supplies to the battle area only when needed. Adding multipurpose RAS to formations will improve efficiency and potentially reduces the number of sustainment systems in the operational area; for example, employing a system

[1] Multi-Domain Battle: Evolution of Combined Arms for the 21st Century, Version 1.0, December 2017, describes the physical spaces and components of the operational framework as the Deep Fires Areas (Strategic and Operational Deep Fires Areas), Deep Maneuver Area, Close Area, and Support Areas (Strategic, Operational, and Tactical Support Areas). The competition continuum consists of competition, armed conflict, and return to competition.

that can autonomously traverse the battlefield to deliver supplies forward and, when needed, evacuate casualties rearward.

RAS should be designed with multiple capabilities: The number of RAS platforms performing functionally-focused tasks increases the number of systems in the formation requiring staff or operator planning, control, and management; additionally, more systems in the formation increases the load on the formation's networks and the formation's sustainment requirements. Collaboration between concept and material developers should produce a set of tasks common to all RAS platforms such as network extension, electronic warfare, obscuration, mission command (e.g., processing, exploitation, dissemination),and CBRN reconnaissance. RAS that are large enough to transport cargo should be capable of transporting casualties to casualty collection points or ambulance exchange points.

Unmanned aviation systems (UAS) enhance organizational capabilities, but present airspace management challenges: During operations, battalions employed between 24-32 UAS throughout its operational battlespace. Higher echelon units employed UAS in the battalion battlespace to conduct various tasks, such as casualty evacuation, sustainment, and site reconnaissance. The staff estimated units in the battalion's battlespace could simultaneously employ 40-50 UAS during operations; manned aviation systems will further congest the battalion's airspace. Future formations will be required to plan, employ, and manage UAS operating in its area of operations. Planning staffs may rely on AI-enabled solutions due to the volume and speed of systems in the operational area.

RAS provides the 2035 combined arms battalion a significant capability upgrade: The Strike Battalion's staff utilized RAS to conduct a wet gap crossing in an urban environment against a near peer adversary.

- RAS direct fire systems were able to be within range of enemy weapon systems and provide fire support to enable the wet gap crossing. However the battalion staff's wargaming revealed that RAS operators could become "task saturated" should they have to assume control over the RAS associated with a manned robotic combat vehicles (RCV) that was damaged or destroyed.
- RAS minefield systems that were emplaced by artillery, attrited the enemy, hindered their reinforcement and hastened their retreat.
- Tethered UAS's were used by the battalion to offset the degradation of communications caused by enemy actions.
- RAS critical care systems assisted with casualty evacuation.

Summary and Way ahead: The RAS Application Workshop provided a productive venue for participants to discuss how the future force may apply RAS technologies in conjunction with next generation tactical formations. Participants generated valuable insights and a CONOPS that will serve as the baseline for an urban operations scenario workgroup in the Deep Futures Wargame. These efforts, by the end of the DFWG, will help provide better understanding of how to operationalize RAS in support of Multi-Domain Battle.