Managing Terrorism Risk in Touchstone

AIR WORLDWIDE®

Agenda

- Overview of the AIR Terrorism Model

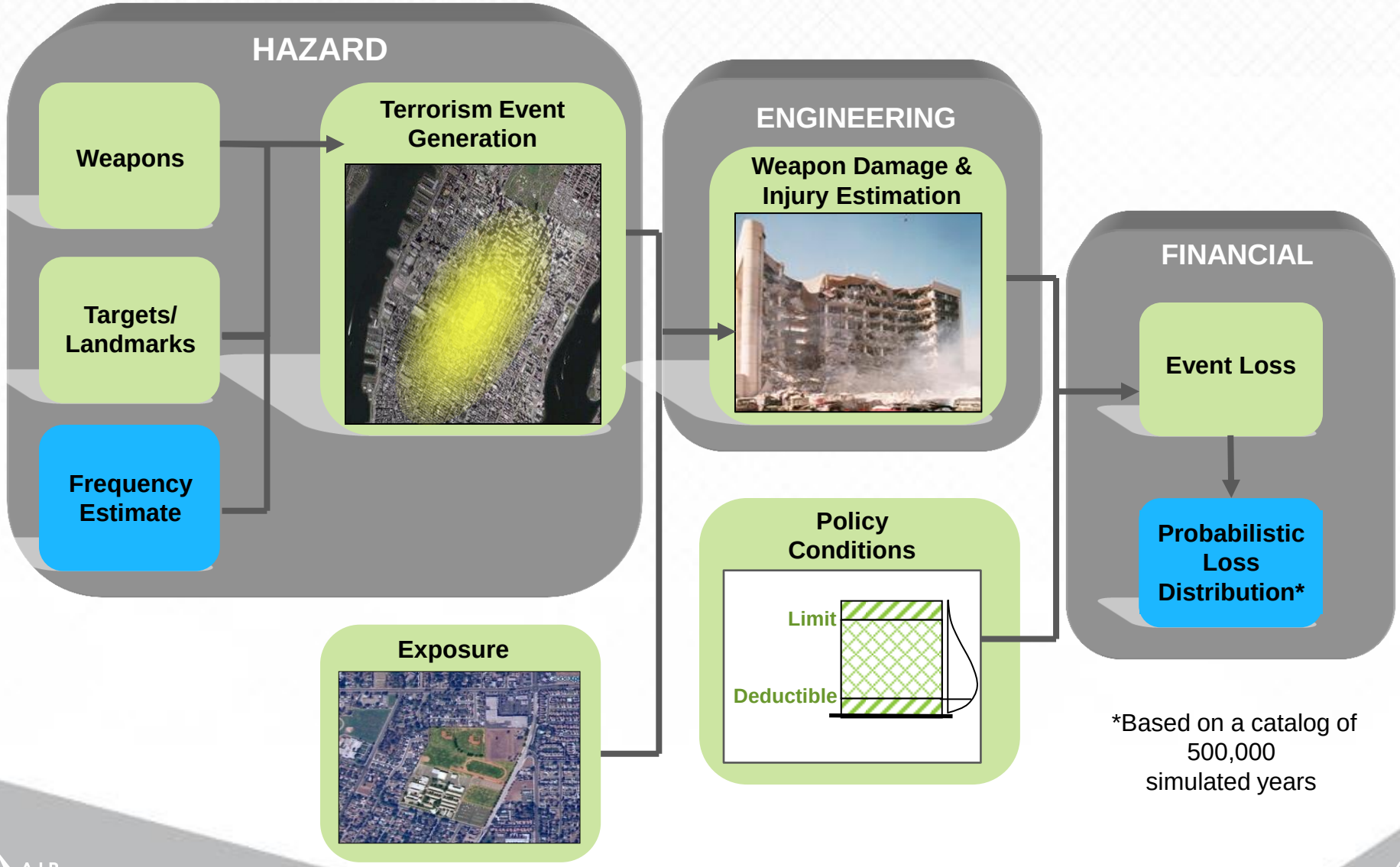
- Terrorism risk management using Touchstone®

- The evolving terror risk insurance landscape:
  - Modeling global terror threats
  - TRIA case study

Overview of the AIR Model for Terrorism

Peter Bingenheimer, CCM

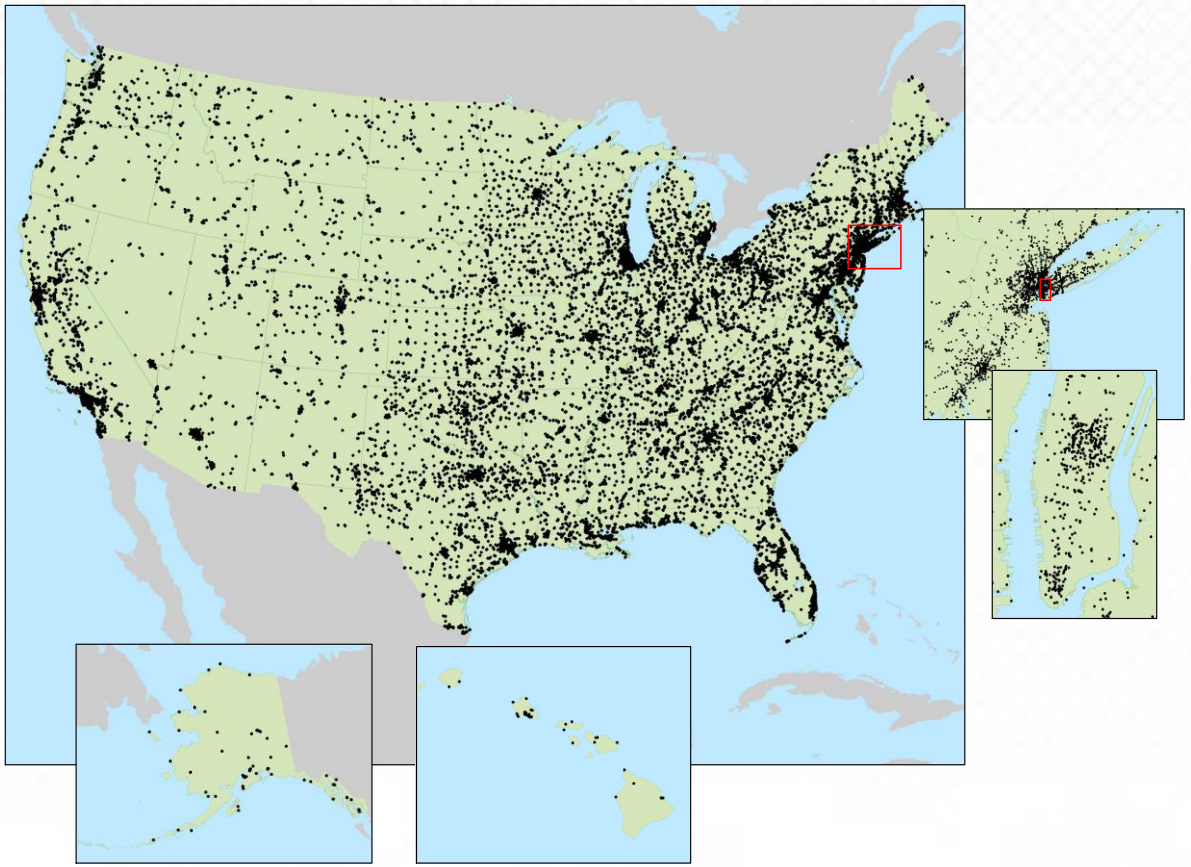
AIR Terrorism Model Framework



*Based on a catalog of 500,000 simulated years

AIR Target Database Includes a Full Spectrum of Potential Targets in All 50 States

- Commercial
  - Prominent buildings
  - Corporate headquarters
  - Transportation hubs
  - Chemical plants
  - Energy and power facilities
  - Malls
  - Hotels and casinos
  - Amusement parks
  - Sports venues
- Government
  - Federal buildings
  - Embassies
  - State capitols
  - Post offices
- Other institutions
  - Educational
  - Medical
  - Religious



AIR Landmark Database

- Approximately 300,000 potential targets used to create master catalog
- Over 41,000 selected in the stochastic catalog
- Includes approximately 100 Trophy Targets

AIR Terrorism Model Includes Both Conventional and CBRN Weapons

CONVENTIONAL

Vehicle bombs (Ton - TNT)

- Portable (0.25)
- Car (0.75)
- Van (2.5)
- Delivery truck (6)
- Large truck (25)

Airplane crash

- Small plane
- Large commercial airliner

CBRN

Chemical*

- Sarin (GB)
- VX Nerve

Biological*

- Anthrax
- Smallpox

Radiological

- Cesium 137
- Cobalt 60

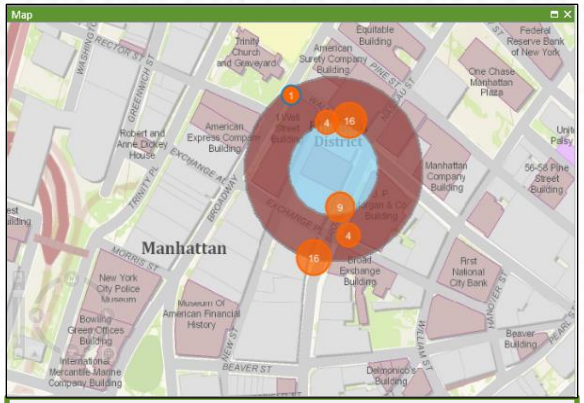
Nuclear*

** Includes small, medium, and large*

Terrorism Risk Management Using Touchstone

AIR

What Methods Should Be Used to Manage Terrorism Risk?

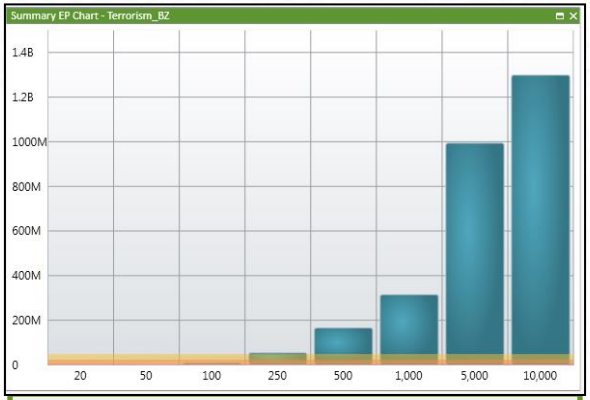


Manage/Monitor Exposures

- Geospatial Analysis
  - Accumulate exposure values
  - Assign damage ratios within user-defined concentric rings
- Hazard Analysis
  - Identify accumulations in vicinity of terror landmarks

Deterministic Modeled Loss Scenarios

- Conduct loss scenarios at points of accumulation
- Model attacks at locations of known or potential terror threats
- Assess impact of various weapon types on buildings and workers
- Determine net impact to losses after TRIA recovery



Probabilistic Loss Analysis

- Illustrates full spectrum of loss potential and likelihood of terrorism events
- Supports pricing, portfolio management, and underwriting decisions
- Incorporates research and knowledge of counterterrorism experts

Investigate Locations Contributing to Ring Analysis Accumulation

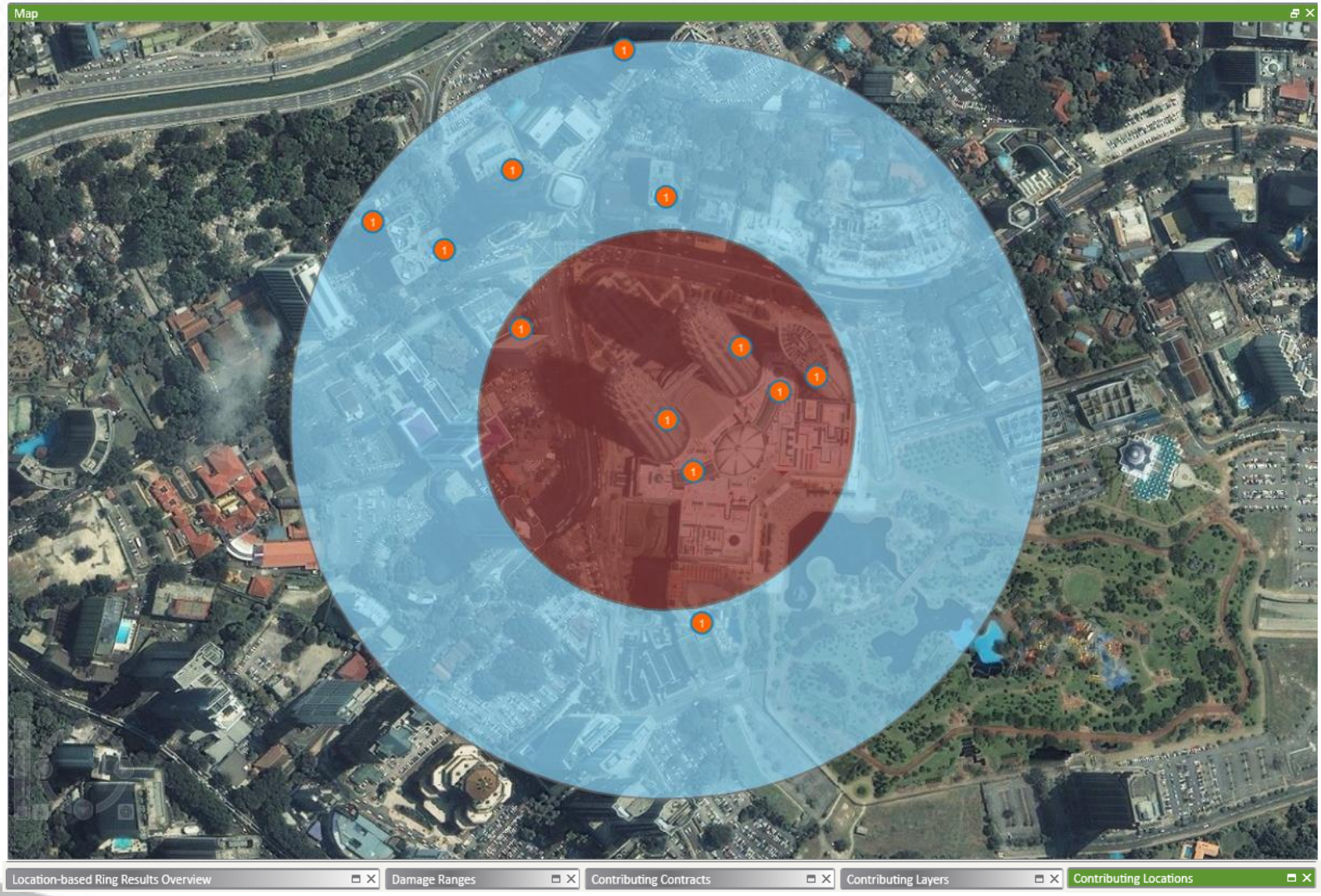
- **Visually review proximity of exposures to terror target landmarks**
- **Establish underwriting rules to monitor accumulation at point of decision**
- **Respond to rating agency requirements**

Geospatial Analytics Allows for Straightforward Analysis of Lloyd's Realistic Disaster Scenarios

Damage Ranges

Damage Band Info			Perspectives		
ID	Radius	Damage Ratio	Ground Up	Gross	Net of Pre-CAT
1	200 Meters	100	399,132,965	2,246,665	2,246,665
2	400 Meters	25	357,534,650	14,220,697	14,220,697
3	500 Meters	10	175,031,143	4,939,196	4,939,196

Geospatial Analytics Enables You to Manage Terrorism Risk for Locations Anywhere in the World

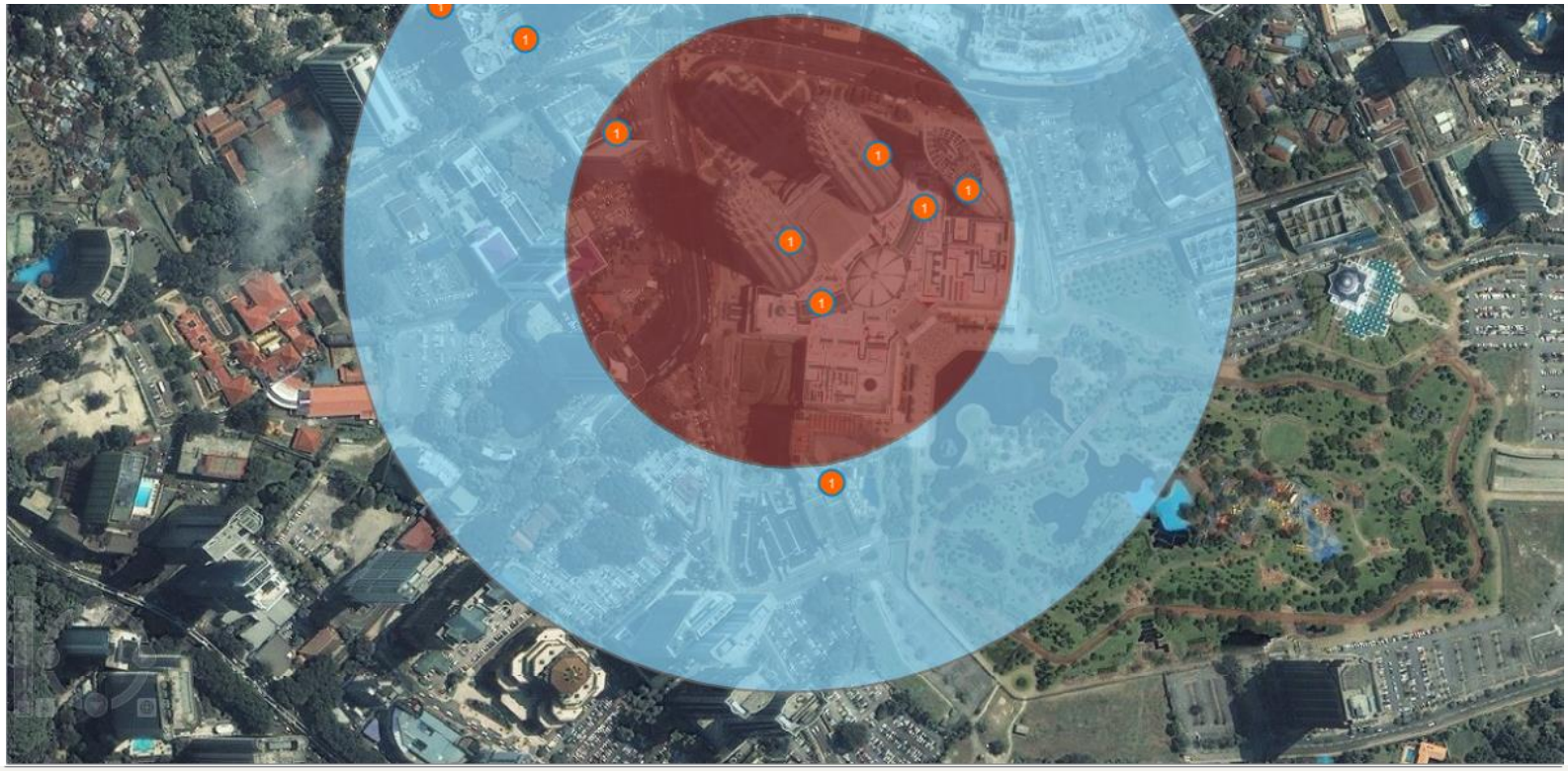


Geospatial Analytics Enables You to Manage Terrorism Risk for Locations Anywhere in the World

Map

Damage Ranges

Damage Band Info			Perspectives				Attributes			
ID	Radius	Damage Ratio	Ground Up	Gross	Net of Pre-CAT	Post-CAT Net	Total Replacement Value	Risk Count	Location Count	Peril
1	200 Metres	100	2,339,800,000	1,857,800,000	1,857,800,000		2,339,800,000	6	6	TR
2	400 Metres	25	53,950,000	53,950,000	53,950,000		215,800,000	6	6	TR



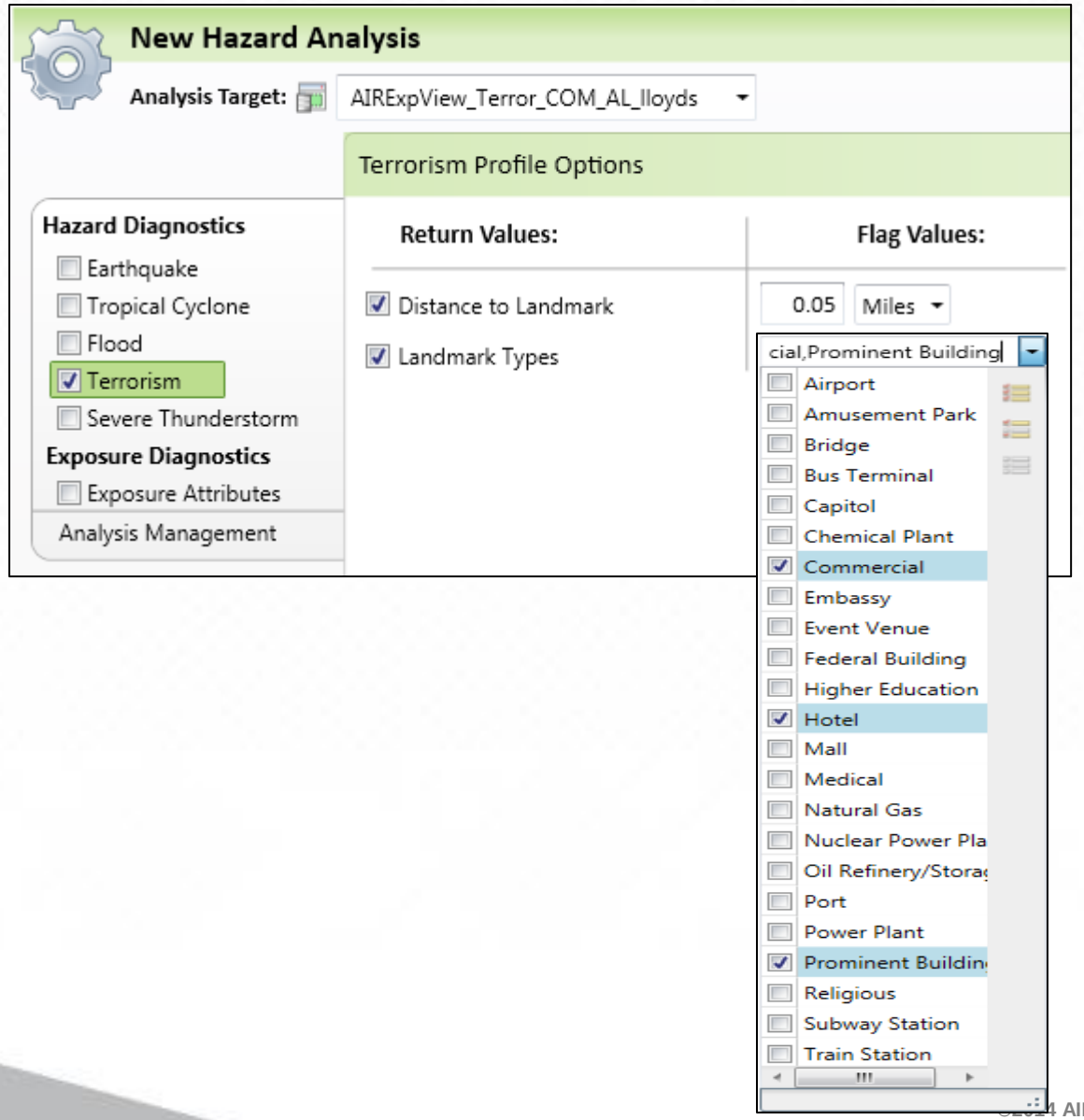
Location-based Ring Results Overview | Damage Ranges | Contributing Contracts | Contributing Layers | Contributing Locations

Geospatial Analytics Enables You to Manage Terrorism Risk for Locations Anywhere in the World

Contributing Locations

Location Info									
Insured Name	Location ID	Contract ID	Street	City	Area	Postal	Country	Geocode Match Level	Latitude
Ambank	1	1	8 Jalan Yap Kwan Seng	Kuala Lumpur			Malaysia	User Supplied	3.16125
The British Council	1	10	142 Jalan Ampang	Kuala Lumpur			Malaysia	User Supplied	3.159619
Twin Towers Medical Center	1	11	Suria Klcc Jalan Ampang	Kuala Lumpur			Malaysia	User Supplied	3.15723
AX Armani Exchange	1	2	50088 Kuala Lumpur	Kuala Lumpur			Malaysia	User Supplied	3.157994
Embassy of The Kingdom of Morocco	1	3	50450 Kuala Lumpur	Kuala Lumpur			Malaysia	User Supplied	3.159349
Malasian Rubber Research and Dev	1	4	148 Jalan Ampang	Kuala Lumpur			Malaysia	User Supplied	3.159852
Mandarin Oriental Hotel	1	5	50088 Kuala Lumpur	Kuala Lumpur			Malaysia	User Supplied	3.155784
Menara Public Bank	1	6	146 Jalan Ampang	Kuala Lumpur			Malaysia	User Supplied	3.160109
Pan Malaysia Pools Sdn Bhd	1	7	Kuala Lumpur City Centre	Kuala Lumpur			Malaysia	User Supplied	3.158138
Petronas Towers	1	8	1 Jalan Ampang	Kuala Lumpur			Malaysia	User Supplied	3.157723

Underwriters Can Identify a Location's Proximity to Terror Landmarks Using the Hazard Analytics Module



Underwriters Can Identify a Location's Proximity to Terror Landmarks Using the Hazard Analytics Module

Hazard Results Table

Earthquake Profile | Tropical Cyclone Profile | Exposure Attribute Profile | Flood Profile | Severe Thunderstorm Profile | ☑ Terrorism Profile

Location ID	Contract ID	Location Details									Terrorism Profile Details	
		Address	State	City	Country	Postal Code	Total Replacement Value	Geocode Match Level	Latitude	Longitude	Distance To Nearest Landmark	Nearest Landmark Type
Loc1	Policy14		New York	NEW YORK	United States	10005	500000	User Supplied	40.703144	-74.007471	0.0642963364254625	Port
Loc10	Policy14		New York	NEW YORK	United States	10005	1000000	User Supplied	40.705986	-74.007644	0.0468601321029302	Prominent Building
Loc11	Policy14		New York	NEW YORK	United States	10005	1000000	User Supplied	40.706051	-74.010648	0.0494565334515385	Prominent Building
Loc12	Policy14		New York	NEW YORK	United States	10005	1000000	User Supplied	40.705490	-74.010488	0.0568676439086434	Prominent Building
Loc13	Policy14		New York	NEW YORK	United States	10005	500000	User Supplied	40.703499	-74.009522	0.0566444596576865	Prominent Building
Loc14	Policy14		New York	NEW YORK	United States	10005	1000000	User Supplied	40.707067	-74.008943	0.0231614474933965	Hotel
Loc15	Policy14		New York	NEW YORK	United States	10004	500000	User Supplied	40.705712	-74.012702	0.0910318115802373	Subway Station
Loc16	Policy14		New York	NEW YORK	United States	10006	500000	User Supplied	40.708374	-74.011310	0.025695454668551	Prominent Building
Loc17	Policy14		New York	NEW YORK	United States	10005	500000	User Supplied	40.707634	-74.008317	0.0237202802469942	Prominent Building
Loc18	Policy14		New York	NEW YORK	United States	10005	500000	User Supplied	40.705576	-74.006503	0.0978813347546844	Prominent Building
Loc19	Policy14		New York	NEW YORK	United States	10004	500000	User Supplied	40.702299	-74.012812	0.0103032205687156	Commercial

First | Prev 1 Next | Last

Hazard Results Map

Deterministic Terrorism Loss Analysis Is a Powerful Tool for Risk Management and Rating Agency Requirements

STATEMENT YEAR 2013 SRQ OF THE _____ A.M. Best#: _____

X. TERRORISM SECTION (Continued)

Please refer to the Questionnaire Instructions for additional information on how to complete the exhibits in this section.

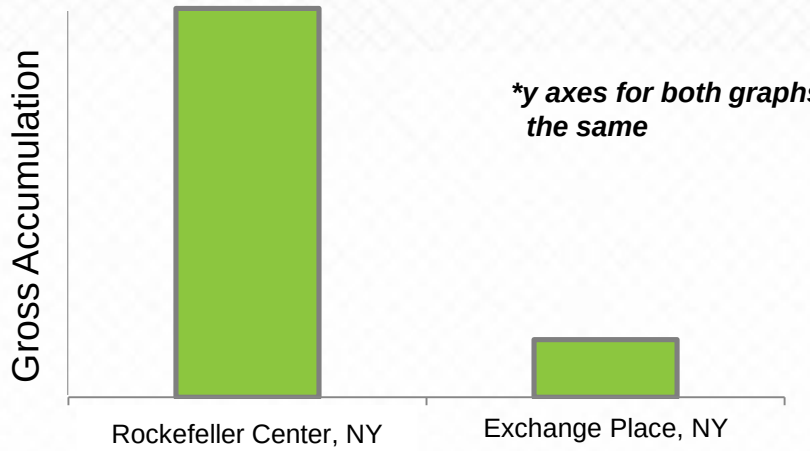
45. DETERMINISTIC LOSS METHOD (PRIOR TO REINSURANCE AND TRIPRA)

a.Assume the Specific Loss Scenario is located within the city limits of the following 5 cities: New York NY, Chicago IL, San Francisco CA, Washington DC, Los Angeles CA.

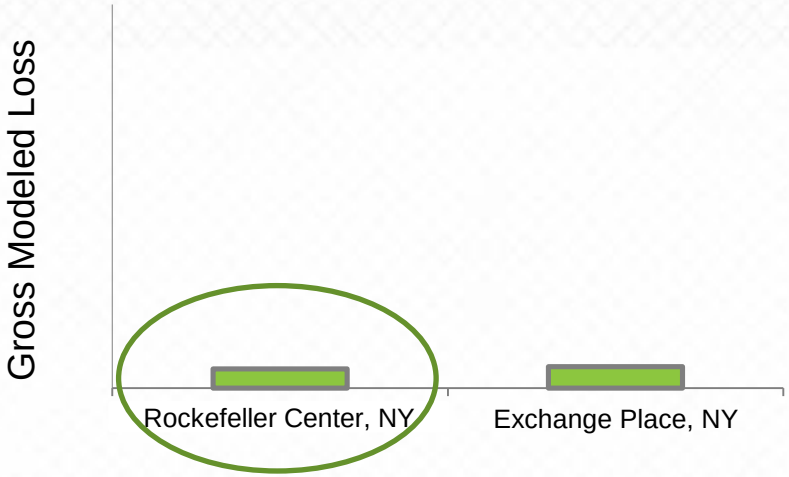
(01) Location of Attack (Street/ZIP, City, State) (Rank based on Total Modeled Losses in column 06 which is the sum of Columns 03 through 05)	Modeled Primary Losses Prior to Reinsurance and TRIPRA					
	(02) Average WC Loss per Employee ($000)	(03) Total Workers' Comp ($000)	(04) Total Property Including Business Interruption ($000)	(05) Total Other Coverages* ($000)	(06) Total Modeled Losses ($000)	(07) % of 2013 Group PHS
1.						
2.						
3.						
4.						
5.						

- Create custom terror attack scenarios while leveraging AIR's propagation algorithms, vulnerability functions, and trusted financial module
- Model deterministic terror loss scenarios for A.M. Best SRQ and S&P Terrorism Survey requirements for commercial property and workers' compensation exposures

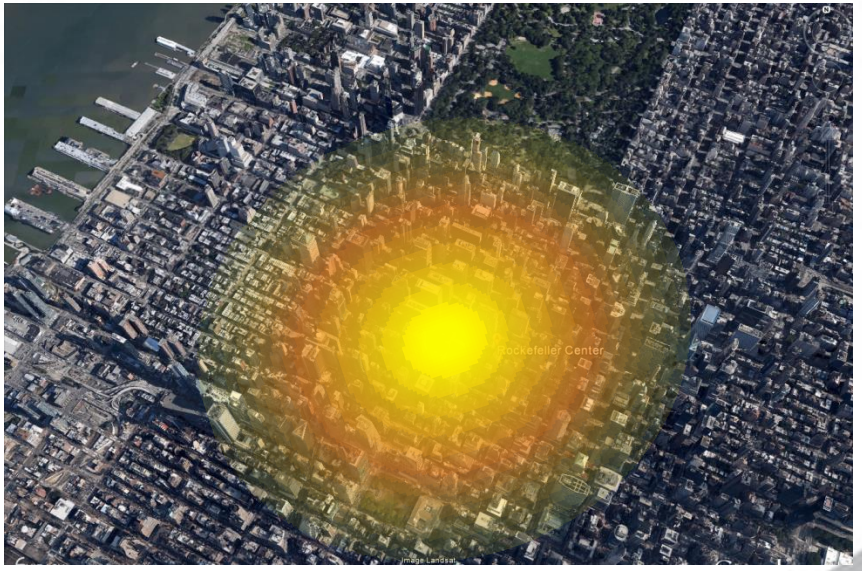
AIR's Deterministic Terrorism Analysis Shows Substantially Lower Accumulation than Lloyd's PML approach



***y axes for both graphs are the same**



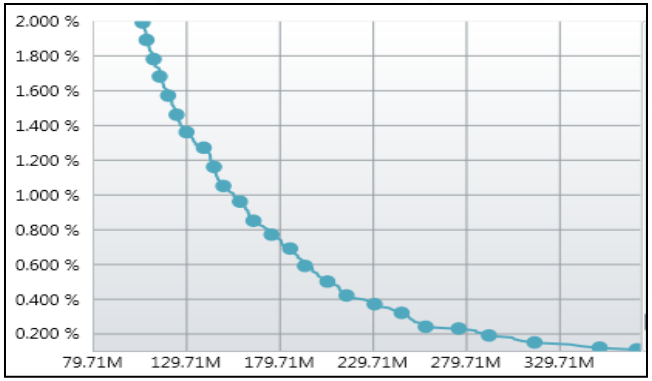
Zone	Radius	Damage
1	200 m	100%
2	400 m	25%
3	500 m	10%



Probabilistic Loss Analysis Results Provide Value in Terrorism Risk Management

- A consistent baseline for pricing analysis
- Compare different books of business
- Assess new submissions
- Compare different underwriting strategies
- Identify maximum loss scenarios
- Understand exposure to various attack types
- Estimate probabilities of extreme tail events

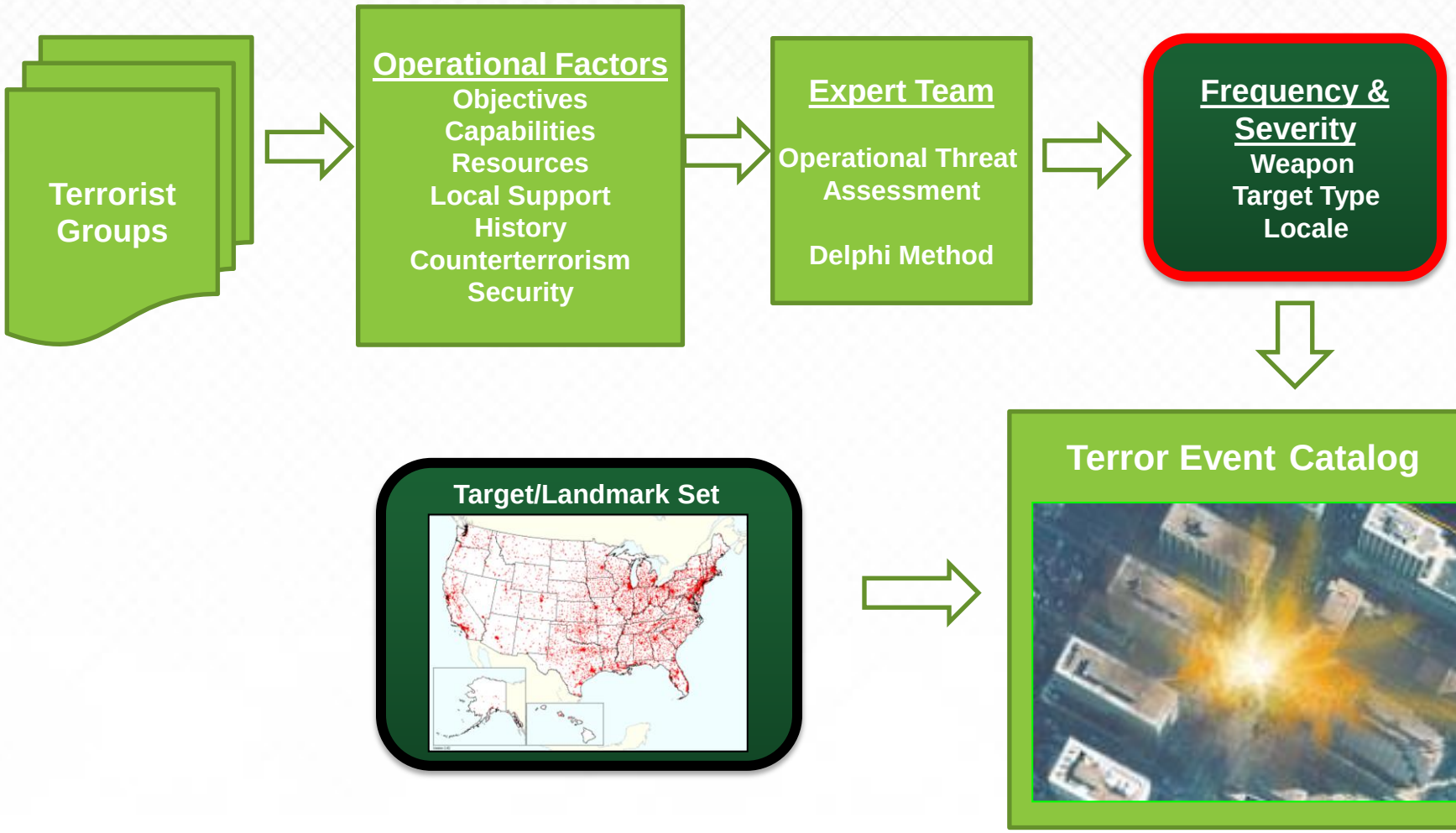
Agg/Occ	Perspective	AAL(EV)	SD	0.4%	0.2%	0.1%	0.07%	0.02%	0.01%
AGG	Ground Up	82,916	1,936,139	1,646,198	9,763,620	29,609,958	46,548,124	64,980,441	65,720,903
	Retained	37,104	1,176,986	737,453	2,342,003	9,717,674	16,648,922	27,684,764	58,583,735
	Gross	45,812	1,282,828	312,838	2,631,978	14,703,315	24,994,212	58,087,011	64,108,288
	Net of Pre-Cat	45,812	1,282,828	312,838	2,631,978	14,703,315	24,994,212	58,087,011	64,108,288
OCC	Ground Up	82,771	1,932,633	1,642,642	9,762,423	29,609,958	46,548,124	64,975,155	65,614,866
	Retained	37,057	1,176,706	736,432	2,328,448	9,717,674	16,641,057	27,684,764	58,583,585
	Gross	45,764	1,281,388	312,732	2,631,978	14,593,085	24,994,174	58,087,011	64,108,288
	Net of Pre-Cat	45,764	1,281,388	312,732	2,631,978	14,593,085	24,994,174	58,087,011	64,108,288



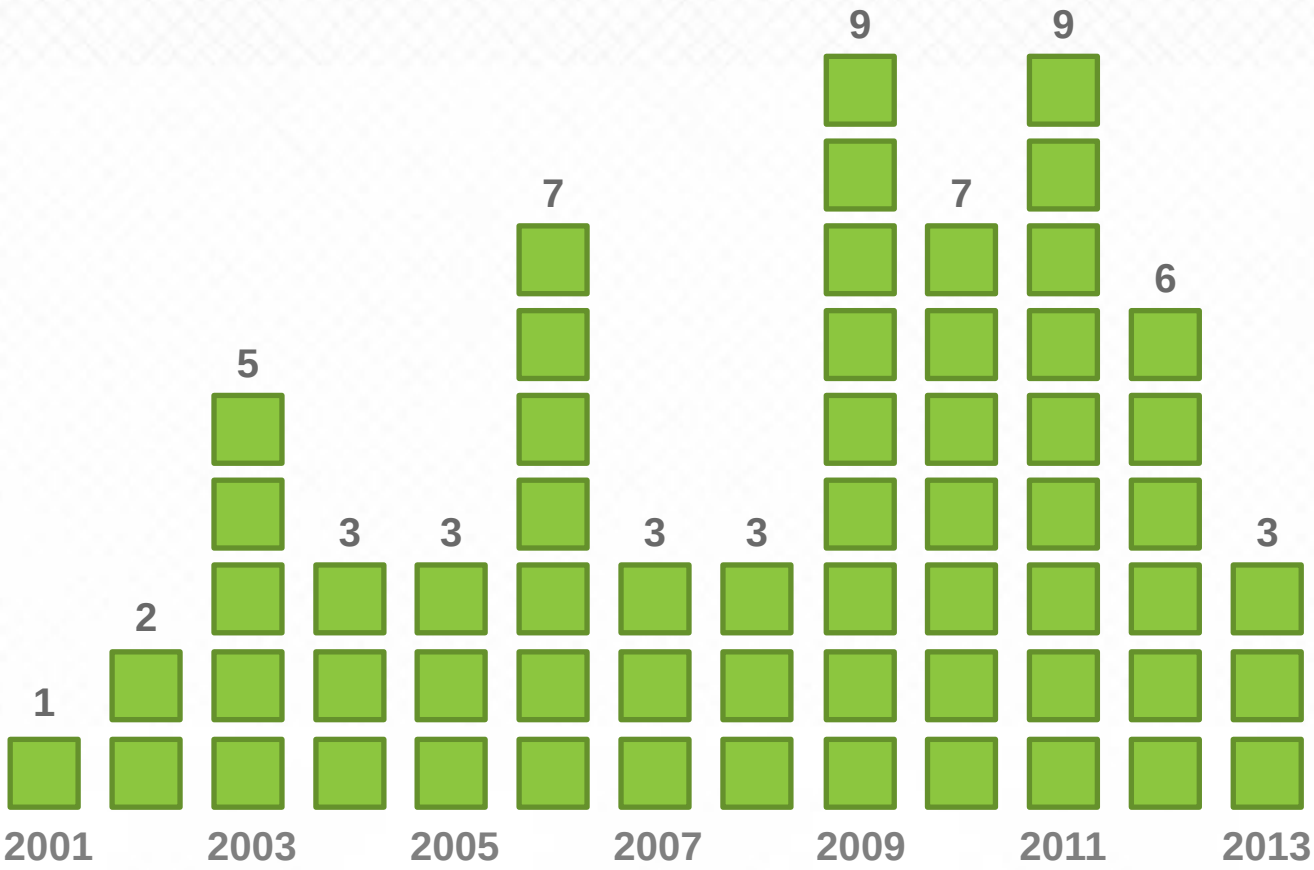
The Evolving Terror Risk Insurance Landscape

Alissa Legenza, CCM

Expert Operational Threat Assessment Is Used to Generate Terrorism Model Event Catalog

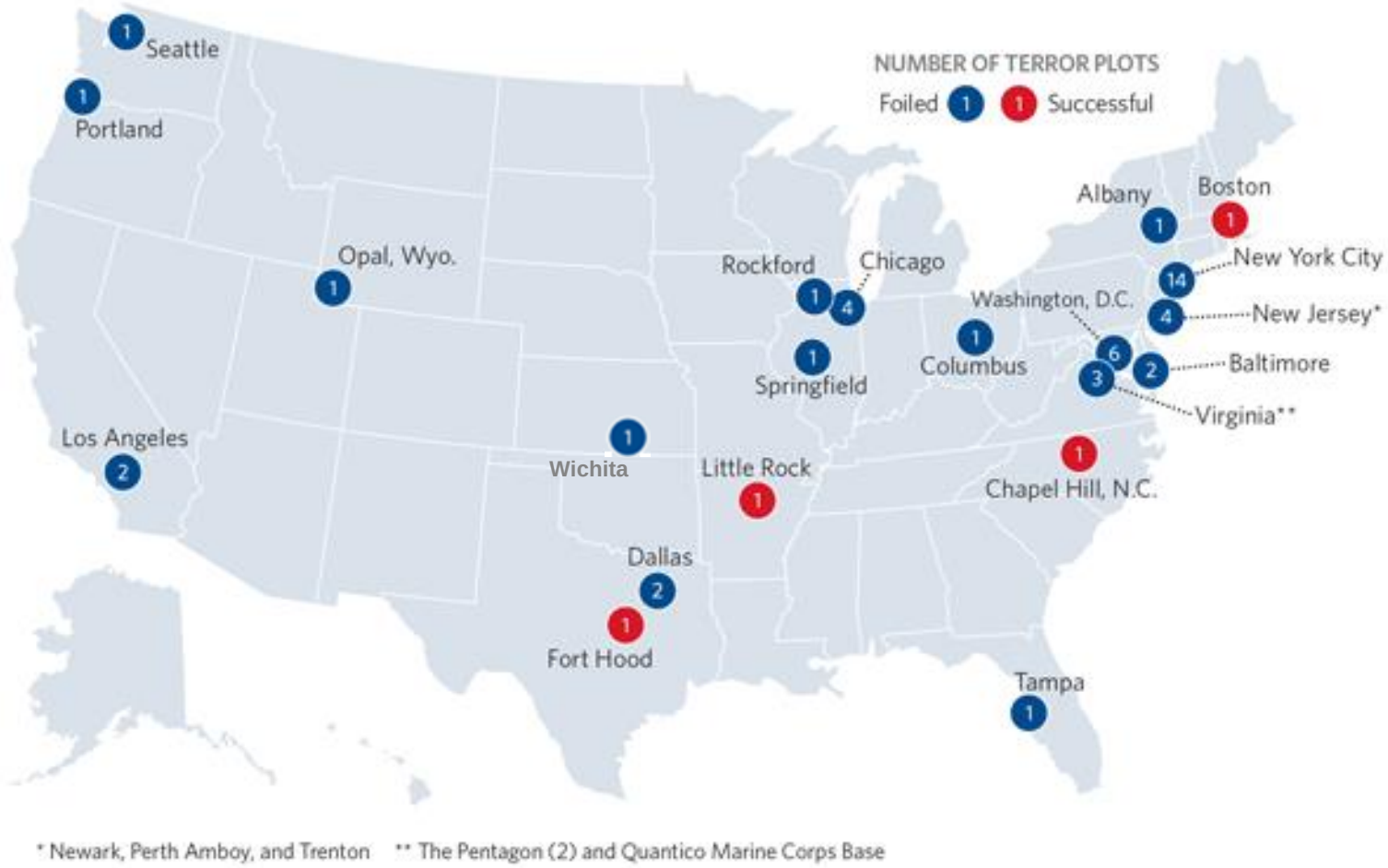


Terror Plots Against the U.S. Since 9/11



Source: Heritage Foundation

Terror Plots Against the U.S. Since 9/11



Terrorism Risk Insurance Act (TRIA): Ensuring Protection to the Commercial P/C Insurance Industry

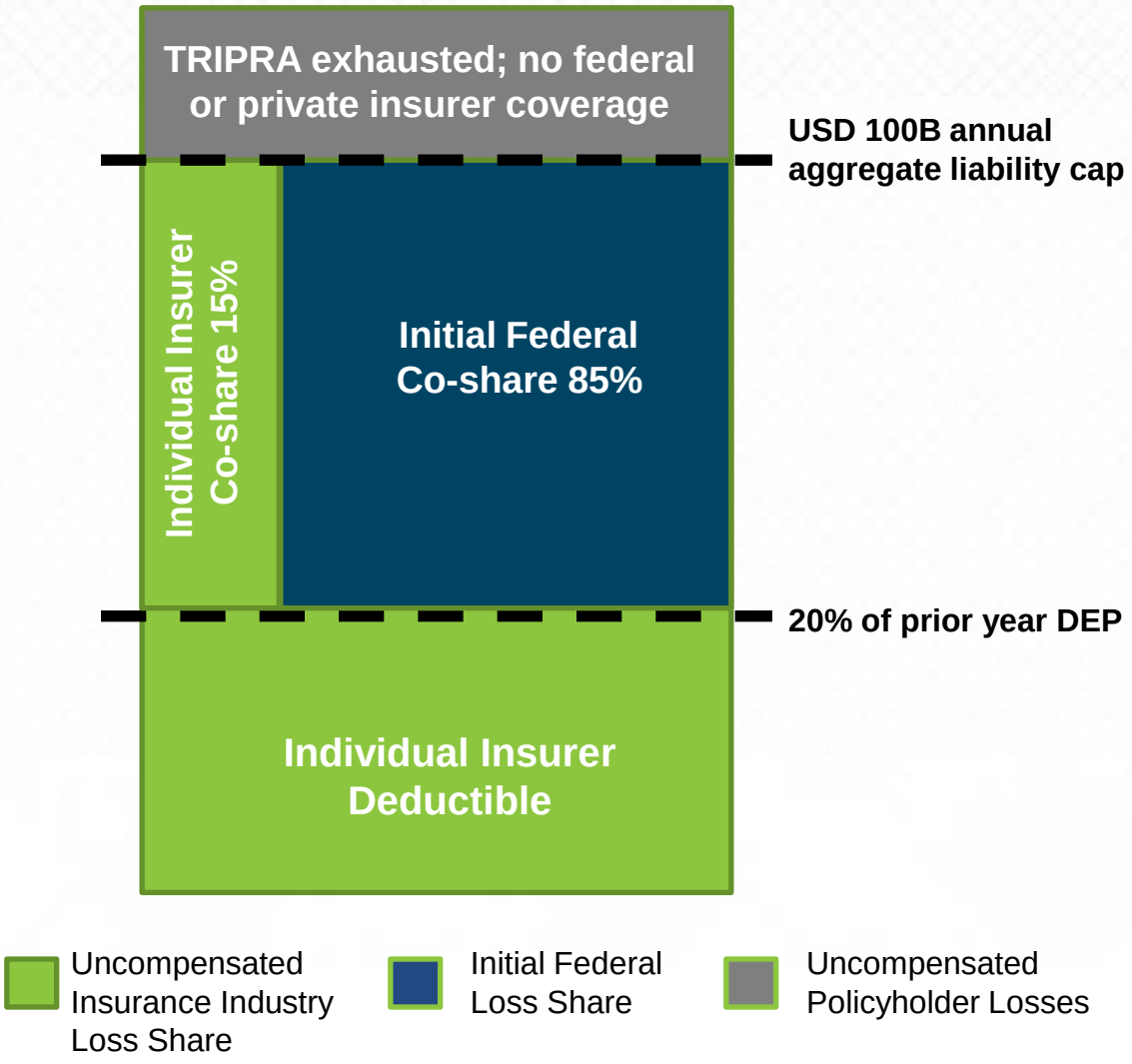
- Tragic Events of Sept. 11, 2001, resulted in over USD 42 Billion Insured Loss*

- Congress responded to larger economic fears with Terrorism Risk Insurance Act in 2002:
  - Last extension of TRIA passed in 2007 (TRIPRA)
  - TRIA is set to expire on December 31, 2014
  - TRIA encourages affordability and availability of commercial terrorism insurance, especially for risks in terror-prone areas

**2013 Dollars: Insurance Information Institute*

Loss Sharing Under TRIPRA for Certified Acts of Terrorism

- Act of terrorism resulting in industry insured losses of at least USD 5M to be eligible for certification
- Insured losses must exceed program trigger of USD 100M for coverage to apply
- Individual insurer deductible size based on 20% of prior year direct earned premium (DEP)
- Annual cap on liability of USD 100B aggregate insured losses
- Mandatory recoupment applies if uncompensated insurer losses below industry retention of USD 27.5B



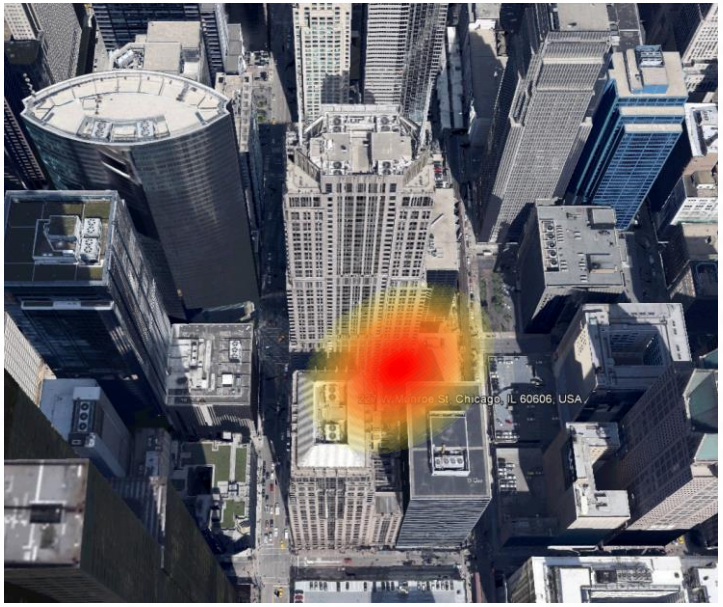
What's Next for TRIA? Reduced Federal Role Based On House and Senate Reauthorization Proposals

	Senate Bill: S.2244	House Bill: H.R.4871
Program Length	7 years	5 years
Program Trigger	**No change**	**Conventional** ↑ **CBRN** **No change**
Insurer Deductible	**No change**	**No change**
Insurer Loss Share	↑	**Conventional** ↑ **CBRN** **No change**
Industry Retention (for mandatory recoupment)	↑	↑

Based on House and Senate positions as of October 21, 2014

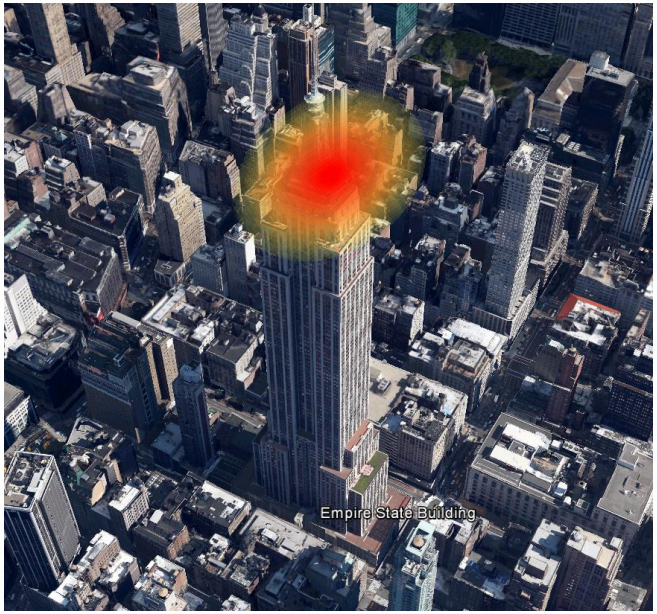
TRIA Case Study: USD 40 Billion Conventional Terror Attack Insured Loss

25 Ton TNT Large Truck Bomb Blast Chicago, IL (Franklin Center)



Commercial Property	**USD 18B**
Workers' Compensation	**USD 21B**
Total Insured Loss	**USD 39B**

Commercial Airplane Crash New York, NY (Empire State Building)

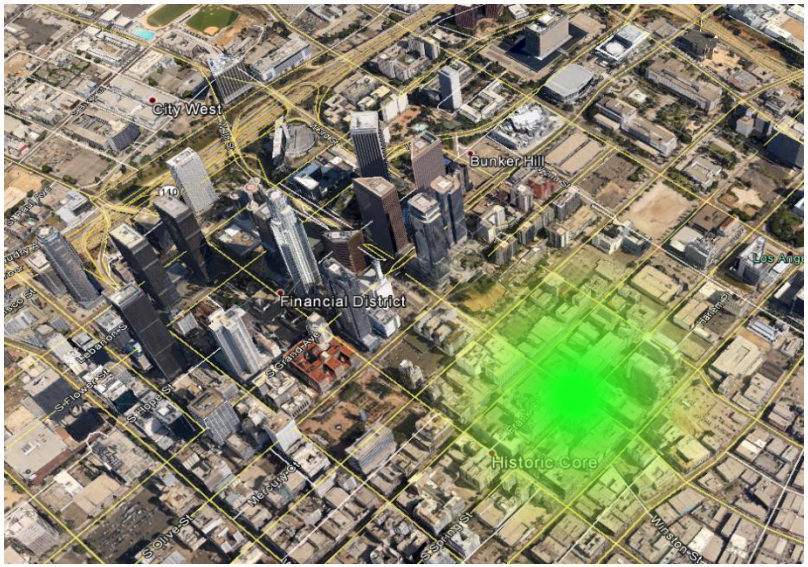


Commercial Property	**USD 18B**
Workers' Compensation	**USD 22B**
Total Insured Loss	**USD 40B**

Assumption: *62% take-up rate for Commercial Property; 100% take-up for Workers' Comp.*
Note: *Attack simulation shown in images for illustrative purposes only.*

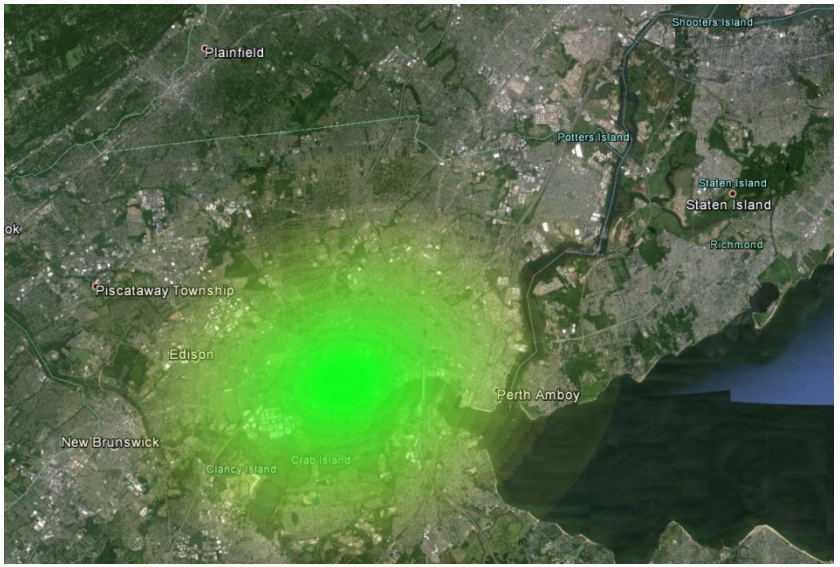
TRIA Case Study: USD 40 Billion CBRN Terror Attack Insured Loss

1 kg VX Attack Los Angeles, CA



Commercial Property	USD 38B
Workers' Compensation	USD 1B
Total Insured Loss	USD 39B

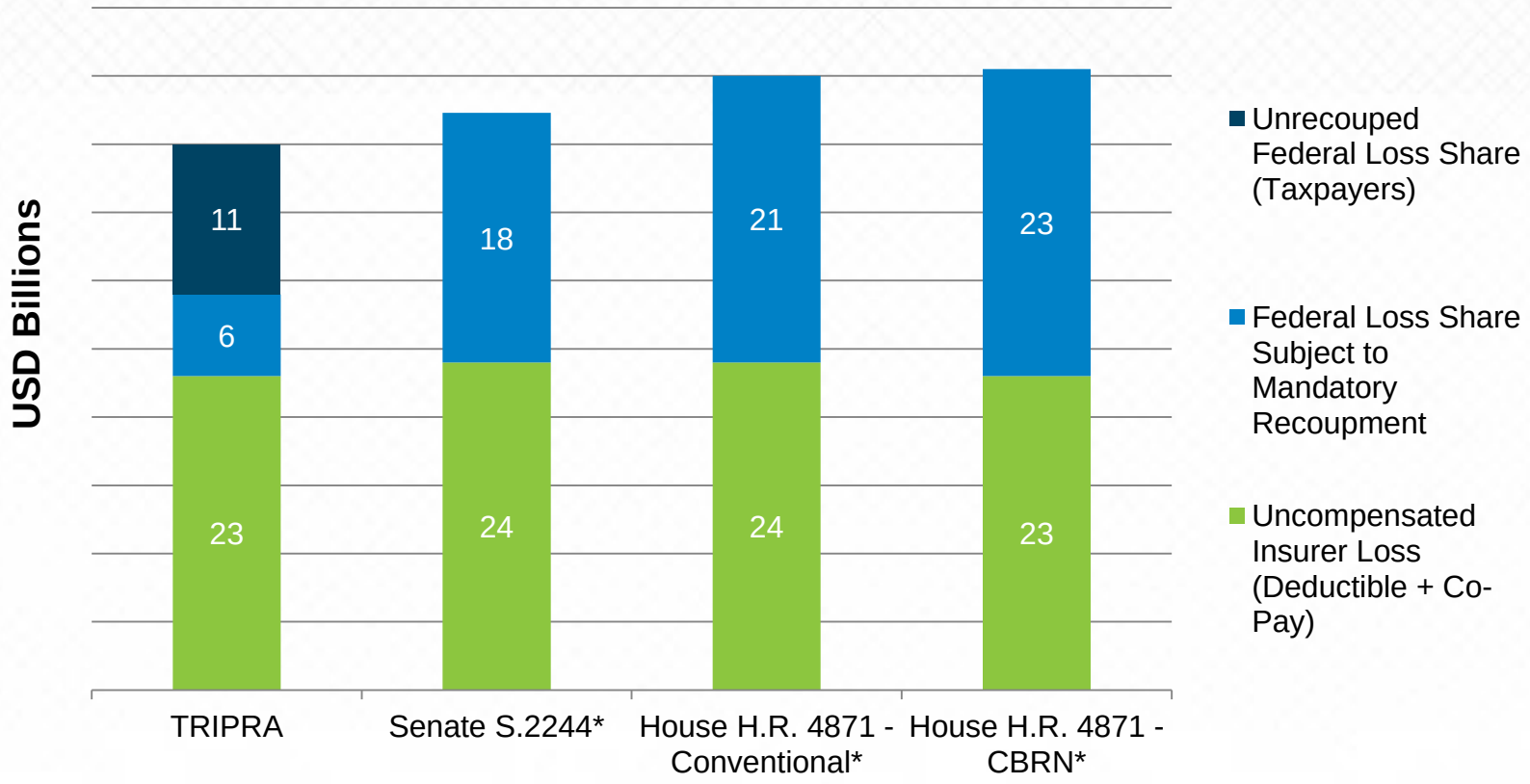
0.1 kg Anthrax Attack Somerset, NJ



Commercial Property	USD 4B
Workers' Compensation	USD 36B
Total Insured Loss	USD 40B

Assumption: *62% take-up rate for Commercial Property; 100% take-up for Workers' Comp.*
Note: *Attack simulation shown in images for illustrative purposes only.*

TRIA Case Study: Loss Sharing Comparison for USD 40B Insured Loss Under Different TRIA Designs

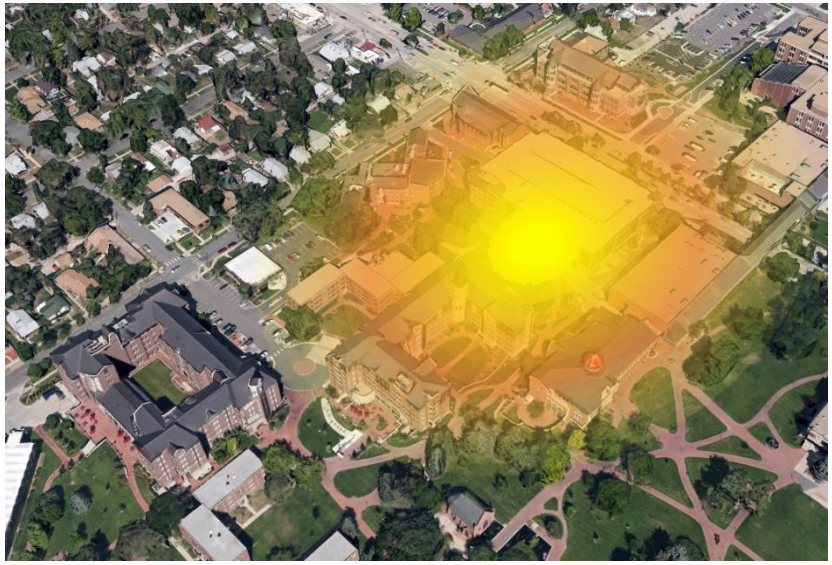


Total Insurer Deductible	**USD 20B**	**USD 20B**	**USD 20B**	**USD 20B**
Insurer/ Federal Co-Share	**15% / 85%**	**20% / 80%**	**20% / 80%**	**15% / 85%**
Industry Retention (for mandatory recoupment)	**USD 27.5B**	**USD 37.5B**	**USD 38B**	**USD 38B**
Rate of Recoupment	**133%**	**135.5%**	**150%**	**150%**

**Based on Senate and House of Rep.'s position as of October 21, 2014*

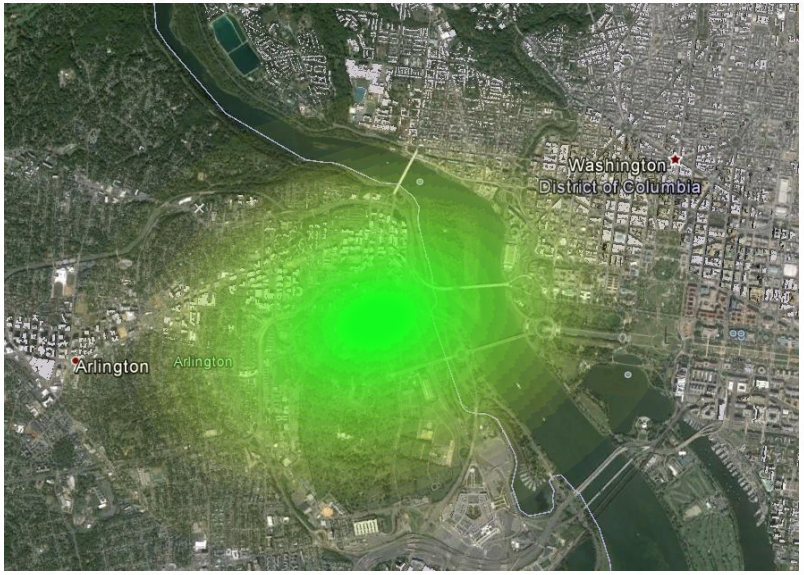
TRIA Case Study: USD 150 Billion CBRN Terror Attack Insured Loss

50 kilotons Nuclear Attack Denver, CO (University of Denver)



Commercial Property	**USD 3B**
Workers' Compensation	**USD 147B**
Total Insured Loss	**USD 150B**

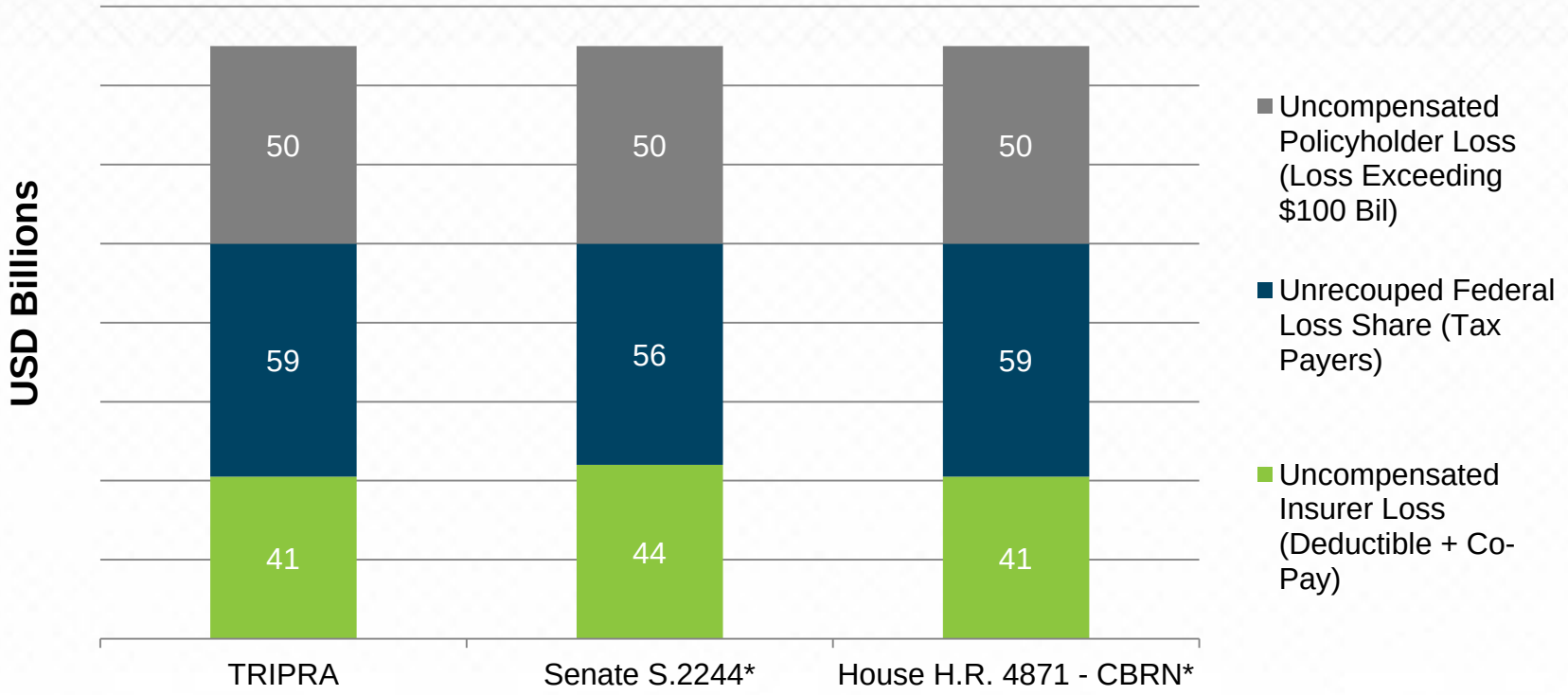
100 kg VX Attack Arlington, VA



Commercial Property	**USD 149B**
Workers' Compensation	**USD 4B**
Total Insured Loss	**USD 153B**

Assumption: *62% take-up rate for Commercial Property; 100% take-up for Workers' Comp.*
Note: *Attack simulation shown in images for illustrative purposes only.*

TRIA Case Study: Loss Sharing Comparison for USD 150B CBRN Insured Loss Under Different TRIA Designs



Total Insurer Deductible	**USD 30B**	**USD 30B**	**USD 30B**
Insurer/ Federal Co-Share	**15% / 85%**	**20% / 80%**	**15% / 85%**
Industry Retention (for mandatory recoupment)	**USD 27.5B**	**USD 37.5B**	**USD 38B**
Rate of Recoupment	**133%**	**135.5%**	**150%**

**Based on Senate and House of Rep.'s position as of October 21, 2014*

Summary

- Companies can use AIR's terrorism modeling solutions to estimate property and casualty losses resulting from a full range of potential terrorist attacks
- Best practices for managing terrorism risks using Touchstone should include:
  - Exposure management using Geospatial Analytics and Hazard Analytics Modules
  - Deterministic Modeled Loss Scenarios
  - Probabilistic Loss Analysis
- Terrorism is a highly dynamic peril; expert operational threat analysis ensures ongoing accuracy of model
- To ensure the continued protection of the commercial P/C insurance industry, TRIA must be extended beyond 2014

Additional Reading on the AIR Website

For More Information

Contact AIR for information about software and consulting solutions to help manage terrorism risk:

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