

Project 20: Risk-Based Resource Allocation Case Study (Kleinmuntz and Quadrifoglio)

This project is developing new methods for improving the allocation of resources to alternative programs for reducing the risks and vulnerabilities to terrorist attacks.

Modeling Area: Risk Analysis

Case Studies Supported: Risk-Based Allocation

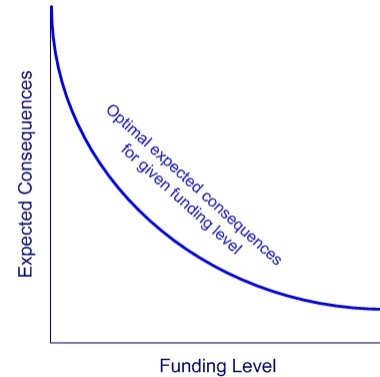
Principal Investigator: Don Kleinmuntz

Institution: University of Illinois at Urbana-Champaign

Other Investigators: Detlof von Winterfeldt, Luca Quadrifoglio

Brief Description:

This project will use existing software tools to develop improved methodologies for the allocation of funds to programs and projects based on the ability of these programs and projects to reduce terrorism's risks and consequences. One major area is the allocation of DHS grants to States to improve the capabilities of first responders to deal with terrorist events.



Objectives:

This research will develop advanced decision analysis methods to improve resource allocations. Building on several years of resource allocation models, this project will use an existing resource allocation model and computer tool to guide resource allocations. A main task is to quantify the effectiveness of risk or consequence reduction for alternative programs or projects. We will also explore new a new methodology for defining a cost function for protecting targets.

Interfaces to other CREATE Projects:

This work will maintain a close interface with the risk analysis and economics projects.

Interfaces to non-CREATE Projects:

We are working with the Infrastructure Protection division of the DHS to use their RAMCAP methodology for prioritizing risks, and with the California Office of Homeland Security to implement a pilot study to prioritize California sites in terms of risks and risk reductions. We also plan to collaborate with Lawrence Livermore National Laboratories' HOPS program to provide risk assessments.

Major Products and Customers:

Customers: DHS – IP; DHS – ORD; California OHS

Products: Risk assessment methodology for prioritizing projects and programs and to gauge the cost/effectiveness of investments in risk reductions; Software implementation of these methodologies; Research publications and reports.

Technical Approach:

- Survey resource allocation approaches and models
- Collect information on selected California targets and perform a Likelihood and Consequence assessments of terrorist attacks for each target.
- Design risk assessment and allocation methodology for selected set of sites in California.

- Definition and development of a “consequences function” for each target, representing the expected consequences due to terrorist attacks as a function of the funds invested to mitigate them.
- Development of an optimal allocation among the entire set of targets and mitigation levels in order to minimize the total expected consequences subject to the constraint in total available funds.
- Conduct pilot study for prioritizing California sites and allocating investments to reduce risk at these sites.
- Generalization of the methodology to be applied at other decision levels, such as the funding allocation of federal funds among States.

Major Milestones and Dates:

1. Survey paper of resource allocation approaches and models -- December 2005.
2. Design of risk assessment and allocation methodology for a set of sites in California -- January 2006.
3. Develop risk and consequence measures to reflect the impact of terrorism events and a multidimensional risk index that combines these diverse risk and consequence measures based on policy makers’ judgments about the relative severity of consequences -- March 2006.
4. Completion of pilot study for prioritizing California sites and for allocating investments to reduce risk at these sites -- April 2005.
5. Incorporate the risk reduction measures into a risk allocation model that takes into account both the effectiveness of various alternatives and their cost -- June 2005.
6. Reports on the models and implementation described above -- June 2005.
7. Conduct case study for bioterrorism risk reduction -- August 2006.
8. Explore extensions of model to account for continuous expenditure levels -- October 2006.