Empirical Data to Guide Risk Mitigation: Examples from MTI Database

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Briefing Objectives

- Outline why empirical data – & the trend analyses, case studies and models they empower - can help decision-makers manage risk – including catastrophic risks - *and* point out their limitations.

- Outline MTI's Database on Terrorist Attacks Against Public Surface Transportation, its case studies and trend analyses.

- Share a few thought-provoking examples of empirical data from the MTI Database:
  - On All Attacks
  - On Attacks against HSR versus Non-HSR Targets
  - On Jihadist Attacks and All Attacks in "Western Cities"

Why Is Empirical Data Important?

- Truth Serum: Challenges sometimes unspoken assumptions about attacks that can lead to risk-*enhancing* decisions. Requires us all to think through very complex issues.
  - Example: Current thinking may focus catastrophic attacks. But past attacks – i*ncluding* successful jihadist ones – strongly suggest future attacks aimed at modest body counts.

- Essential for Key Products: Trend analyses and case studies illuminate for decision-makers *similar but not identical* situations. Quantitative models *can help* decision-makers estimate outcomes and consequences.

- What's the Alternative?
  - Ignore the past and repeat it?
  - Base actions only on political costs and benefits?

Caveat Emptor

- Empirical data, analyses, case studies and models are *not* predictive: *No two risk challenges are the same.* However, in-depth understanding of past attacks/attackers is critical

- Databases and data *are* biased
  - Original data ambiguous which necessitates rules on what to count and how. This skews results.
    - What is a public surface transportation target?
    - When does a bomb detonate on target, instead of away from the target?
    - When is an attack an attempted derailing?
  - Organizations must allocate limited resources to serve specific customers
    - A focus on accurate binning of terrorist groups may not be compatible with detailed transport target analysis. Funding and customer needs influence database design and what its researchers explore in depth.
    - Human Capital choices (who you hire): SME backgrounds enhance certain analyses and limit others.

Examples of MTI's Products Strengthened by Empirical Analysis

- Case Study: *Attacks Against the TGV (2010)*
- Training: NTSCOE *Bus Operator Security Program*
- DHS Training Support: Data analysis provided to TSA's Front-line Bomb Appraisal Officers
- In Process:
  - Case Studies of Attacks against Israeli Bus Targets
  - High Speed Rail Security and Safety Project
  - Threat Scenarios for UCASS Models
  - Analysis of Plots against Public Surface Transport Targets

MTI's Database: Designed For Transportation Security Analysis

- History
  - Pre-9/11: Seminal Chronologies by Brian Michael Jenkins.
  - July 2009: Detailed analysis of UMSTART and other gov't lists yielded preliminary analyses based on 1,049 attacks
- Today:
  - Numbers (**as of 3/24/2011**): 2, 927 attacks of which 74% used explosive or incendiary devices.
  - By Primary Target Groups: Bus: 48%; Passenger Train: 26%; Freight Trains & Stations: 3%; Railway Tracks: 13.5%; Highway Infrastructure: 7.6%.
  - Sources: MTI Chronologies, RAND Core Data, UMSTART through 2008, NCTC WITS NEX GEN: 2004-9/2010, and ***daily*** open Source Searches.
  - Platform: Microsoft Access with custom calculations for average and median fatalities per attack *and* per device.
  - Detailed Data Fields/Values Allow Complex Analyses: Targets (56 Values); Attack Methods (52 Fields, 21 specific to bombs); Delivery Methods for Bombs: 25; Outcomes of each device: 7.
- Bottom Line: MTI's Database is a "Mother of all Known Databases" Database

MTI Database Examples: All Attacks

- **WHERE**: Attacks - *and* the most lethal ones - occur *outside* of the West
  - Looking at top 20 countries (86% of all attacks):
    - 60% occur in non-western countries (33.4% occur in Pakistan & India Alone)
    - 26% occur in western countries
  - Most Lethal Attacks in Non-Western Countries
    - 8.3 FPA in Sri Lanka
    - 8.0 FPA in China
    - 5.4 FPA in Algeria
    - 3.4 FPA in India
    - 2.9 FPA in Israel
    - 2.2 FPA in Russia
    - 1.6 FPA in Spain
    - 0.9 FPA in UK
    - 0.6 FPA in France

MTI Database Examples: All Attacks (con't)

- **What:** More attacks against bus targets (48.4%) than train targets (26.1%) BUT train attacks are more lethal:
  - 5.3 FPA in Attacks on Trains
  - 3.4 FPA in Attacks on Buses
  - 2.6 FPA in Attacks in Train Stations
  - 1.6 FPA in Attacks in Bus Stations

MTI Database Examples: All Attacks (con't)

- **How**: 74% of attacks involve bombs but these **not** the most lethal
  - 2.57 FPA for All Bomb Attacks
  - 2.82 FPA for All Non-Bomb Attacks
- **How are Bombs Delivered**: Suicides are a small % of all bomb deliveries; most lethal against train targets:
  - Nearly 10% of all bomb attacks against bus targets are suicides causing **2.5 times** their proportional share of deaths
  - Only 2.3% of all bomb attacks against train targets are suicides but they cause **6.2 times** their proportional share of deaths
- **How Lethal are Attacks**: 71% of attacks kill no one
  - Attackers are inept, stopped, or the attacks are designed to disrupt, not to kill.
  - Data yields low average and zero median fatality rates.
  - Catastrophic attacks <u>have not</u> happened; most successful attacks have modest body counts.

Database-Empowered : Lethality Compared to Civil Air Transport since 9/11

- Airliners and airports remain a Jihadist obsession
  - 75 attacks outside of Afghanistan, Somalia and Iraq killed 157
  - Most killed no one (2.0 FPA)
  - Most lethal were 2004 twin Moscow suicide bombings killing 88
- But since 9/11, more attacks ***and*** more lethal attacks against public surface transport
  - 1,738 attacks, mostly against train and bus targets, killing **3,749**
  - Most killed no one (3.7 Bus FPA, 4.1 Train FPA)
- While Lockerbie reminds us of the consequences of in-flight hull loss, a train and even bus attack can cause a large loss of life
  - 11 public surface transport attacks resulted in 50 or more deaths
  - 3 public surface transport attacks caused just under 200 deaths

MTI Database Examples: HSR and Non-HSR Attacks

Type of Rail	# of Attacks	FPA	% Bombs	% Derailments	% Detonated on Target	% Rendered Safe
HSR	22	2.0	77%	41%	45%	22%
Non-HSR	423	5.2	84%	25%	71%	15%

- HSR attacks concentrated in HSR countries, non-HSR attacks spread across many countries reliant on train transport
- HSR attacks less lethal (most deaths come from 2009 Nevsky Express attack)
- HSR attacks involve a higher % of attempted derailment, and achieve a lower % of successful detonation. This may be due to the of location of attacks and/or better security

MTI Database Examples: Jihadist and Major City Attacks

- **Lethality**: Jihadist Attacks Most Lethal – A Troubling Development

Type of Attack	# of Attacks	% No Deaths	% > 25 Deaths	% ≥ 50 Deaths
Jihadist	83	40.0%	9.8%	6.1%
Non-Jihadist	2,844	72.0%	1.7%	0.6%
Western or Analogous Cities	257	85.2%	2.7%	1.6%
In Sri Lanka & Israel	268	54.5%	2.2%	1.1%
In Sri Lanka	81	44.4%	7.4%	3.7%

Examples from MTI Database: Jihadist and Major City Attacks

- **Suicides**: Jihadists use suicides more often than non-Jihadists but achieve fewer gains in lethality

Type of Attack	% Attacks Suicides	% Train Attacks Suicides	Increase in Lethality	% Bus Attacks Suicides	Increase in Lethality
Jihadist	14.5%	8.7%	1.05 X	18.0%	.6 X
Non-Jihadist	4.5%	2.0%	7.6 X	9.6%	2.7 X

MTI Database Examples: Jihadist Attacks: Most Commonly Used Delivery Methods

Delivery Method	Non-Jihadist		Jihadist		Major City	
	Avg FPD	Median FPD	Avg FPD	Median FPD	Avg FPD	Median FPD
Carried on Person	7.4	5.0	5.4	0.5	7.2	4.0
Placed in Pax Compartment	3.0	0.0	9.8	4.0	1.8	0.0
Placed in Pax Compartment, Leave-Behind Bag	1.8	0.0	11.2	14.7	8.0	14.7
Concealed inside Station	1.8	0.0	1.8	0.5	2.3	0.0
Concealed outside Station	1.7	0.0	3.0	3.0	0.0	0.0
Placed on Vehicle Road	1.4	0.0	4.8	1.7	0.3	0.0
Placed on Rail Tracks/Bridges	1.1	0.0	1.6	0.0	0.1	0.0
Placed near Bus/Other Target	4.1	0.0	3.5	3.1	0.0	0.0
Physically Thrown	0.3	0.0	1.5	1.5	0.1	0.0
Concealed/Placed inside Station, Toilet, Locker, etc.	0.3	0.0	0.0	0.0	0.3	0.0
Concealed/Placed at Bus Stop	0.7	0.0	None	None	0.8	0.0

Jihadist Utilization of a Delivery Method is Usually, But Not Always, More Lethal

MTI Database Examples: Jihadist Delivery Methods

"Leave Behind" Delivery most lethal; Suicide Delivery Not most Lethal

Concealment/Delivery Method	% of total Devices	Average FPD	Median FPD
Placed in Pax Compartment	24.2%	9.8	4.0
Placed in Pax Compartment, Leave-Behind Bag	19.2%	11.3	14.7
Placed Near Bus or Other Target	14.2%	3.5	3.1
Placed on Vehicle Road	11.7%	4.8	1.7
Carried on Person (Suicide)	11.7%	5.4	0.5
Placed on Rail Track or Bridge	6.7%	1.6	0.0
Placed Inside of Station	5.0%	1.8	0.5
Physically Thrown	3.3%	1.5	1.5
Placed outside of Station	1.7%	3	3
Placed outside of station in Trash Bin or Other Container	0.8%	0	0

MTI Database Example: Jihadist Bombs on Target Increase Lethality More

Method	JH FPD	JH FPDE	+/-	% +	Non-JH FPD	Non-JH FPDE	+/-	% +
Placed in Pax Compartment	4.0	5.0	+1.0	25%	0.0	1.0	+1.0	+~
Placed on Vehicle Road	1.7	3.00	-1.3	-76%	0.0	0.0	0.00	0%
Leave-behind bag in Pax Compartment	14.7	38.2	+23.5	159%	0.0	0.0	0.0	0%
Carried on Person	0.5	17.3	+16.8	3600%	5.0	7.0	+2.0	40%
Placed on Rail Track/Bridge	0.0	0.0	0.0	0%	0.0	0.0	0.0	0%
Placed inside of Station	0.5	3.0	+2.5	500%	0.0	0.0	0.0	0%
Placed outside of Station	3.0	3.0	0.0	0%	0.0	0.0	0.0	0%
Placed Near Bus or Target	3.1	3.1	0.00	0%	1.0	0.0	0.0	0%
Physically Thrown	1.5	1.00	-0.5	-33%	0.0	0.0	0.0	0%