

Executive Summary: Cost-Benefit Tradeoffs for Counter-Terror Strategies (MSDRAMA)

Challenge: Managing Risk from Evolving Terrorist Threats

In the decade since 9/11, Homeland Security authorities have improved their capabilities to identify and analyze threats significantly. For example, the United States Coast Guard has developed and successfully deployed a Maritime Security Risk Analysis Model (MSRAM).

MSRAM is a database application that helps the Coast Guard to perform the following tasks:

- Identify potential targets of terrorist attacks in the nation's ports and waterways, including vessels, passenger and cargo transfer facilities, pipelines and storage tanks
- Estimate quantitatively the risks to those targets from diverse land- and water-based terrorist attack modes. Example modes include boat and truck bombs, and terrorist assault teams
- Analyze the distribution of risks by geography, target type, attack mode.

In essence, models such as MSRAM categorize and quantify risk in a consistent and standardized manner, allowing them to be compared, ranked, and so on. Given robust capabilities to analyze risk, the obvious follow-on challenge is managing these risks systematically. This objective can be decomposed into two tasks:

- Determining how best to reduce exposure to terrorist risks, while minimizing cost and time
- Implementing these security strategies effectively.

Reducing Risk from Terrorist Attacks – Portfolio Management

The Coast Guard's MSRAM system conforms to the generalized definition of risk employed by the Department of Homeland Security (DHS):

$$\text{Risk of terrorist attack} = \text{Threat} * \text{Vulnerability to attack} * \text{Consequences of attack.}$$

These factors are estimated in terms of quantitative judgments about component factors by intelligence and security experts. For example, Threat is determined from assessments about terrorist group capabilities and intent to carry out specific kinds of attacks on potential targets. Consequence can be estimated in terms of anticipated loss of life, economic impacts, etc.

Reducing risk in this context revolves primarily around lessening Vulnerability and Consequence. Broadly, Vulnerability can be reduced by improving capabilities to detect and interdict attacks or by "hardening" targets to withstand them. Examples include installing barriers around facilities, improving communication systems, and adding waterway patrols. Consequence can be reduced by improving capabilities to respond to, and recover from, attacks should preventive efforts fail.

Achieving these objectives requires allocating existing security resources and investing in new personnel, training, systems, technologies, and tactics. Funding is constrained due to competition for resources with defense, healthcare, Social Security, education, and other national needs.

Managing risks from terrorist threats can be viewed as a problem of defining and managing a portfolio of risk mitigation activities and investments. Rather than maximizing asset growth, a robust counter-terrorism portfolio minimizes risk from terrorist threats. A risk portfolio must be diversified to cover geographically distributed targets and threats. It must also be dynamic, because social, political, and economic conditions change over time. Thirdly, it must be adaptive, because our terrorist adversaries continually adapt their tactics, capabilities, and targeting strategies to overcome our improving defenses. Finally, costs must be tracked over time in order to determine the economic performance (i.e., cost effectiveness) of security portfolios.



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Maritime Security Dynamic Risk Analysis & Management Application (MSDRAMA™)

DecisionPath is partnering with ABS Consulting to extend the Coast Guard's MSRAM system with dynamic risk management capabilities. The resulting prototype decision support system, called MSDRAMA, was constructed with DecisionPath's ForeTell® software platform.

ForeTell combines scenario planning with advanced "what-if" simulation, enabling organizations to "test drive" complex decisions such as counter-terrorism strategies. In essence, ForeTell improves decision-making by enabling users to "practice" strategies in a low risk virtual environment and learn from simulated rather than real mistakes, before actually deploying them.

Our ForeTell MSDRAMA solution enables the Coast Guard to analyze strategies for improving maritime security by projecting how risk is likely to be reduced by competing security solutions.

MSDRAMA starts by importing threat and risk analysis data directly from MSRAM. It then extends this initial "current state" baseline with expert analyst estimates of the following factors:

- Expected lifecycle costs of individual security solutions, including startup expenditures annual operations and maintenance, and labor (e.g., new patrol boats, upkeep, and crews)
- Planned schedules for deploying those measures
- Anticipated impacts over time (i.e., to reduce Vulnerability or Consequence). For example, training produces "quick hit" benefits, while new sensors require years to develop and deploy.

Next, MSDRAMA projects likely outcomes, by simulating aggregate reductions in risk as security solutions are "implemented". It rolls up target risks and solution costs by individual ports and regional groupings of ports, typically over projected five year intervals. Analysts can quickly create new scenarios based on competing portfolios of security solutions; alternate assumptions about costs, schedules or impacts on risk; and assumed changes over time in Vulnerability, Consequence, and Threat (e.g., if terrorist groups develop new capabilities or objectives).

Finally, MSDRAMA's analytics enable users to assess projected outcomes through graphic charts and reports that summarize key cost and risk reduction metrics. Comparing performance results helps identify the relative costs, benefits, and speed to results of candidate counter-terrorism strategies, which is critical to effective decision-making.

Our initial studies analyzed a set of alternative defensive solutions against attack threats involving small vessels around a major coastal port and waterway. We compared strategies varying from new boat purchases, increased staffing and training, to alternative patrol tactics to identify "winners" with respect to cost and risk reduction performance.

Bottom Line

MSDRAMA's goal is to help the Coast Guard identify and validate robust strategies, which are decisions that result in cost-effective security systems that perform well across a spectrum of plausible future conditions. MSDRAMA can improve the speed, quality, depth, and scope of critical risk management decision-making processes. It thereby increases authorities' confidence and consistency in key strategies to reduce the nation's exposure to risk from terrorist threats.

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