

Perspectives on Terrorism Modelling



Catastrophe Modelling Seminar
6 July 2006

Bill Churney

BETTER TECHNOLOGY
BETTER DATA
BETTER DECISIONS

www.air-worldwide.com



How is the Terrorism Threat Evolving?



“While we have made great strides in disabling traditional terrorist models like al Qaeda, the convergence of globalization and technology has created a new brand of terrorism. Today, terrorist threats may come from smaller, more loosely-defined individuals and cells who are not affiliated with al Qaeda, but who are inspired by a violent jihadist message.”

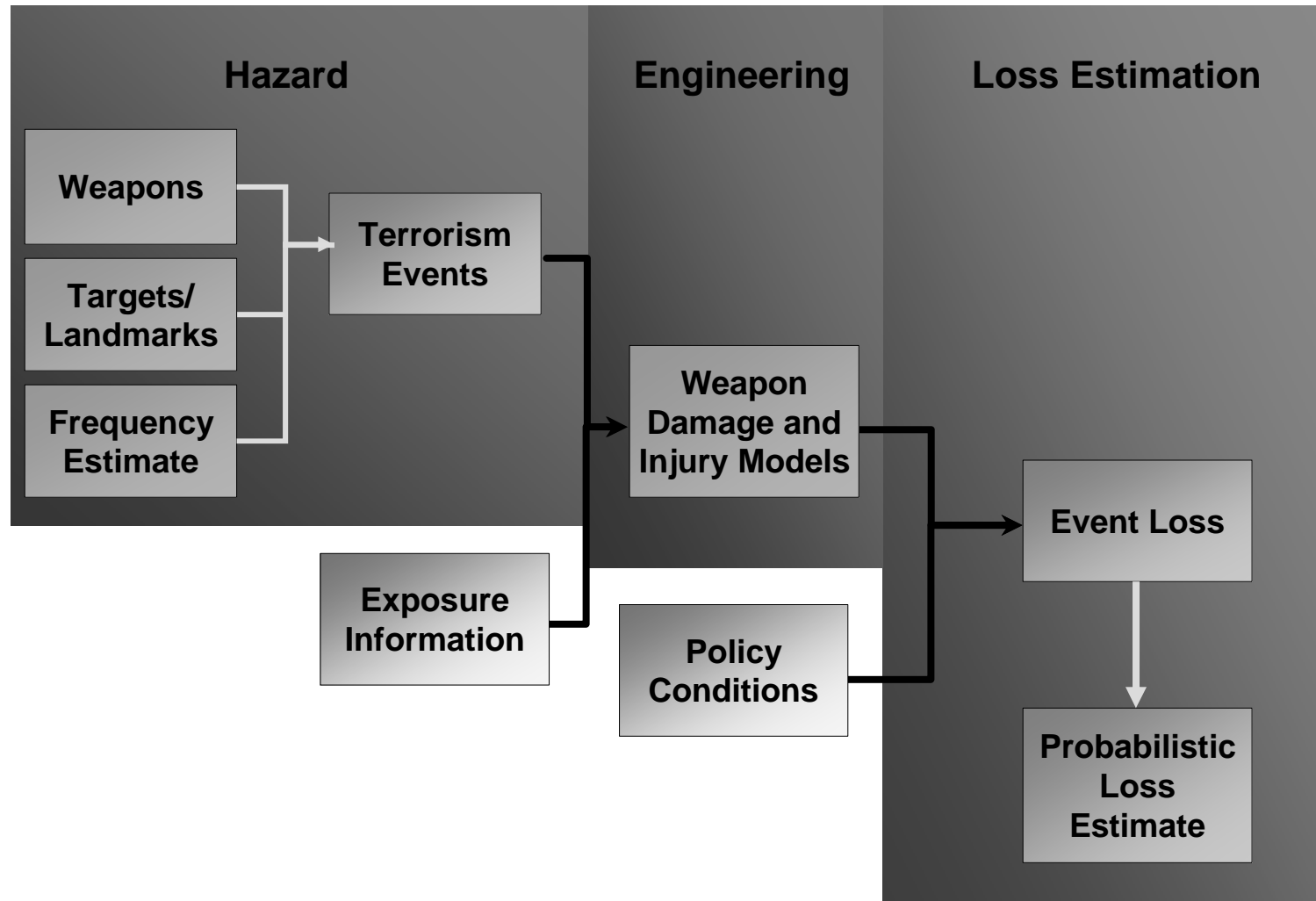
“We have already seen this new face of terrorism on a global scale in Madrid, London, and Toronto.”

“These extremists are self-recruited, self-trained, and self-executing. They share ideas and information in the shadows of the Internet. They gain inspiration from radical websites that call for violence.”

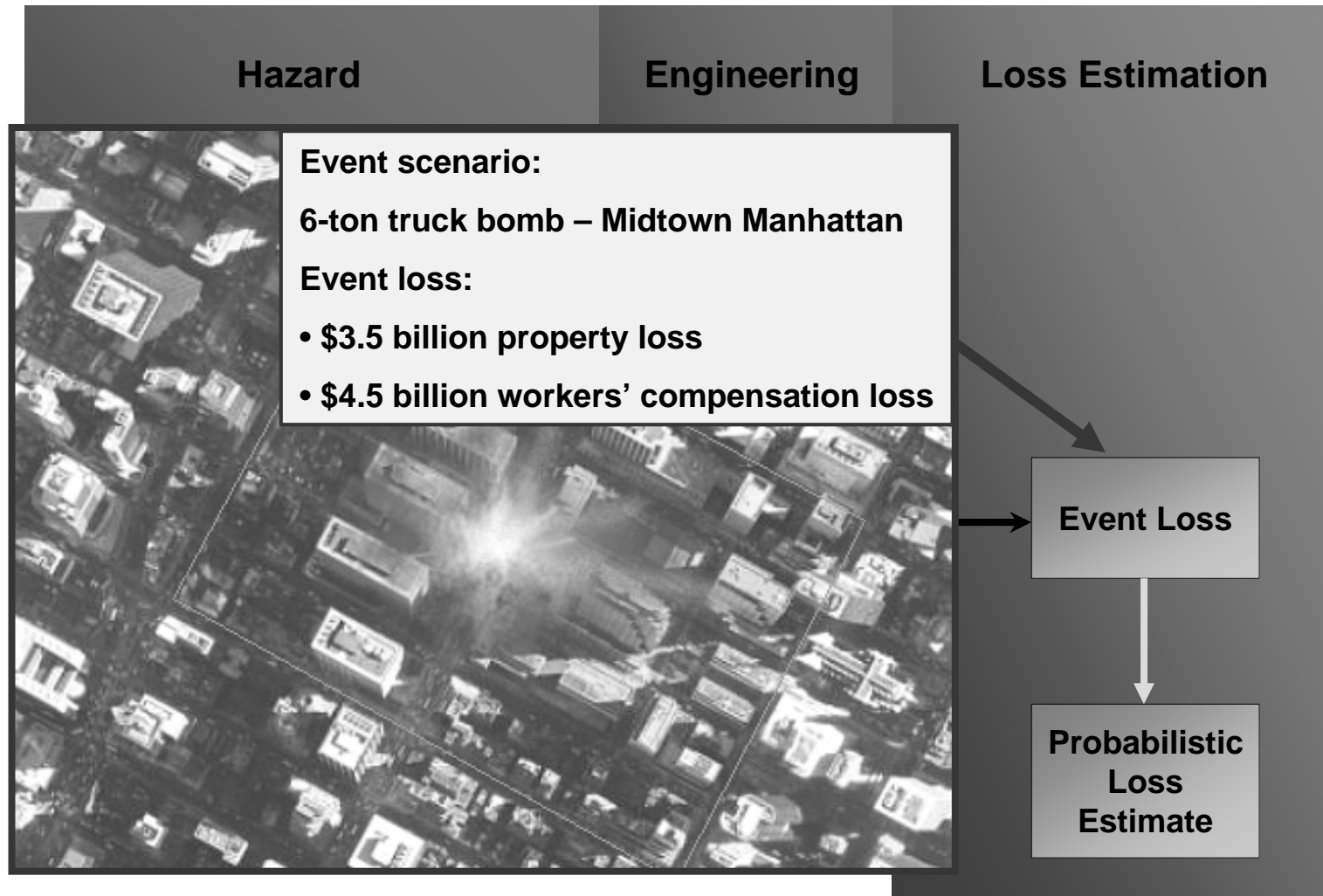
Robert S. Mueller, III, Director, FBI
Remarks Prepared for Delivery at the City Club of Cleveland
23 June 2006



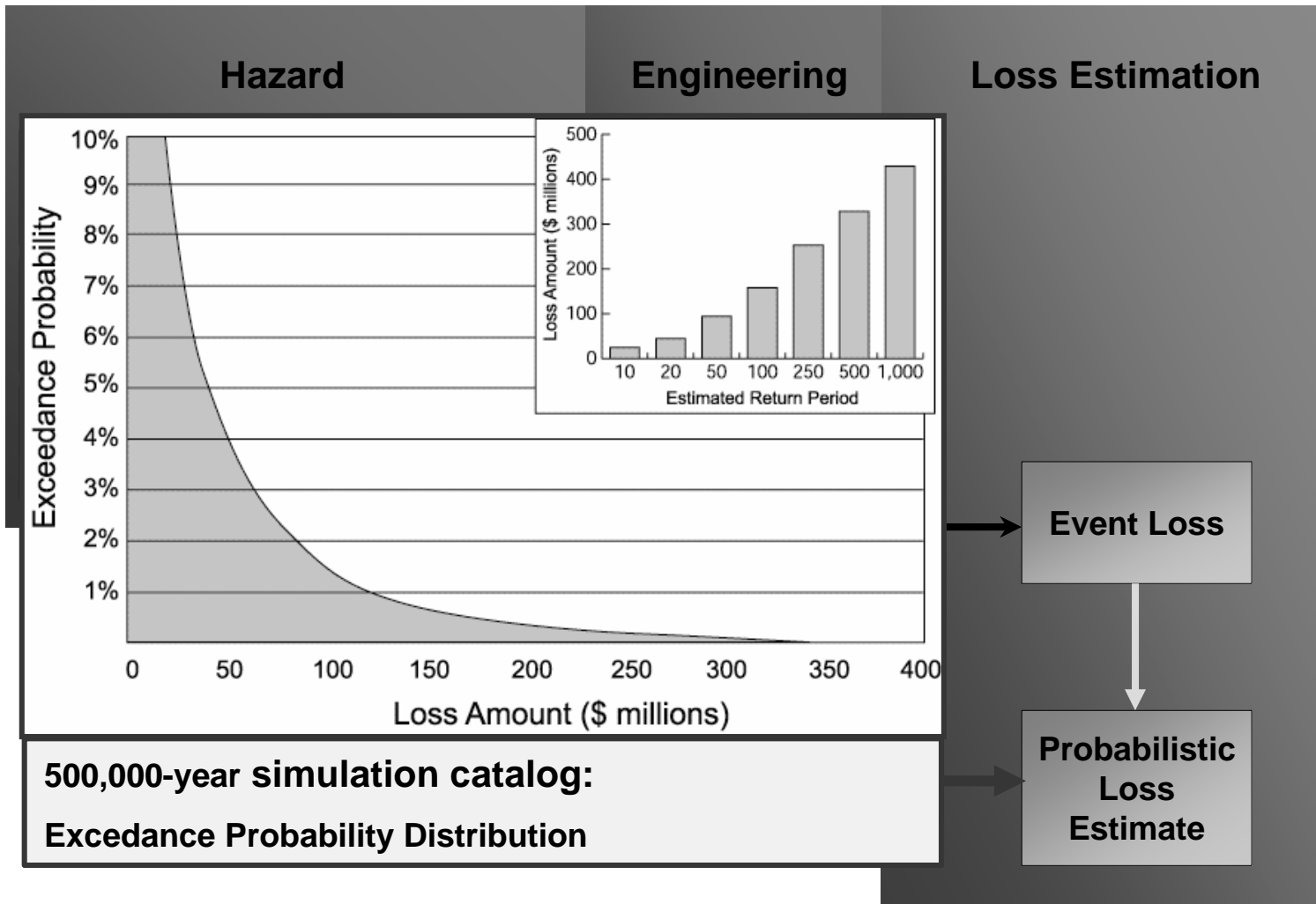
Terrorism Model Components



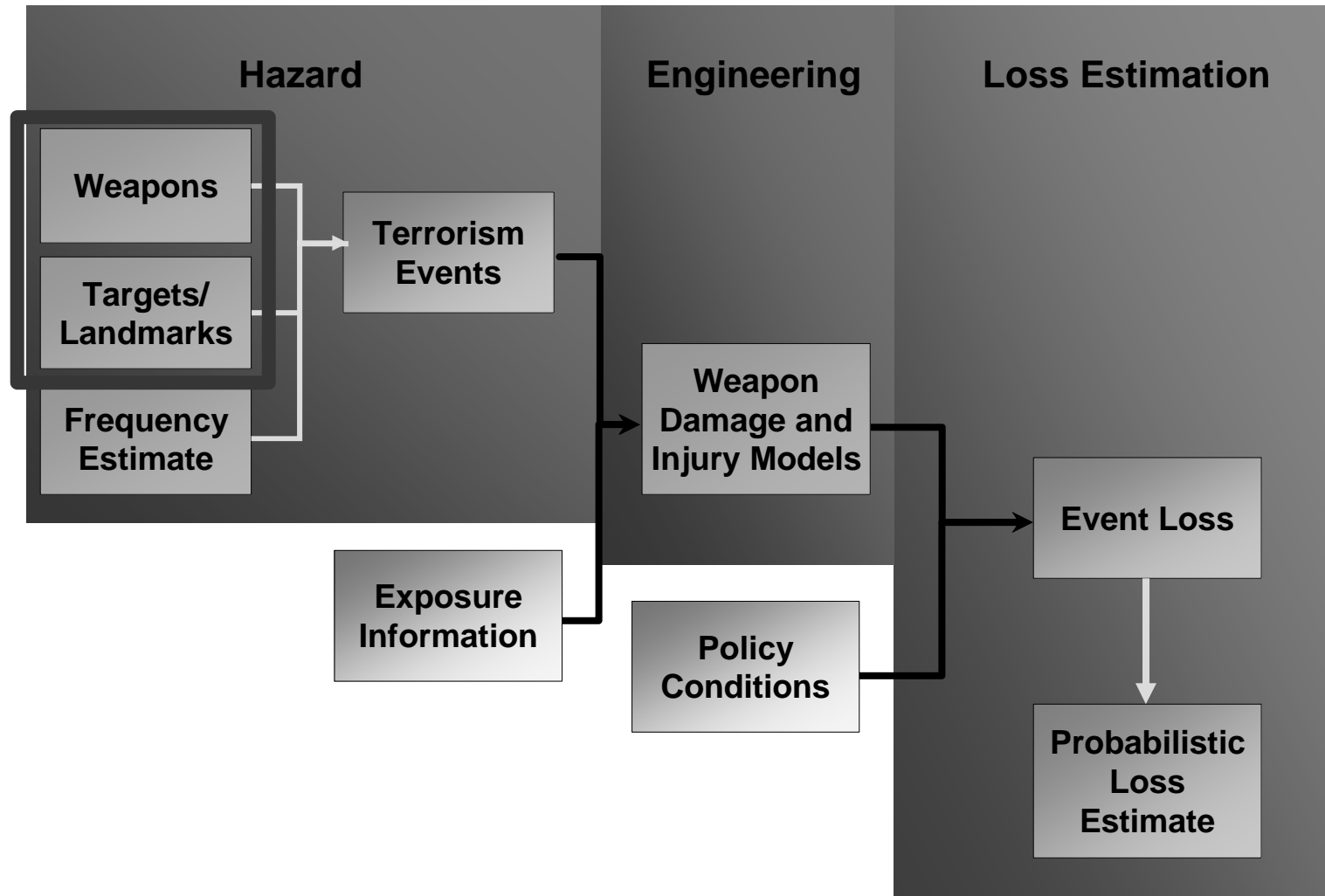
Terrorism Model Components



Terrorism Model Components



Terrorism Model Components



AIR Models a Range of Weapon Types and Sizes

CONVENTIONAL

- ❑ Vehicle bombs
 - Portable
 - Car
 - Van
 - Delivery Truck
 - Large Truck
- ❑ Airplane crash
 - General aviation
 - Large commercial airliner

CBRN

- ❑ Chemical*
 - Sarin (GB)
 - VX Nerve
- ❑ Biological*
 - Anthrax
 - Small pox
- ❑ Radiological
 - Cesium 137
 - Cobalt 60
- ❑ Nuclear*

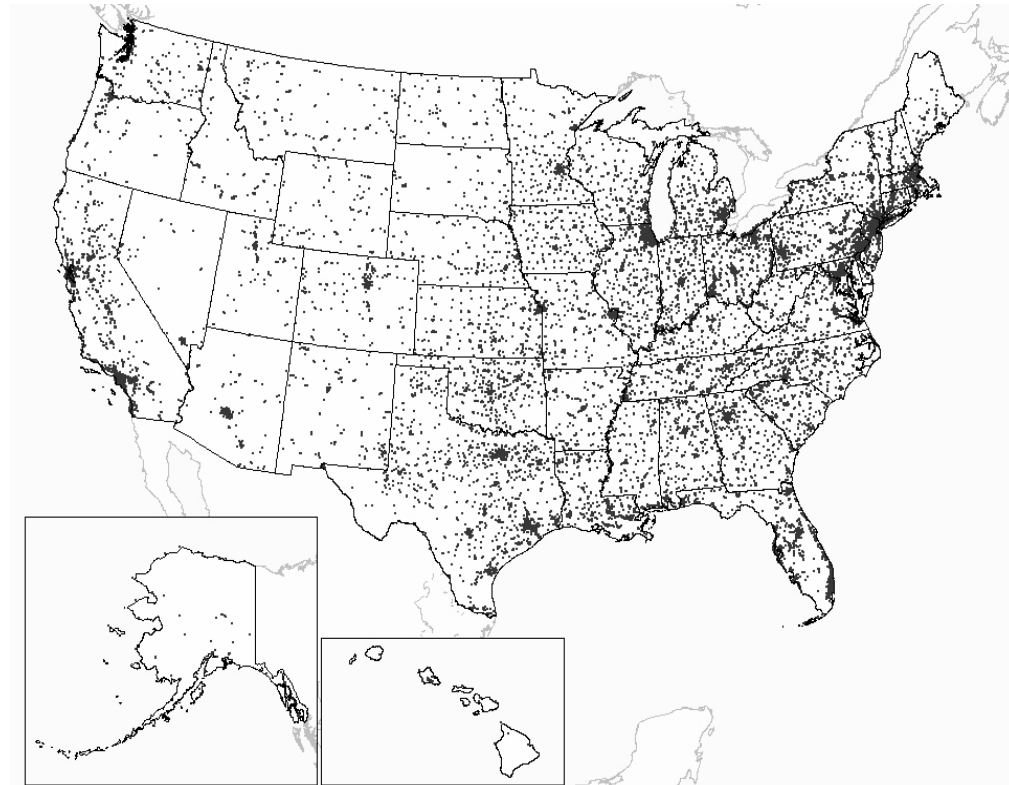


* Includes small, medium, and large



AIR Models Possible Future Attacks Where They Could Occur

- ❑ Commercial facilities
 - Prominent buildings
 - Corporate headquarters
 - Transportation
 - ❑ Airports
 - ❑ Rail; Bus
 - ❑ Bridges; Ports
 - Chemical plants
 - Energy facilities
 - Retail centers and malls
 - Hotels and casinos
 - Amusement parks
 - Sports venues
- ❑ Government facilities
 - Federal office buildings and courthouses
 - Embassies
 - State capitols
- ❑ Educational, medical, and religious institutions, etc.



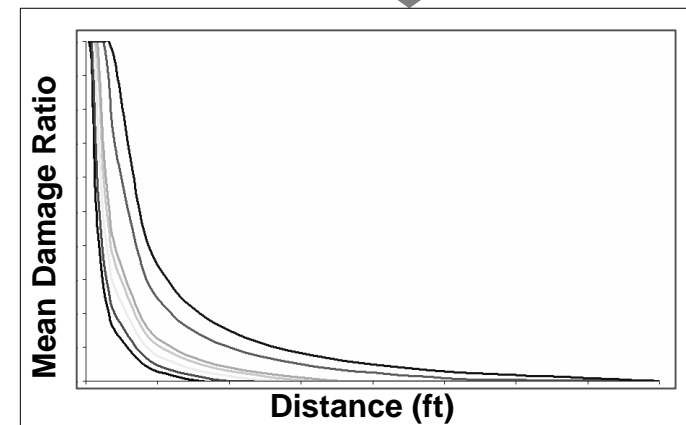
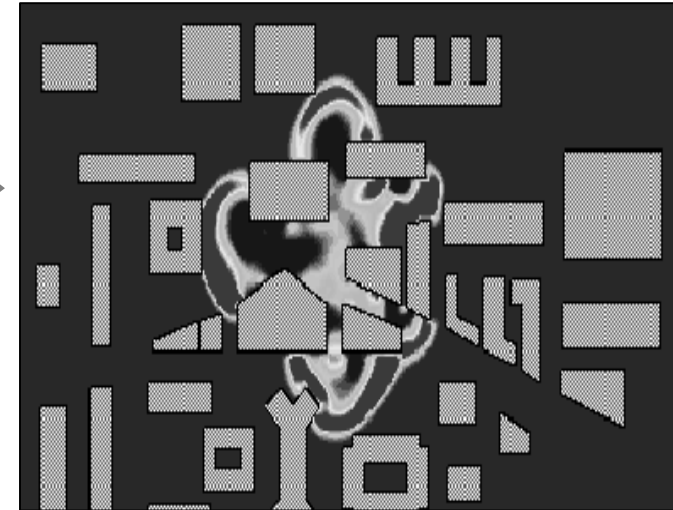
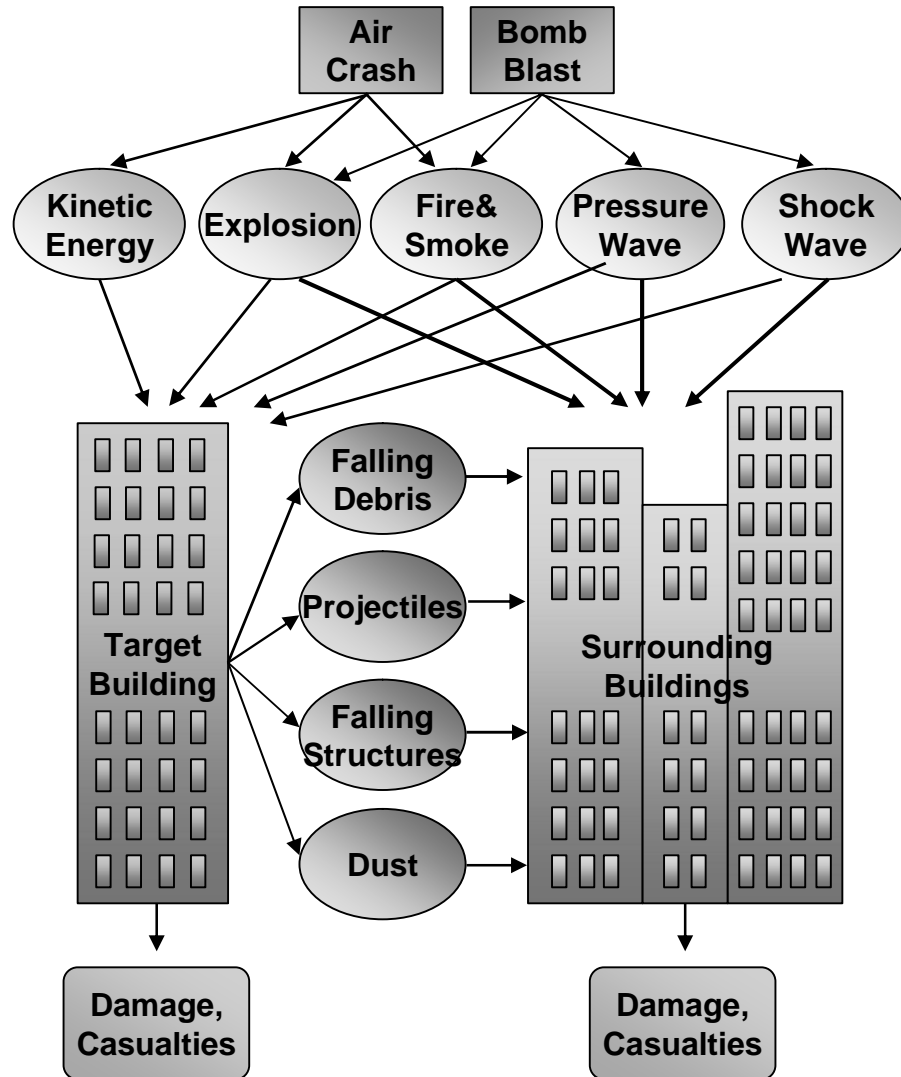
Comprehensive Set of Possible Targets



AIR Has Expanded the Landmark Database to the United Kingdom

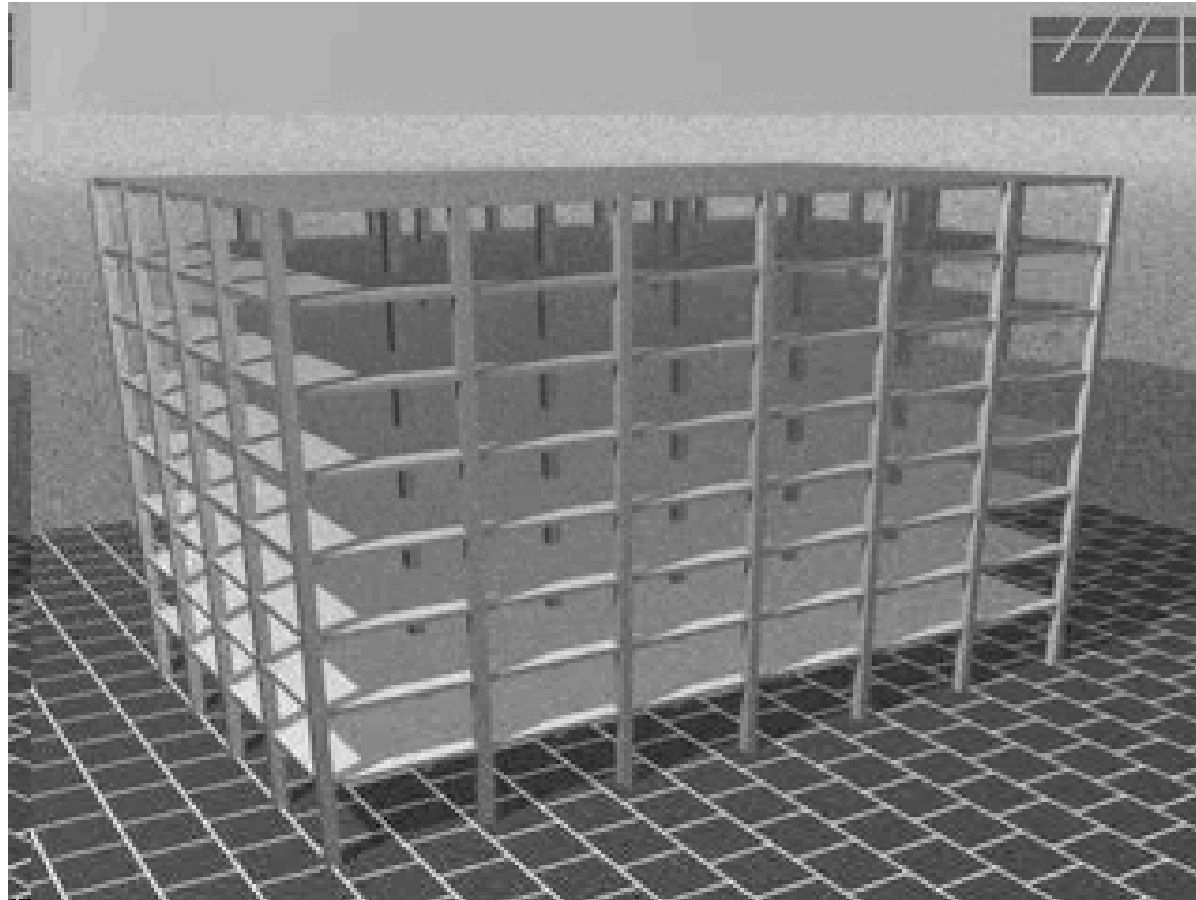


Statistical Damage Probability Functions Vary with Urban Environment and Building Construction Characteristics



Weapons Effects Modeling is a Mature Engineering Discipline

- ❑ Since WWII, weapons effects modeling has been an integral component of development, testing, planning, and training

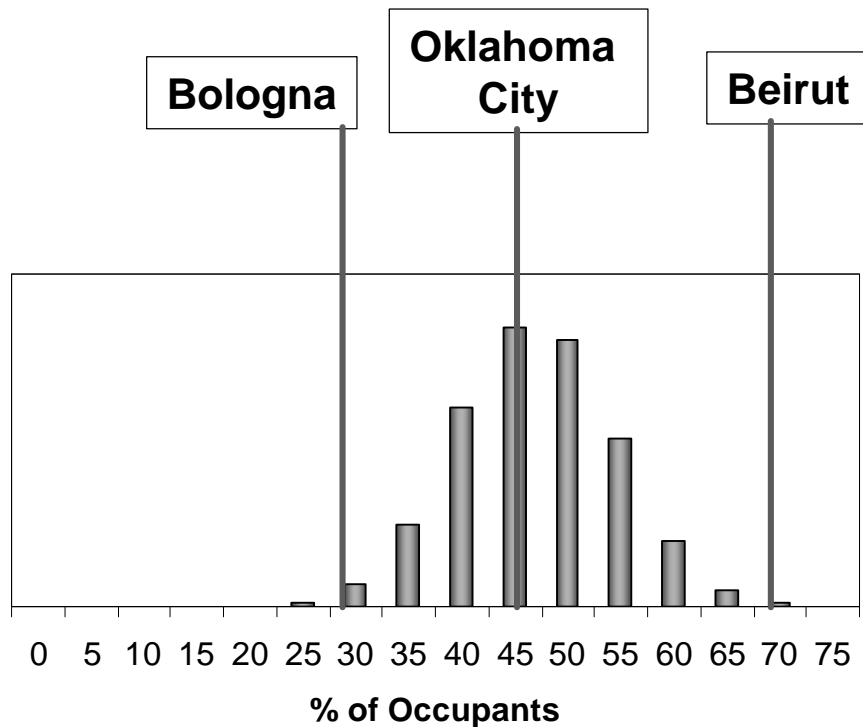


Building Physical Damage Outcome Also Determines Distribution of Injury Severity Levels

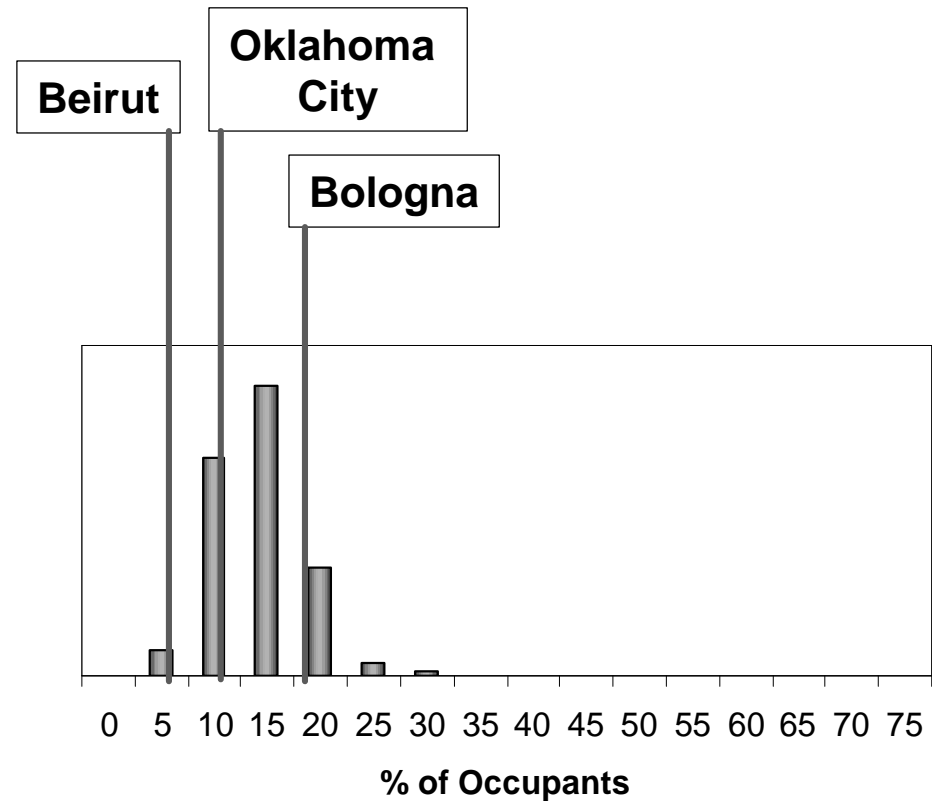


Estimated Injury Severity Distributions for Building Collapse

Fatality



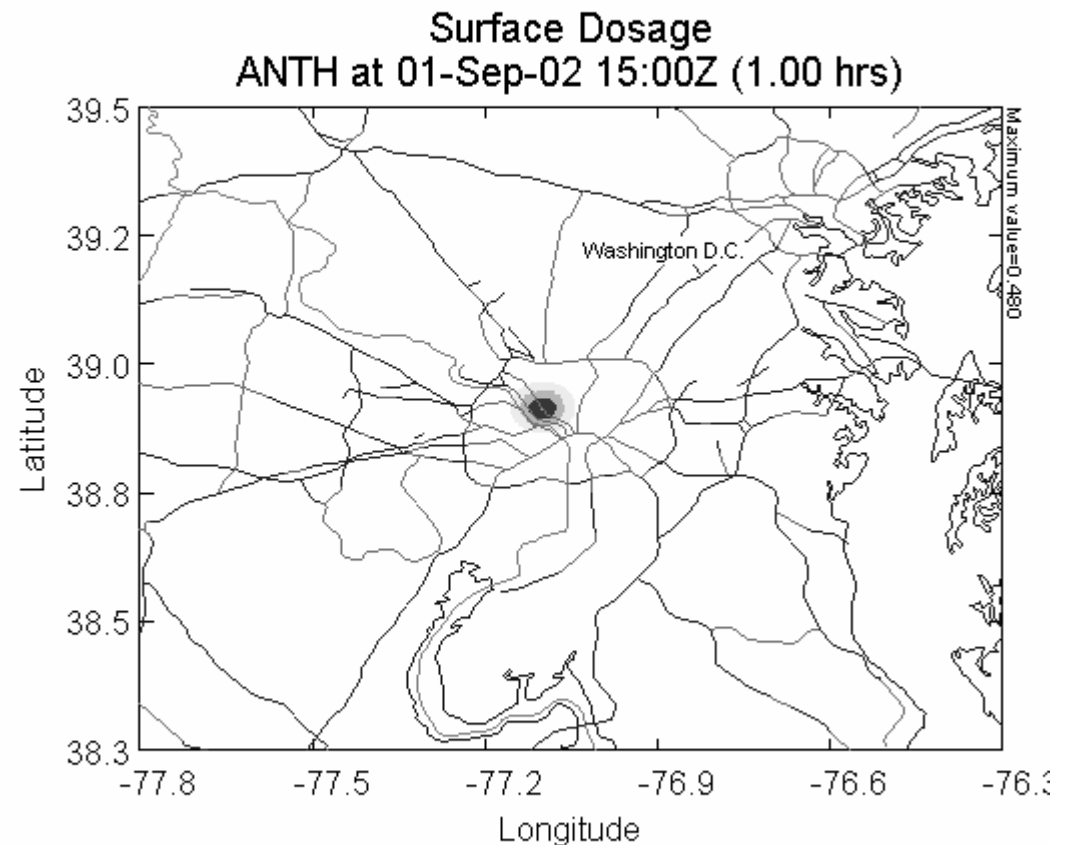
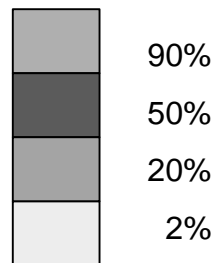
Life Threatening



CBRN Events Modeled Using Department of Defense Standard Model



- ❑ Full spectrum of NBC weapons
- ❑ Accurately predicts the effects of hazardous material releases
 - Contamination
 - Injuries and fatalities
- ❑ Embedded climatology and historical weather data
- ❑ Terrain data and supporting wind-flow models calculate the local windfield

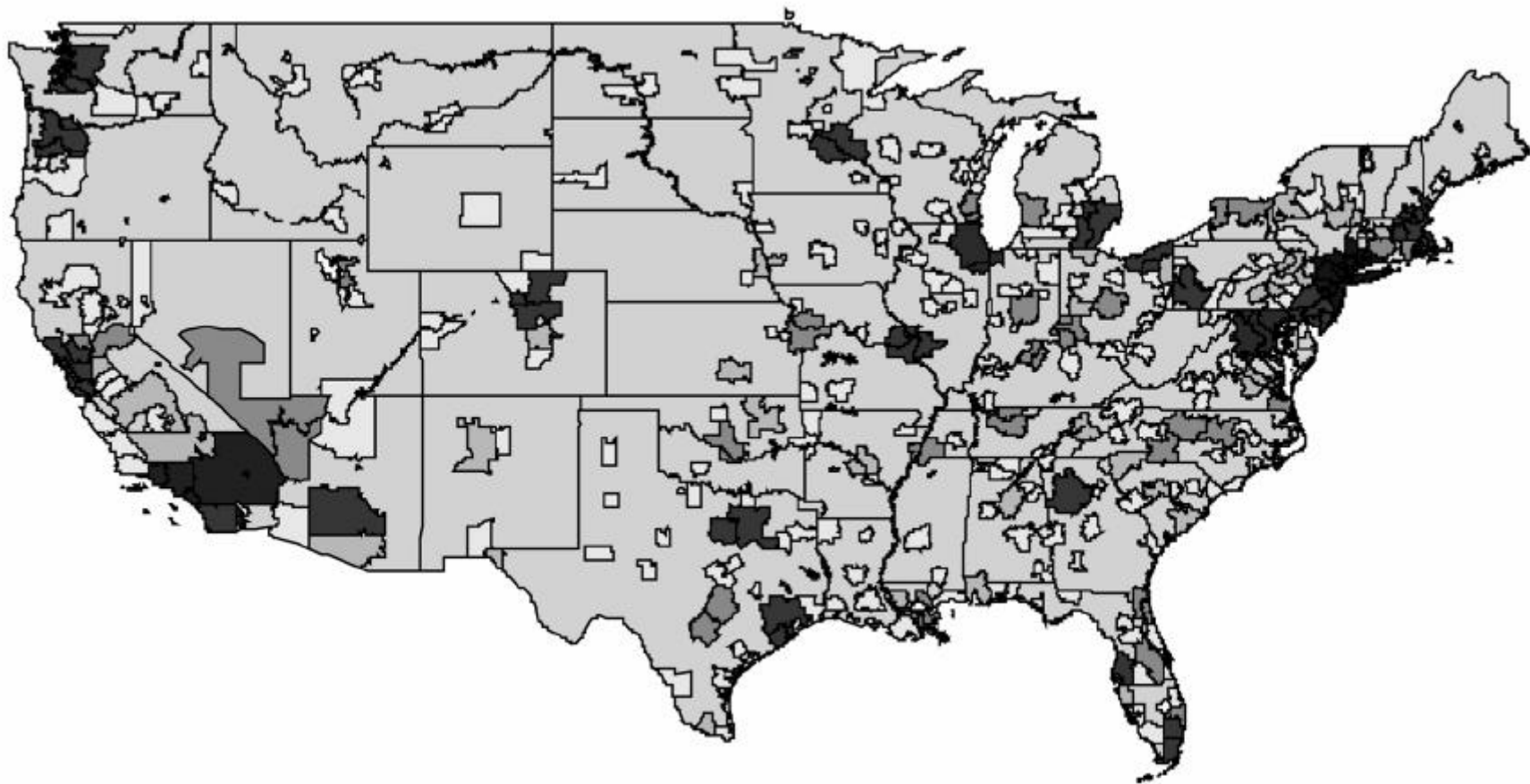


Contour area at indicated level (sq Km)


NOTE: Exposures based only on the displayed portion of the plume



CBRN Catalog Source Locations Are Distributed Across Metropolitan Areas

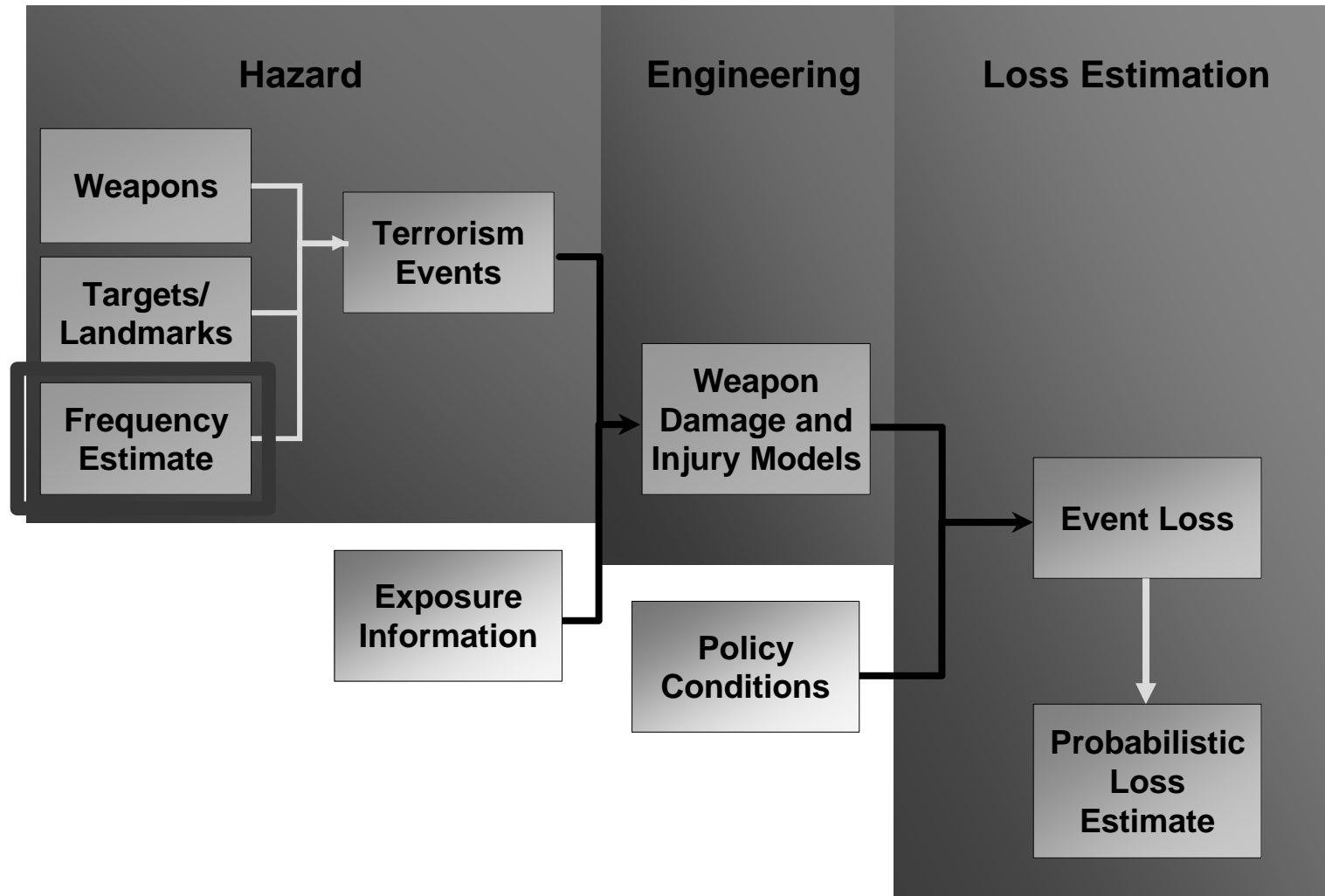


AIR's Potential Insured Loss Estimates Included in 2006 AAA Report

 AMERICAN ACADEMY <i>of</i> ACTUARIES Terrorism Risk Insurance Subgroup			Insured Losses, in \$ billions	
Scenario	New York	Washington	San Francisco	Des Moines
Truck bomb	\$12	\$6	\$9	\$3
Chemical	\$447	\$106	\$92	\$27
Biological	\$778	\$197	\$171	\$42



AIR Frequency Estimation Process Based on Operational Threat Assessment by Terrorism Experts



AIR Expert Team - 150 Years of Operational Threat Assessment Experience

- ❑ **Ed Badolato, Deputy Assistant Secretary of Energy (ret.)**
 - ❑ Currently Executive Vice President for Homeland Security, The Shaw Group
 - ❑ Principal architect of terrorism security for energy infrastructure
 - ❑ Chairman, National Cargo Security Council
 - ❑ Military attaché in Middle East – led operations against terrorists
- ❑ **Peter Probst, CIA and Office of the Secretary of Defense (ret.)**
 - ❑ Initiated and supervised CIA's "Terrorist Group Profiles"
 - ❑ Represented Secretary of Defense on terrorism and political violence
 - ❑ Recently completed work on National Academy of Sciences report on risk analysis
- ❑ **Buck Revell, Executive Assistant Director, FBI (ret.)**
 - ❑ Advises State and Justice Departments, and Korea, India, and UAE on terrorism
 - ❑ Award from Middle East Forum for fight against international terrorism
 - ❑ Managed counterterrorism, criminal investigations, counter-intelligence at FBI
 - ❑ Led Operation Goldenrod, first apprehension overseas of international terrorist
 - ❑ Credited personally with reduction in threat from right wing terrorist groups
- ❑ **Dr. Joshua Sinai, Senior Policy Analyst, ANSER**
 - ❑ On loan as full time employee in Homeland Security Department as terrorism expert
 - ❑ Teaches "Forecasting Terrorism" at American Military University
- ❑ **David Wiencek, President, International Security Group**
 - ❑ Performs terrorism threat and risk assessment for businesses worldwide
 - ❑ Assesses international and domestic terrorist group CBRN capabilities for government



Operational Threat Assessment Considerations of the Terrorism Expert Group

❑ Objectives

- Mass casualties?
- Economic impact?
- Symbolic?
- Punish a group, industry, company, government?

❑ Capabilities and Resources

- Weapon availability
- CBRN efforts
- Coordinated attacks
- Manufacture vs. buy
- Financial
- Technical
- Operational skills

❑ Deployment

- Locales with presence
- Financial vs. operational
- Local target surveillance opportunity
- Local support

❑ Historical attacks

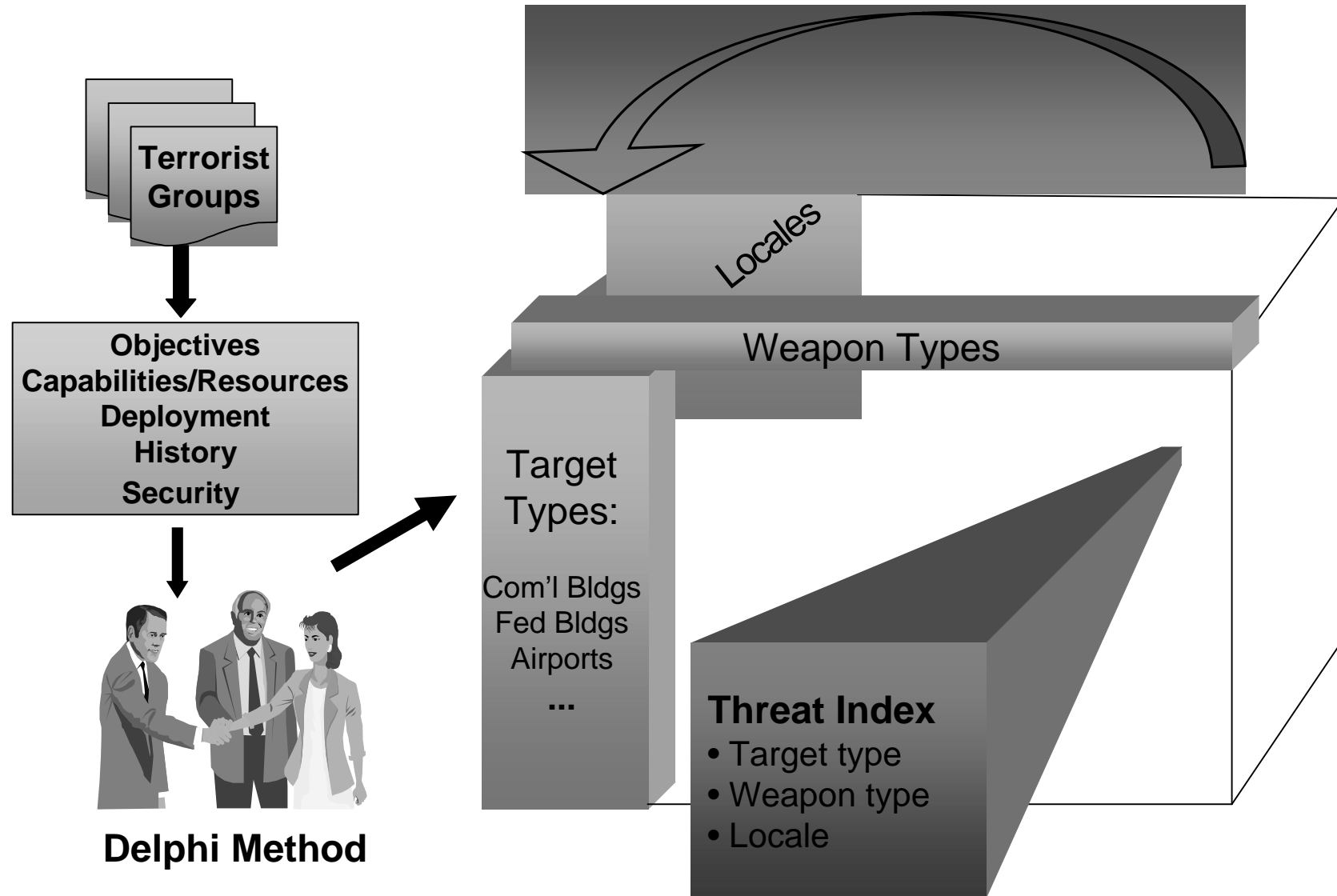
- Targets
- Weapons
- Locales

❑ Reaction to Security

- Federal
- State
- Local
- Private



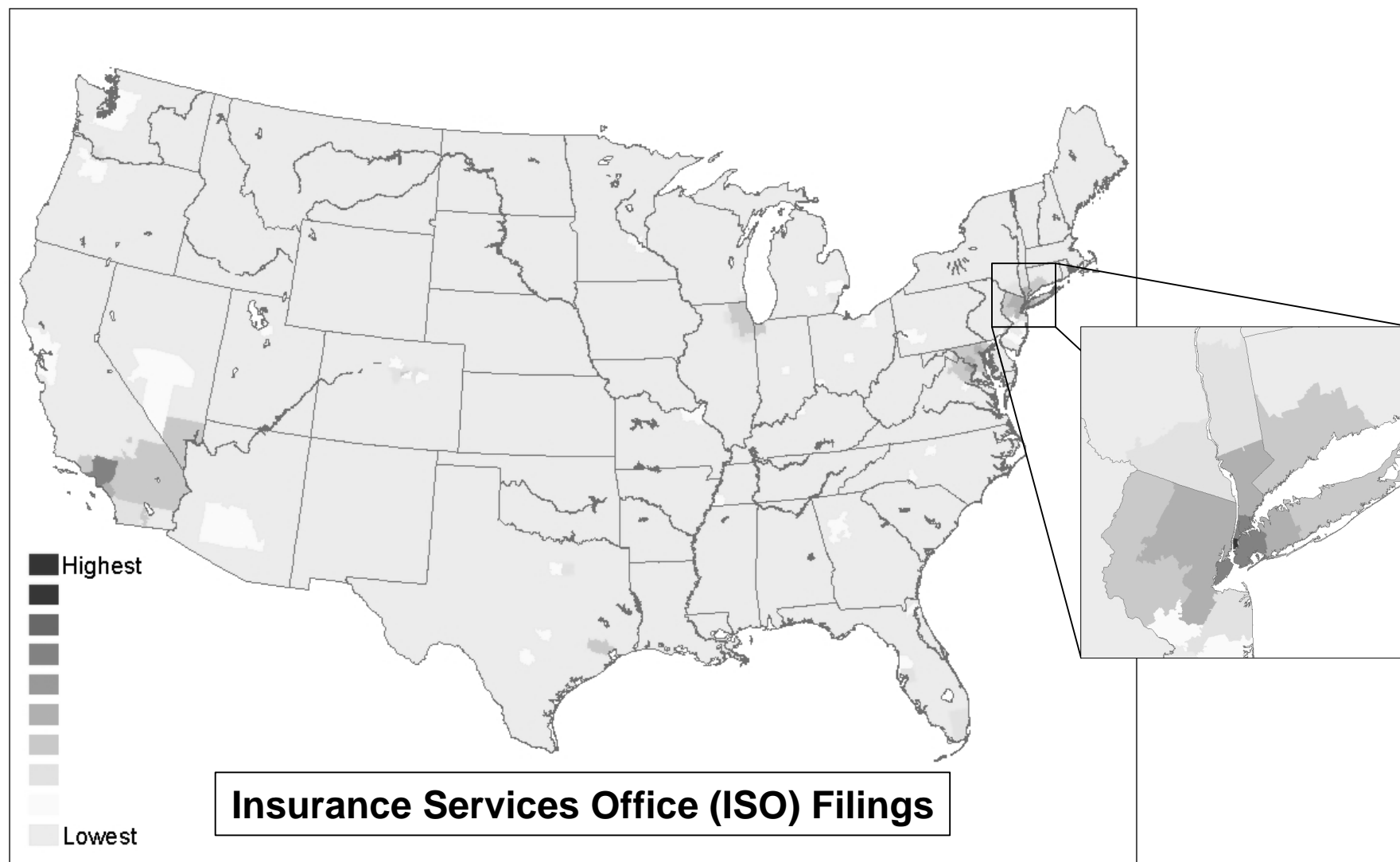
Development of Frequency Estimate: Threat Index



AIR Supports Terrorism Risk Analysis for Many Government Agencies



AIR Probabilistic Industry Loss Results Were Used to Develop ISO Advisory Loss Costs



Terrorism Risk Management Best Practices

- ❑ Exposure concentration analysis
 - Identify potential areas of too over-accumulation
- ❑ Landmark proximity risk analysis
 - Focus on exposure near potential targets
- ❑ Deterministic modeled loss analysis
 - Identify worst-case loss scenarios
- ❑ Probabilistic loss analysis
 - Measure and compare portfolio risk

