

## **TESTIMONY ON TERRORISM INSURANCE RISK MODELING**

Dr. Gordon Woo

Catastrophist, Risk Management Solutions Inc.

United States House of Representatives, Committee of Financial Services,

2129 Rayburn House Office Building, Washington DC 20515

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### **EXECUTIVE SUMMARY**

Terrorism has become and will remain a catastrophe insurance risk. The possibility of a malicious aircraft impact in a central business district of a major U.S. city will exist as long as there is air travel. The private sector market for any catastrophe insurance peril requires risk to be quantified. To meet this need, catastrophe insurance modeling has progressed from covering earthquakes and hurricanes in the 1990s to terrorism after 9/11.

In 2002, when the Terrorism Risk Insurance Act (TRIA) was introduced, and subsequently, when TRIA was reauthorized in 2005 and 2007, some attention was given to terrorism insurance risk models, but experience was still too limited for them to be accorded much weight. Now, in September 2013, with a doubling of experience since 2001, terrorism insurance risk modeling has attained a level of capability, validation and maturity to make a more notable contribution to the discussion over the future of TRIA.

What has become clearer since 2007 is that terrorism risk is as much about counter-terrorism action as about terrorists themselves. U.S. terrorism insurance is essentially insurance against the failure of counter-terrorism. This is true not just in the U.S.A., but across the western alliance: Canada, Western Europe and Australia. Numerous terrorist plots are developed, but the vast majority are interdicted through the diligence of western intelligence and law enforcement agencies. Mass surveillance of communication links, and the intrusion of intelligence moles, elevate the likelihood of plot interdiction with plot size.

The ambitious plots that might have the potential to cause massive insurance loss would tend to involve a significant number of operatives, and thus be very prone to interdiction: too many terrorists spoil the plot. Attacks by a lone wolf, or a pair of operatives such as the Boston bombers, may be horrific acts of murder and destruction, but they are unlikely to cause large catastrophe insurance payouts.

An earthquake is a deadly and destructive force of Nature, but it is not a crime. After the tragic Japanese tsunami of March 2011, a Japanese boy asked why the earthquake that caused the tsunami could not be arrested. Terrorism is a crime. Terrorists can be arrested in a way that earthquakes and hurricanes cannot. Whereas Katrina and five other hurricanes could strike the U.S.A. in 2005, the possibility of a wave of successful terrorist attacks throughout a single year is extremely remote because of the prompt and vigorous counter-terrorism response that would inevitably follow any successful attack. Once aware of the appalling 2005 London bombing death toll, Prime Minister Blair responded that ‘this changes everything’. And it did, particularly in more robust counter-terrorism legislation and counter-radicalization initiatives.

With every terrorist brought to justice, the evidence of counter-terrorism control of loss volatility is accumulating across the western alliance. Progressively, the courtroom record of terrorism convictions, combined with low terrorism insurance losses, should encourage cautious expansion of the U.S. terrorism insurance market.

However, terrorism risk is not geographically diversifiable. In striving to maximize loss impact, subject to counter-terrorism security constraints, terrorists predominantly choose iconic targets with name recognition in populous urban centers. There is thus a steep threat gradient outside New York and Washington D.C., and other major American cities. Hurricane insurance is required all along the East coast, in suburban and rural areas as well as cities. But unlike hurricanes, terrorists intentionally focus on striking the crowded centers of large cities. Furthermore, Al Qaeda seeks to use whatever means, including weapons of mass destruction, to inflict maximum loss, which might be far beyond private sector market capacity.

The lack of geographical diversification inherently limits the insurance market capacity for covering terrorism risk in the central business districts of Manhattan and other main metropolitan areas. A key ongoing challenge for future terrorism insurance market development is the lack of capacity in some prominent zip codes.

Market pricing and capacity depend not just on past loss experience, which has been low since 9/11, nor just on the estimated average loss, but also on the perception of the uncertainty in risk estimation. In contrast with natural hazards, terrorism risk analysis is not learned in college or professional insurance courses. Unless insurers are otherwise informed about counter-terrorism effectiveness, uncertainty is instinctively presumed to be very large compared with natural hazards.

Terrorism risk modelers thus have an important educational role in guiding the perception of uncertainty through analysis of the key risk factors, such as terrorist plot interdiction. Such analysis is not common public knowledge because security agency staff, with several notorious exceptions, take pride in serving in silence.

The federal government has a permanent implicit involvement in terrorism insurance in providing extensive counter-terrorism resources to stop terrorists before they move to their targets. These resources have been deployed very effectively since 9/11. Continued proficiency of counter-terrorism action provides a solid security platform for future development of the terrorism insurance market, and potentially also risk transfer to the capital markets, provided that a government backstop is in place for the most extreme losses.

### **THE INTERDICTION OF TERRORIST PLOTS**

For terrorism as with natural hazards, a catastrophe insurance risk analyst's task is to assess the likelihood of an event occurring, not to predict, let alone prevent, an event. This is the responsibility of the intelligence and law enforcement agencies. In leaving office as FBI director after 12 years of distinguished service, Robert Mueller thanked his staff: *'Through their hard work, their dedication and their adaptability, the FBI's better able to predict and prevent terrorism and crime'*.

The annual frequency of terrorist attacks against the U.S. homeland is quite narrowly bounded, being tightly constrained by intelligence and law enforcement vigilance. The high interdiction rate of terrorist plots against the countries of the western alliance can be understood through an analysis of social networks. Many audacious terrorist plots may be imagined; but the actual scale of any real terrorist plot is fundamentally restricted by the connectivity of social networks. A terrorist plot can be readily compromised through leakage of information.

RMS Inc. has estimated that a plot involving as many as ten operatives has only a slim 5% chance of avoiding interdiction. This is corroborated by the injunction of Osama bin Laden from his Abbottabad hideout that plots against the U.S. homeland should not involve more than ten operatives. With the intensive global surveillance conducted today by western intelligence agencies, a plot involving as many as 19 hijackers or bombers would have only a minimal chance of eluding their attention. This is of course the very purpose of such surveillance – to stop 9/11 happening again.

Lone wolf attacks are the most likely to evade interdiction, but the least likely to cause massive catastrophe insurance loss. Next, plots involving two terrorists may have a reasonable chance of succeeding, especially, as in Boston, when the operatives are brothers, with just one family as a potential leakage source. Ambitious plots with the potential to cause catastrophe insurance losses would generally need to involve a sizeable number of people to be technically and operationally effective and successful. In particular, it should be recognized that large complex plots requiring numerous operatives, e.g. 5 ton truck bombs and weapons of mass destruction, would only have a slight chance of being successful.

Risk-based estimates of potential loss, taking account of scenario likelihood, might support enhanced insurance cover in central business districts of major cities. To take a seismic risk analogy, earthquake insurance capacity in Manhattan would be substantially reduced if loss aggregation were based on a rare Magnitude 7 earthquake scenario, that might cause an economic loss of several hundred billion dollars.

The plot that would have caused the largest U.S. terrorism catastrophe insurance loss since 9/11, had it not been interdicted, was masterminded from Britain by Dhiren Barot. This ambitious 2004 plot targeted important iconic buildings in New York and Washington D.C.. Had it succeeded, the insured loss might have been of the order of \$10 billion. But this plot was interdicted: Barot and his team of seven accomplices were arrested, convicted and jailed.

Only a handful of major terrorist plots in countries of the western alliance have not been interdicted since 9/11. For the U.S.A., before the Boston marathon attack on April 15, only three major plotters were not foiled: the aircraft shoe bomber, Richard Reid, in December 2001; the aircraft underpants bomber, Umar Farouk Abdulmutallab, in December 2009; and the Times Square vehicle bomber, Faisal Shahzad, in May 2010. In U.K., there have been the London transport bombings of July 7, 2005 and July 21, 2005, and an attempted vehicle bombing of a nightclub in the London theater district in June 2007.

In U.K., as in the U.S.A., the advanced professional tradecraft in plot detection and tracking means that terrorism insurance is essentially insurance against the failure of counter-terrorism. Government reinsurance over the maintenance of effective counter-terrorism programs should reduce a major source of uncertainty in the minds of terrorism insurers.

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## TERRORISM IS A CONTROL PROCESS

Flexible and rapid counter-terrorism threat response reduces the volatility in insurance loss potential.

- **Terrorism is NOT just about terrorists.**
- Terrorism is a deadly strategic game where terrorist action is opposed by counter-terrorism force.



In countries of the western alliance, including USA, Canada and Western Europe, which have extremely proficient intelligence and law enforcement services, terrorism is controlled.

# Suppressive counter-terrorism action as a response to terrorist attacks

- Security is ratcheted up to prevent another terrorist attack.
- Targets are hardened.
- More security staff are hired.
- More informants are recruited by the security and law enforcement services to obtain early warning of future plots.

# The principles of terrorist modus operandi

- Terrorists seek to maximize loss, subject to security changes.
- Terrorists follow the path of least resistance in their operational planning.
- Terrorists are members of social networks, which are under surveillance from counter-terrorism intelligence and law enforcement services.



# Social network plot constraints



**For terrorism in countries with effective intelligence services, hazard events are subject to the universal law of social networks, which apply as much to terrorists as to other groups in society.**

# Meta-data mining of conspiracies

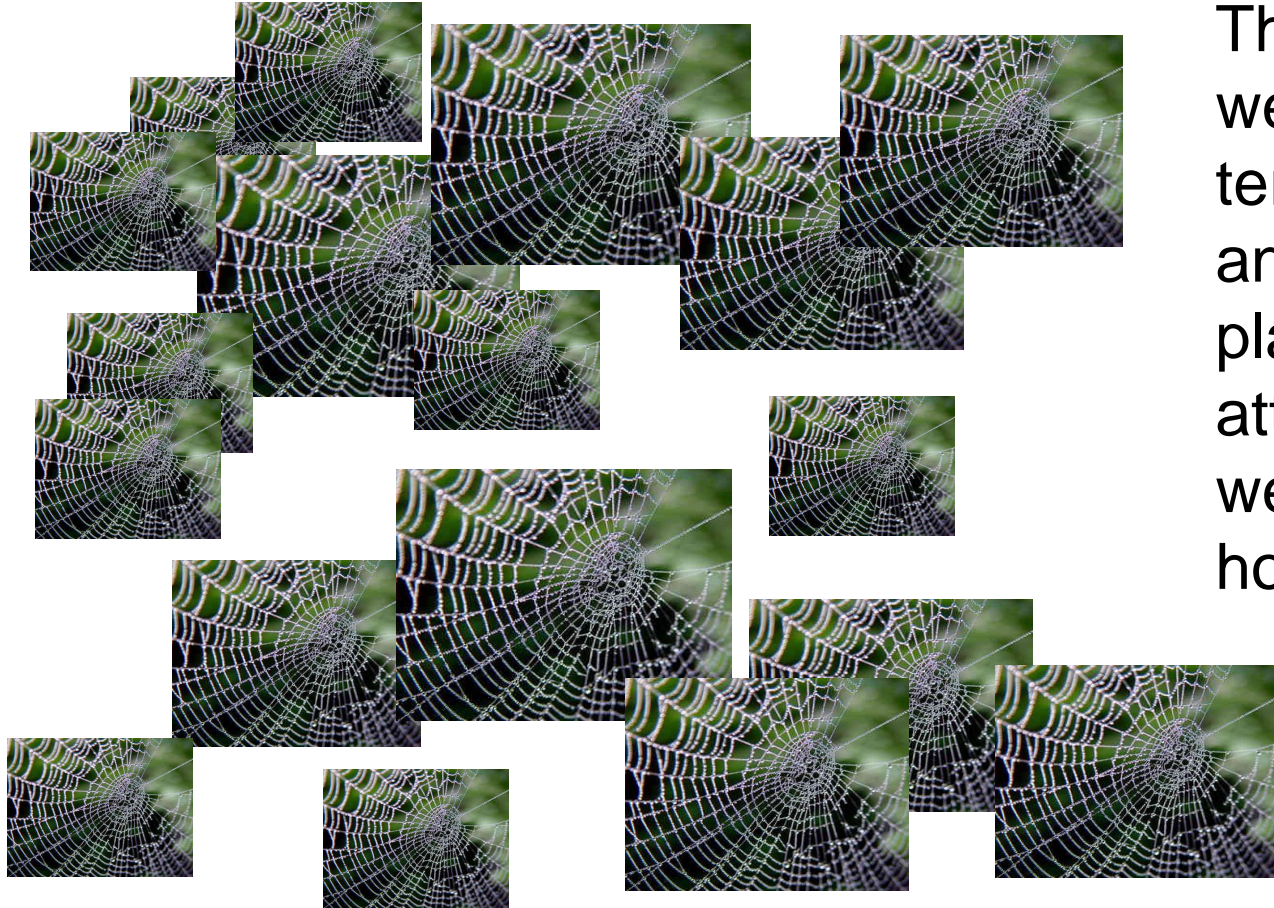
*“Analysts start with a suspect and spider-web outward, looking at everyone he contacts, and everyone those people contact, until the list includes thousands of names.*

*Before individuals are actually wiretapped, computers sort through flows of meta-data , information about who is contacting whom by phone or e-mail.”*

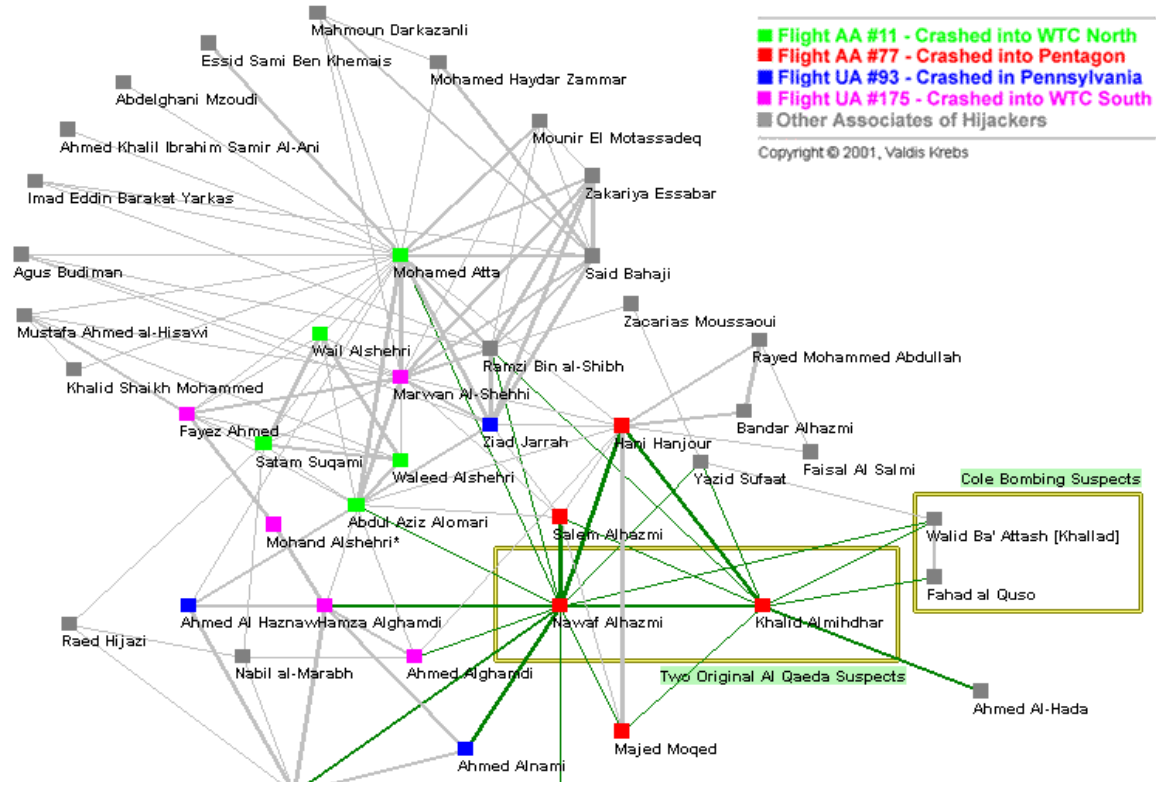
Ex-NSA staff member



# Spanning the webs of known terrorists



The aggregated webs of known terrorists close in on any operatives planning new attacks against western alliance homelands.



All nineteen 9/11 hijackers were within 2 degrees of separation from two original suspects uncovered by CIA in 2000.

# Social network downfall of Osama bin Laden

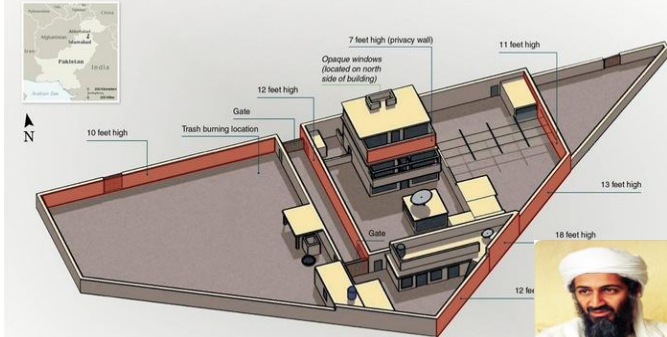


Old Friend

Intercepted  
catch-up  
phone call

Abu Ahmed al-Kuwaiti  
COURIER

Illustration of Abbottabad Compound





# Too many terrorists spoil the plot

Through indiscretion, each contact may provide an entry point into a plot network. The probability that a conspiracy is not compromised is the product of the likelihood of non-discovery by any external contact.

| Cell Size                     | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|
| Plot Interdiction Probability | 0.26 | 0.46 | 0.60 | 0.70 | 0.78 | 0.84 | 0.88 | 0.91 | 0.93 | 0.95 |

*‘For a large operation against the US, pick a number of brothers not to exceed ten...’*

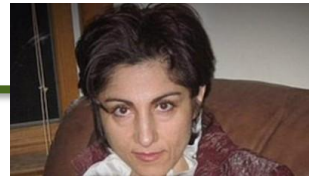
*Osama bin Laden*

# Tamerlan and Dzhokhar Tsarnaev

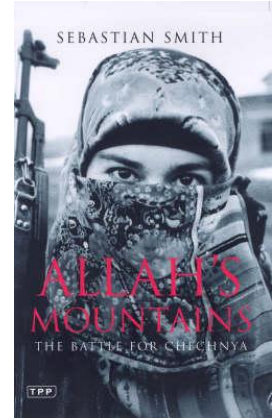
To minimize your social network footprint,  
if you can't carry out the plot as a lone wolf, the  
next best strategy is to enlist your kid brother....



William  
Plotnikov



Zubeidat  
Tsarnaev

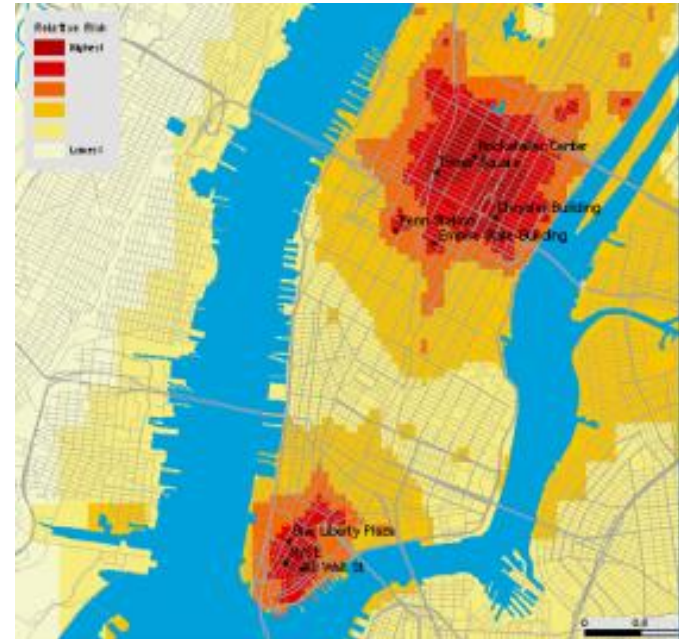


**FSB**

# Concentrating force at crucial points

*'It's been said that when you find a terrorist, he'll have a map of New York City in his back pocket.'*

*Mayor Bloomberg  
(following Times Square bomb plot  
of May 1, 2010)*

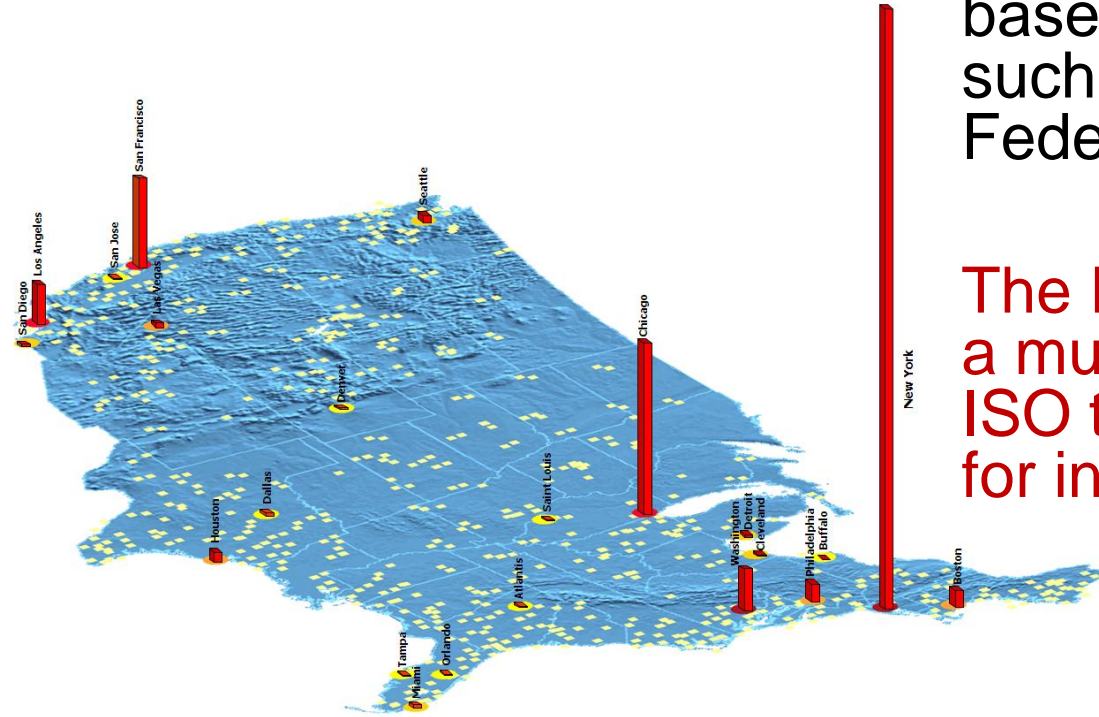


Dzhokhar Tsarnaev told the FBI that he and his brother had intended to drive to New York and detonate additional explosives in Times Square.



The 2002 RMS model challenged the 'population-based' assessments of risk, such as those used to distribute Federal funds.

The RMS model contrasted with a much flatter gradient of the ISO terrorism rating by zip code for insurance.



The heartland theory suggested that terrorists might concentrate their attacks in small towns, so that no American could feel safe.

# Post 9/11 bomb plots targeted at major commercial buildings

2004: **New York, Newark NJ and Washington DC** offices (Dhiren Barot)

- Operation Rhyme originating in UK

2006: Sears Tower, **Chicago** (Narseal Batiste)

- Conspiracy of seven from Liberty City, Miami

2009: 60-story skyscraper in **Dallas** (Hosam Smadi)

- FBI vehicle bomb sting operation

2010: Times Square, **New York**, bomb (Faisal Shahzad)

- FBI exploded a correctly constructed version of the bomb.

2010: Pioneer Courtyard Sq., **Portland**, (Osman Mohamud)

- FBI vehicle bomb sting operation

# Precise terrorist targeting of high-value properties

- With the centers of the principal US cities being the prime focus of terrorism, there is a heavy concentration of exposure at risk that is only weakly diversifiable across the country.
- Commercial insurers cannot build a significant book of business without including a high proportion of exposures in these areas.
- This leads to substantial adverse selection: the strongest demand for terrorism insurance comes from the principal cities.

# No bound to potential destruction

- The proclaimed ambition of terrorist plot destruction has no upper bound.
- An early version of the 9/11 plot involved additional planes flying into high-rise buildings in Chicago and Los Angeles.
- The 2006 liquid explosives aviation plot targeted the destruction of seven passenger planes over North America.
- There is no intrinsic finite limit to the catastrophe scale of property and casualty losses from a terrorist attack.

# Insurance against counter-terrorism failure

- Whatever behavioral moves a terrorist organization makes can be countered by agile and adaptive western security and law enforcement services.
- A successful terrorist attack can only happen if there is some failure of the counter-terrorism forces.
- Terrorism insurance in countries of the western alliance is essentially insurance against counter-terrorism failure.

# 'Known Knowns' of terrorism risk

- Terrorism has become and will remain a catastrophe risk.
- Terrorists have the ambition to inflict maximum loss, with no limit to the scale of property or casualty loss.
- Terrorists deliberately target properties in principal cities with very high insured value.
- But terrorism is subject to counter-terrorism control.