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An Engineered Resupply System for Humanitarian Assistance and Disaster Relief Operations

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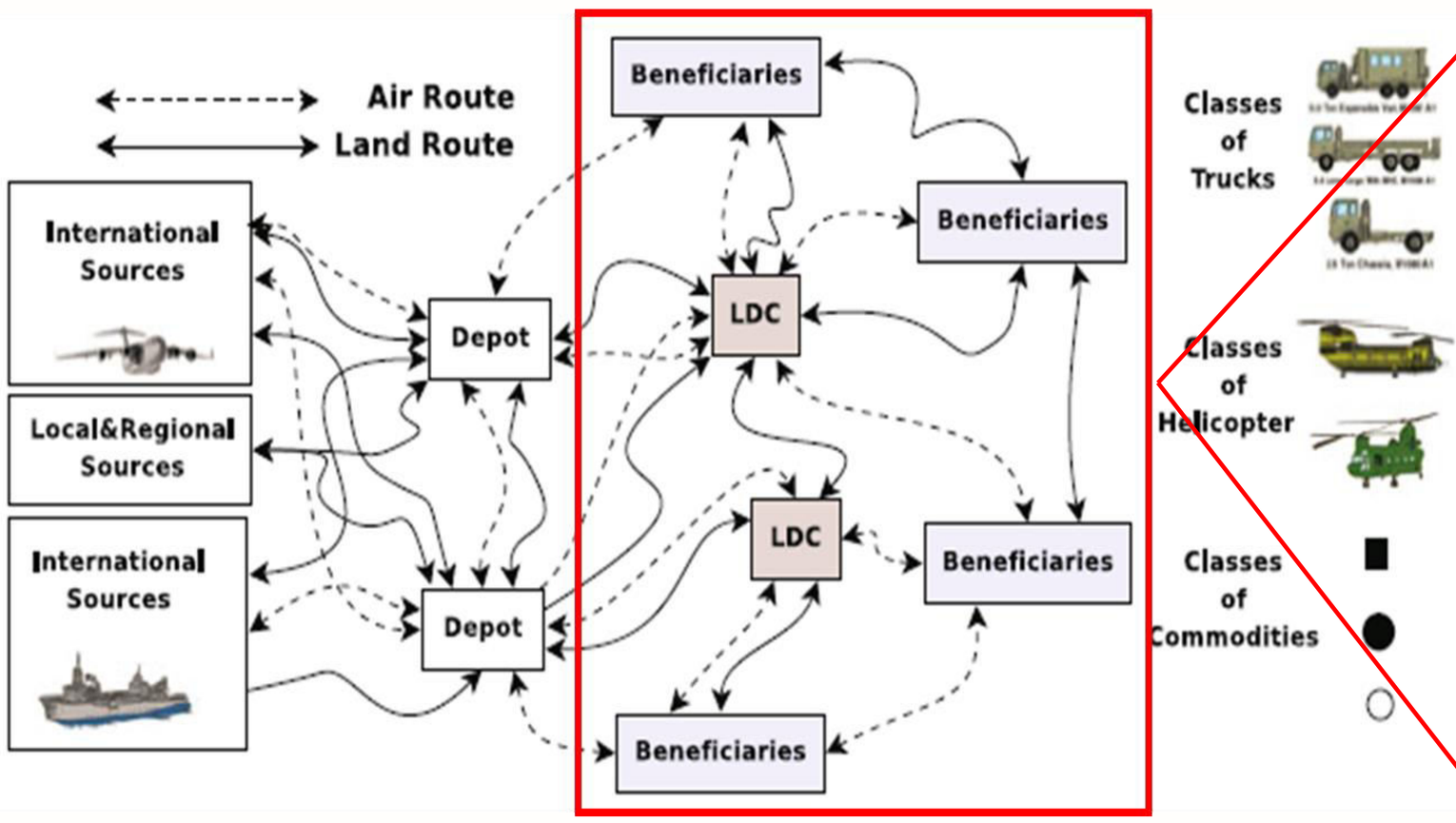
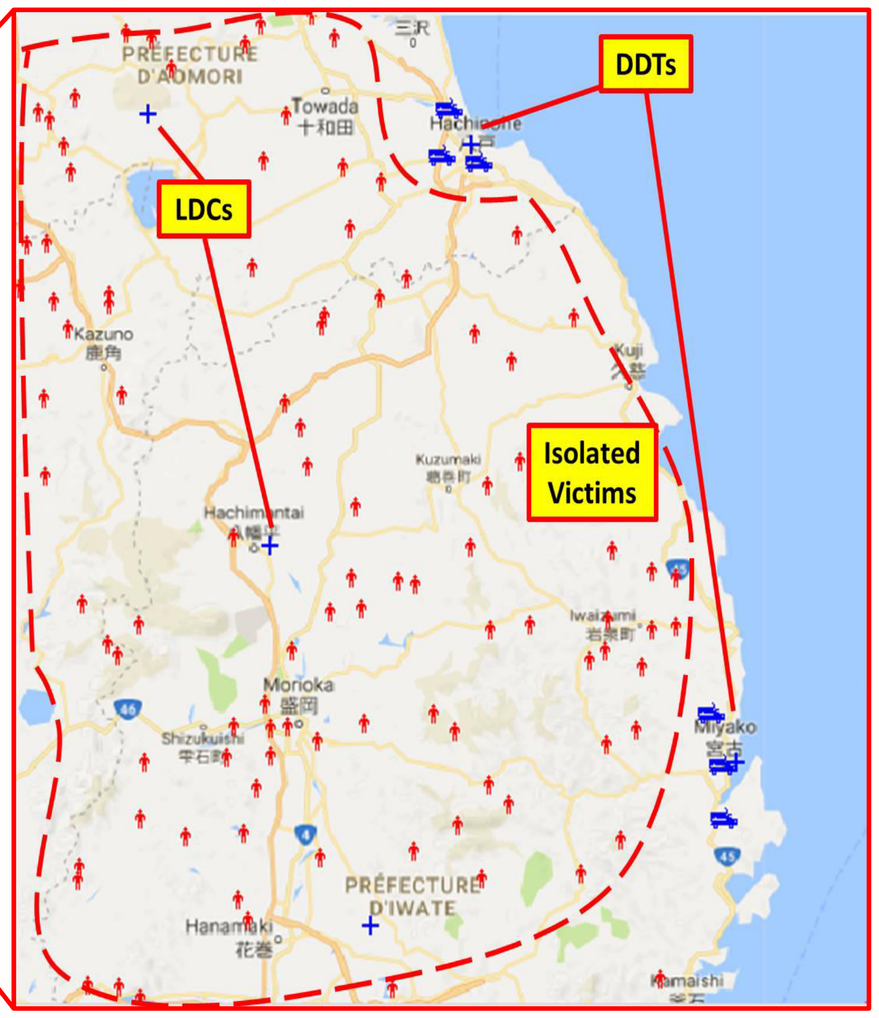
This research examines the effectiveness of resupply systems in humanitarian assistance and disaster relief (HADR) operations by exploring different permutations of operational energy (OE)-focused assets and policies that a Marine Expeditionary Unit (MEU) employs to improve its throughput of resources to disaster victims.

This thesis utilizes a large-scale design of experiments (DOE) applied to an agent-based simulation tool called the map-aware, non-uniform automata (MANA) to investigate the effectiveness of OE technologies and concepts (e.g., efficient driving techniques, hybrid technologies, and follower vehicles) in allowing the MEU to search for and resupply as many isolated victims as possible in a HADR scenario





Scope of Study **Snapshot of MANA Simulation Model**

Statistical results indicate that the operational plans employing shorter and quicker vehicle convoys that communicate with one another are most effective in resupplying isolated victims. This research also confirms that the employment of OE-focused assets and policies is effective in increasing timeliness of resupply. Taken together, these factors contribute towards increasing the operational reach of a MEU conducting HADR resupply. Future work could improve upon the fidelity of the MANA model by incorporating additional data obtained from the DOD and classified sources. The MANA model could also be used to explore the implementation of breaking-edge technologies such as foraging techniques and unmanned technologies to extend operational reach in HADR operations.

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