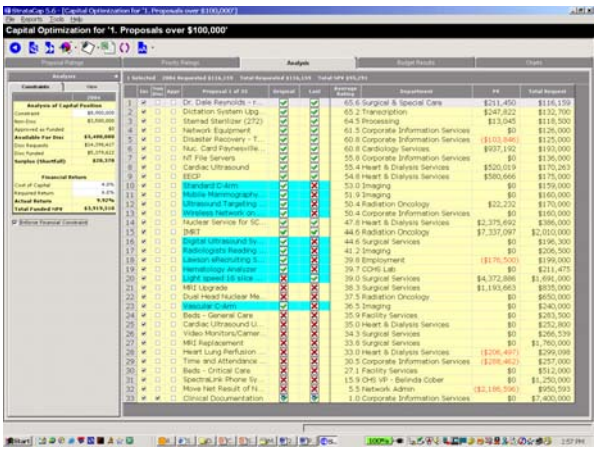
Project 13a: Risk-Based Allocation of Resources to Counterterrorism (Kleinmuntz)

This project is developing methods for using the output of sophisticated threat assessment models to optimally allocate resources to counter terrorism.

Modeling Area: Risk Management
Application Area: Infrastructure Security**,** Risk-Based Resource Allocation
Principal Investigator: Don Kleinmuntz
Institution: USC
Other Investigators: Detlof von Winterfeldt, USC, Henry Willis, Rand Corporation, Vicki M. Bier, University of Wisconsin, Madison



STRATACap software for resource allocation

Brief Description:
The purpose of this research is to improve methods for risk-based allocation of resources to counterterrorism measures. This work builds on CREATE efforts to develop threat assessments for such areas as biological weapons attacks by using those threat assessments as inputs to models designed to help DHS optimally allocate investments intended to counter bioterrorism. In addition, we will address the problem of allocating state grants for emergency responders. The purpose of this work is to provide sound analytical guidance to decision makers regarding the most effective way to obtain maximum impact from a given funding level.

Objectives:
This research will (a) develop one or more comprehensive methodologies for risk-based resource allocation among discrete counterterrorism measures; (b) perform feasibility testing of these methods through application to actual data on infrastructure protection measures; (c) develop one or more comprehensive methodologies for allocation funding where the decisions are selection of continuous funding levels rather than discrete counter measures; (d) perform feasibility testing of these methods through application to the problem of allocating state grants for emergency responders; (e) summarize and evaluate the conceptual and practical soundness of alternative risk-based resource allocation strategies, including comparing the methods developed to allocations developed using simplified methods and approaches.

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:
Project deliverables will consist of a report that will summarize alternative risk-based resource allocation strategies and recommendations using these strategies, including comparing the allocation results of new methods developed to allocations using simplified methods and approaches. 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; research publications and reports.

Technical Approach:
The methods developed will build on previous research on decision analysis methods for resource allocation and the use of mathematical programming for optimal resource allocation. Consequence assessment models and risk reduction assessments will be based on a mix of methodologies including probabilistic risk analysis, economic analysis, and qualitative assessments by experts, as appropriate. Methods for combining these assessments will be grounded in the theory and methods of multiattribute utility and value models. The overall resource allocation framework uses mathematical programming including linear, nonlinear, and integer programming.

Major Milestones and Dates:
1. 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.
2. Incorporate the risk reduction measures into a risk allocation model that takes into account both the effectiveness of various alternatives and their cost -- June 2006.
3. Conduct case study for infrastructure protection-- August 2006.
4. Explore extensions of model to account for continuous expenditure levels -- December 2006.
5. Conduct case study for allocation of first responder grants -- March 2007.
6. Develop models that take into account dependent risks -- June 2007.
7. Conduct rigorous comparisons of various allocation models to compare effectiveness of available methods for resource allocation -- August 2007.