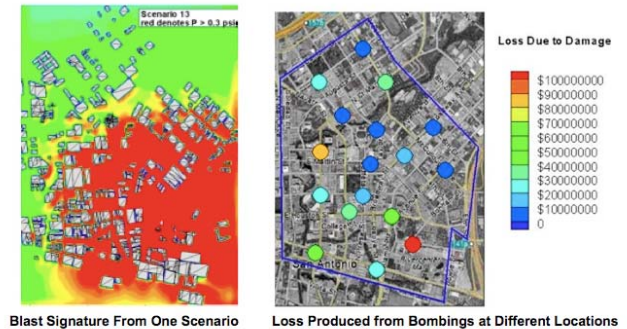


Value-Based Critical Infrastructure Assessment
Keith Clutter and Fred Hudson, University of Texas at San Antonio
 keith.clutter@utsa.edu, fhudson@utsa.edu

This project is developing methods for using state-of-the-art bombing simulation tools and information on the value of assets such as buildings to identify those event locations that produce maximum loss allowing for targeted preventive measures.

Brief Description - The purpose of this research is to develop methods for identifying what potential terrorist bombing attacks in a city or other network of assets produce the most loss. Such information allows for risk-based allocation of resources to counter terrorist measures. This project builds on the PI's past work to develop modeling useful in accurately predicting urban explosion events. Predicted explosion output and resulting damage will be integrated with property, economic and operational value models to determine overall loss. Modeling approaches to increase efficiency will be explored. The ability to estimate overall loss from any event helps planners to make informed decisions on where to target preventive measures. Other data that will be available from the methods include injury patterns produced by the events. This information will be useful to emergency responders. This project will provide sound analytical guidance to decision makers regarding the most effective way to obtain maximum impact from a given funding level.



Objectives

- Develop methodologies for coupling bombing event simulation models with value models for a portfolio of assets such as buildings in a city
- Develop approximation techniques that can use a small set of bombing simulations at discrete locations in a city to provide consequence predictions for a bombing at any location
- Develop value models that incorporate property, economic and operational factors in setting the value of an asset
- Develop injury pattern estimation models that use bombing damage predictions
- Develop effective methods for presenting results to emergency planners and decision makers

Interfaces to other Center Projects - This work will maintain interaction with those center projects addressing economic impact of terrorist events.

Interfaces to non-Center Projects - We are working with the City of San Antonio to test the methodologies developed in this project. We will also be exploring the application of the methods for other cities and organizations.

Major Products and Customers

- Report documenting a proven procedure to establish value models of a portfolio of assets
- Report documenting a proven procedure to establish consequence mappings from bombings against a portfolio of assets, such as buildings in a city

- A method to develop methodologies for coupling bombing event simulation models with value models for a portfolio of assets, such as buildings in a city
- A method for using a small set of sophisticated simulations for bombings at discrete locations to estimate bombing results for an event at any location
- A method for determining injury patterns in a city based on bombing damage
- Software specifications to automate the damage and loss methodologies and interface the necessary databases

Intended Customers: DHS; State and City Governments; Insurance Industry

Technical Approach

- Use state-of-the-art explosion simulation modeling tools to produce benchmark data related to bombing attacks in a variety of cities
 - Benchmark data will be used to develop interface between damage predictions and loss databases
 - Benchmark data will be used to develop estimation method, which uses characteristics of the city and small number of high-fidelity simulations to provide complete coverage on any possible event
- Develop interface between event simulation output and databases that can be used to determine value of assets
 - Survey existing valuation methods and models
 - Working with valuation experts, fill any gaps between existing and needed models
 - Integrate available methods that can be used to establish property, economic and operational value into a single asset valuation
 - Develop interface between various databases to provide single output stream to user
- Demonstrate methodology for asset portfolios of different sizes to determine any scaling issues in the methodology
 - At least cities of three different sizes will be used to demonstrate the methodology
 - Other entities such as insurance companies maintain and analyze portfolios of assets. An attempt will be made to demonstrate the methodology on one such portfolio
 - Document and address any issues that appear that seem to be scale related
- Develop software specifications to be used to produce a tool that automates the process
 - Configuration and interface details related to the various databases will be produced
 - Specifics on the explosion estimation method will be well documented

Major Milestones and Dates

- Initiate project, September 2007
- Produce benchmark explosion event and value databases for sample cities, January 2008
- Define integration approach between the various databases, April 2008
- Develop explosion estimation method to provide continues coverage of a city, July 2008
- Develop fully coupled event estimation and value models for sample cities, October 2008
- Demonstrate methodology for set of cities to quantify scaling effects, January 2009
- Produce software specifications to automate methodology and interface with necessary databases, May 2009