

## Project I Description

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**Project Name:** A Throughput Simulation of Port of Beirut:  
Natural Disasters & Security Risk Analysis

**Sponsor:** CNRS

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### Project Overview

Ocean transportation is the primary transportation mode for world trade. Up to 600,000 tons of goods (imports & exports) flow yearly through Port of Beirut (POB). Hence, an incident at the port (*Natural or manmade*) that results in its shut down for a significant length of time will not only have a devastating effect on the port and its community, but also on the intercontinental trade and the economy.

An incident that reduces the throughput at a port (but not its shutdown) can also be costly to the port in terms of revenue foregone and the loss of future throughput (from ships going elsewhere; e.g. Syria, Turkey, etc...). In order to forecast the extent of throughput reductions for POB from various incident scenarios, a port simulation throughput model will be generated. The model will also be used to investigate the effectiveness of various port management scenarios in reducing incident delays.

This project address the impact that security and/or natural incidents may have on the operation continuity at Port of Beirut and propose/design a plan that respond to security incidents by re-scheduling cranes and re-routing trucks to routes that are free of conflicts and jams while maximizing container throughput. Routes have to be computed in real-time. Simulation will be used to simulate the port under a security or natural disaster incident and to test the performance and efficiency of the proposed plan.

### Project Areas

Simulation , Scheduling and optimization

### **Project Deliverables**

- A discrete-event port simulation model up to the container level.
- A comprehensive evaluation of the impact of certain security and natural incident scenarios on terminal throughput, delays, queues, and/or resource utilization.
- A detailed documentation of the simulation model and risks assessment.
- A plan/design for re-scheduling cranes and re-routing trucks to respond to security/disaster threats while maximizing container throughput.

### **Team Size and Majors needed**

INE: 3 students

**Advisors:** Drs. P. Zouein and JP Arnaout

**Students:**

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