

## Maritime Security Supply Chain Risk Analysis

This project will develop a tool to assess the effectiveness of countermeasures in reducing the risk that a terrorist can import a weapon of mass destruction (WMD) via the maritime supply chain.

**Modeling Area:** Risk Analysis

**Case Studies Supported:** Border Security

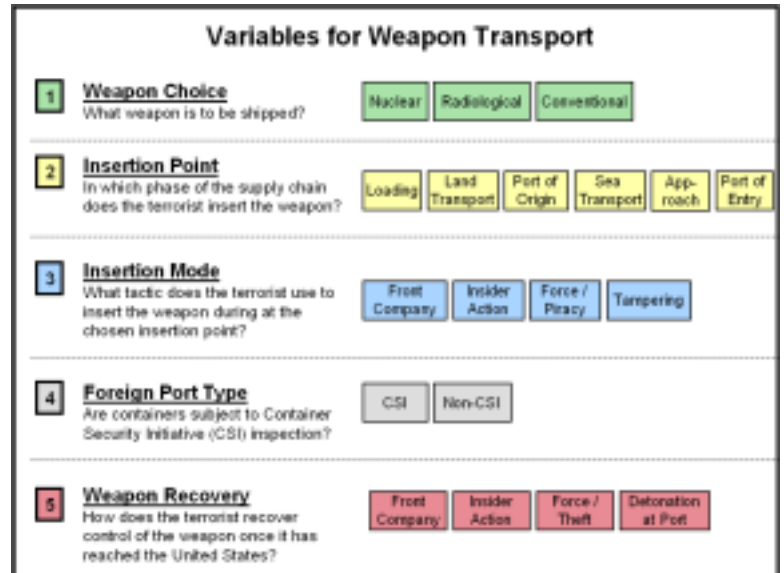
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**Institution:** Johns Hopkins University

**Mentor:** N. Onur Bakir, USC

### Brief Description:

One of the greatest threats facing the United States is the successful import of a weapon of mass destruction for use in a terrorist attack on U.S. soil. Although the maritime supply chain is considered vulnerable to exploitation, decision-makers have few tools to evaluate risks or identify cost-effective countermeasures. This project will develop a methodology to analyze weapons infiltration risk to help decision-makers weigh the effectiveness of potential countermeasures implemented at the various stages of the maritime supply chain. The methodology will help construct potential weapon infiltration scenarios and will support a container security risk analysis tool that will be developed in parallel with this project. The computer tool will enable the user to choose among many potential attack scenario variables—such as terrorist choice of weapon, point of insertion into the supply chain, and method of insertion (see figure below)—from which to base their analyses. As such, the methodology will determine key inputs required for risk analysis in a given scenario. The computer tool will exploit this framework by introducing a user-friendly interface that will allow parameterization



of all variables and, through decision analysis, identify the impact of countermeasures on the overall level of risk.

**Objectives:**

This research will (a) provide methodology supporting the development of a tool for decision-makers to use in analyzing the security of the maritime supply chain and allow them to make informed, risk-based decisions; (b) develop a systems-based framework for analyzing the problem of WMD transport; and (c) establish a foundation for further model development, including complex game-theoretic risk assessment.

**Interfaces to other Center Projects:**

This work will maintain a close interface with other projects using similar decision analysis methodologies, including border security case study and the extension of the MANPADS study. This project will also interface with the economic consequence assessment projects which have been conducted by the economics team. In particular, we will use the prior research on economic consequences of a dirty bomb attack at LA/LB port complex.

**Major Products and Customers:**

The primary project deliverable is a report that will: (a) provide a broad overview of threats, vulnerabilities, and countermeasures in the maritime supply chain; (b) describe the key elements of relevant terrorist attack scenarios; (c) introduce a unique, systems-based methodology to analyze risks in the maritime supply chain; (d) demonstrate mathematically and graphically the impact of various countermeasures on overall system risk; and (e) discuss the limitations of the model and recommends further study, e.g., the value of game theoretical models. *Customers:* DHS-CBP, DHS-CG, U.S. Ports (including LA/LB), private sector shippers, California OHS. *Other Products:* Risk assessment methodology; basis for more refined tools developed in future studies; research report.

**Technical Approach:**

The techniques used in this project will build on the decision analysis methods used in the MANPADS case study, and will include probabilistic risk analysis and construction of a decision tree. Due to the complexity of this analysis (the user will choose from several hundred potential

threat scenarios), the use of Excel for probabilistic risk calculations will not be sufficient. We will therefore help develop a Visual Basic interface that will tailor the analysis to the specific scenario desired by the user. Decision trees will be used to visualize the approach.

**Major Milestones and Dates:**

1. Research into supply chain practices, potential countermeasures, and DHS-recommended best practices for security (completed)
2. Development of detailed, scenario-specific, probabilistic risk analysis model (well underway)
3. Production of sample decision trees for visual representation of the model (early-mid July)
4. Present findings to CREATE team and DHS Fellowship officials (end of July).
5. Complete report and prototype first version of the tool with some risk analysis examples (end of July or early August).