Optimal planning of dispersed operations in urban littoral environments

Coastal environments, also called littoral environment, include mega-cities with ever-growing populations of millions of inhabitants. The littoral environments face several threats, ranging from climate disasters (hurricanes, earthquakes or flooding) to conflicts (organized paramilitary troops, terrorists threats, conventional threats). The Royal Netherlands Armed Forces operates to protect littoral environments in each of these situations. One of the most complex operations it can undertake is launching an amphibious operation that lands marines on the shores of a contested or degraded environment.

We will discuss amphibious operations along three phases: the movement phase, the tactical ship to shore maneuver phase, and the sustainment phase.

Amphibious operations are performed from a sea base consisting of several ships located off the coast. An important problem in the movement phase is to embark the right units and equipment and organize them aboard the ship in a way that facilitates the landing. The planning methods should facilitate insight in the implications of choices, for example the location and layout of the sea base, location and number of landing zones, for solution quality.

In the tactical ship to shore maneuver phase, the land units and resources have to be transported to several locations on the coast. This transport is done by connectors, e.g., helicopters and sea-based landing vehicles. From the coast, the units will disperse to multiple locations on land. The landing has to be conducted in a short period of time, taking the risk posed by the enemy reactions and environmental conditions into account.

In the sustainment phase, the dispersed units ashore are moving towards their objectives to achieve the desired effects. The re-supply and extraction of these units has to be managed from the sea base. The degree of dispersal of troops across multiple positions on land will have an influence on the feasibility of the re-supply. Adaptive and dispersed operations will require frequent and fast re-planning of activities when unexpected (real-time) opportunities and threats occur. A planning method should provide insight in the consequences of such events and the potential response.

The problems above constitute the ship to objective maneuver problem for future amphibious operations. Problems on land and sea are interrelated, meaning that solutions for one problem affect feasibility and effectiveness of solutions for other problems. Continuously finding good solutions as opportunities and threats emerge makes structured techniques and method a necessity.

Supervisors
This project is a joint project of the Erasmus University Rotterdam, TNO in The Hague, and the Netherlands Defence Academy (NLDA) in Den Helder. There will be a supervisor from each of these parties, and the candidate is expected to regularly visit each of these institutions. Specifically, the candidate will spend 40% of his/her time at both Erasmus and TNO, and 20% of his/her time at the NLDA.

Requirements
For now, we want to mention that only Dutch candidates are considered. Moreover, a security screening is part of the hiring process.

Contact
If you are interested in working on this project, please contact the following people.

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Deadline
Please send your application (consisting of your CV, grade list, and a motivation letter) to Krzysztof Postek: postek@ese.eur.nl before April 30, 2019.