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Creating a Simulation Model to Assess Options For Distributed Lethality

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Monterey, California. Naval Postgraduate School

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Creating a Simulation Model to Assess Options For Distributed Lethality

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NPS NRP Executive Summary

Title: Creating a Simulation Model to Assess Options for Distributed Lethality

Report Date: [24/02/2017] Project Number (IREF ID): NPS-FY16-N233-A

Naval Postgraduate School / GSOIS/Operations Research

EXECUTIVE SUMMARY

Project Summary

This research project created, developed and then assessed an agent based model within NSWCCD's Orchestrated Simulation Model to represent naval surface to surface engagements in order to aid in the development of the distributed lethality concept. The Distributed Lethality OSM (DL-OSM) simulation was assessed through wargaming, a fleet exercise, and using advanced experimental design to explore best tactics for organic helicopters, emission control, and formations during surface to surface engagements. The simulation was determined to be satisfactory to explore tactical variables in the distributed lethality concept.

Keywords: combat modeling, distributed lethality, tactical development.

Background

As potential adversaries develop naval capabilities to challenge the United States' sea control, new technologies and maritime tactics need to be conceived, developed, assessed, and introduced through fleet tactical training. Simulation, combined with advance design of experiments and analysis, can make cost-effective contributions in each of these steps. The Naval Postgraduate School's tactic development team and SEED Center partnered with Naval Surface Warfare Center Dahlgren (NSWCDD) modeling team to create an agent-based model within the Orchestrated Simulation Modeling (OSM) framework that mimics important variables in naval surface to surface engagements. The simulation, Distributed Lethality in OSM, was created specifically to aid in develop the distributed lethality concept introduced by VADM Thomas Rowden in January 2015.

Findings and Conclusions

Distributed Lethality in OSM (DL-OSM) was created in coordination with NSWCCD modeling and simulation team. In addition to providing subject matter expertise advice to NSWCCD programmers, NPS SEEDS' contribution to this initial development effort included developing software that allowed to automatically run multiple simulations varying specific parameters to enable the efficient use of the DL-OSM in experimental design. The original DL-OSM prototype beta version was tested in a classified NPS Distributed Lethality wargame with a team of officers from all U.S. military services, including LT Ericksen, USN who would later use the program for distributed lethality

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tactical development. Recommended changes were provided to the DL-OSM programming team and modifications made. A version of this program was used during Valiant Shield 2016 as a decision support tool, with additional changes provided to the programming team.

The updated DL-OSM beta version was then used by LT Kristen Ericksen to explore surface on surface engagements as part of Distributed Lethality tactical development. Her primary thesis question was “Can DL-OSM be used to develop tactics associated with distributed lethality?” She answered this question by creating and executing a design of experiments which focused on surface to surface tactical engagements. She varied tactical formations, emission controls on specific platforms, helicopter tactics, and weapon performance using DL-OSM as the simulation to conduct over 200,000 tactic engagements. Although her exact findings are classified, she demonstrated the importance of helicopter tactics, emission control, and certain formations to make a positive effect on the ability to fire missiles before an adversary can fire their missiles. By doing so, we assess that although some improvements can be made to the simulation, DL-OSM is capable of being used as a surface tactical development aide. This allows NSWCCD to offer their modeling and simulation services to the surface community. LT Ericksen briefed her tactical lessons learned to VADM Rowden and others on COMNAVSURFOR staff. Her final thesis was provided to COMNAVSURFOR staff as a final deliverable.

Recommendations for Further Research

DL-OSM can now be used for further research related to surface navy tactics and technologies. For example, the contribution of a large surface unmanned vessel as a sensor, decoy, and/or weapons delivery platform in a surface engagement may be assessed and tactics developed for its employment. Further, DL-OSM may be modified to understand the impact of multi-domain contributions to surface engagements, such as the use of a P-8 or shore based anti-ship cruise missile battery.

A major change to DL-OSM will allow it to be used as a wargaming tool. Currently, DL-OSM is a closed loop simulation. However, if given the ability for user input during a simulation (man-in-the-loop) given certain events occurring, DL-OSM may be used as a training tool as well as a tactics development tool.