Explosives and Incendiaries Used in Terrorist Attacks on Public Surface Transportation: A Preliminary Empirical Examination

MTI Report WP 09-02

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EXPLOSIVES AND INCENDIARIES USED IN TERRORIST ATTACKS ON PUBLIC SURFACE TRANSPORTATION: A PRELIMINARY EMPIRICAL EXAMINATION

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16. Abstract

This report provides data on terrorist attacks against public surface transportation targets and serious crimes committed against such targets throughout the world. The data are drawn from the MTI database of attacks on public surface transportation, which is expanded and updated as information becomes available. This analysis is based on the database as of February 20, 2010. Data include the frequency and lethality with which trains, buses, and road and highway targets are attacked; the relationship between fatalities and attacks against those targets; and the relationship between injuries and attacks against them. The report presents some preliminary observations drawn from the data that can help stakeholders—governments, transit managers, and employees—to focus on the ways the most frequent and/or most lethal attacks are carried out as they consider measures to prevent or mitigate attacks that may be considered likely to happen in the United States.

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INTRODUCTION

This interim report, produced by the Mineta Transportation Institute's National Transportation Security Center (MTI/NTSC), a National Transportation Security Center of Excellence (NTSCOE) for the Department of Homeland Security (DHS), provides data on terrorist attacks involving explosives and incendiary devices against public transportation targets throughout the world and presents some preliminary observations drawn from those data. The report is part of MTI/NTSC's contribution to the Interagency Counter-IED (improvised explosive device) Working Group managed by DHS. The Working Group began its work in 2008; MTI has been and will remain an active member.

The data presented here are drawn from the MTI database of attacks on public surface transportation, to which additional incidents are added either as they occur or as they are painstakingly culled from existing collections that do not focus specifically on transportation security. On November 12, 2009, the database contained 1,384 attacks. Over the next three months, the database grew to 1,648 attacks, an average of 88 attacks a month. MTI is currently incorporating hundreds of attacks from the 1,700 transportation-attack entries in a chronology maintained by the RAND Corporation, which has graciously provided the data to MTI. The analysis in this report is based on the database as of February 20, 2010; the most recent attack included was the attempted bombing of a train station on February 12, 2010, in West Bengal, India.

Many of the charts in this report were used in a presentation to the DHS Counter-IED Working Group on November 12, 2009, but they have been updated, and some calculations have changed. The original charts are reproduced in the Appendix. The full database was also briefed to the TSA/FTA Safety and Security Roundtable on July 14, 2009, in Portland, Oregon. The briefing to the Counter-IED Working Group focused on bomb attacks, with the emphasis on bomb attacks against train targets. Since then, additional data on bus targets have been included to provide broader treatment.

The charts have been improved by combining average lethality calculations with distribution calculations. They now show not only where, against what, and how most attacks take place, but also which of the attacks are most lethal. For all attacks, lethality is calculated as average fatalities and injuries per attack (FPA and IPA); for attacks involving explosives or incendiaries, lethality is calculated as average fatalities and injuries per device (FPD and IPD).

For ease of discussion, we use the term "bomb attack" to refer to attacks that involve the use of both explosives and incendiary devices. Incendiary devices, the most famous of which is the Molotov cocktail—a crude device consisting of gasoline in a bottle with a flaming cloth as a timer and detonator—have been used with surprising lethality against transportation targets. In a 2007 attack on the "Peace Train" at Dewanna, India, four devices killed 68 people and wounded 50. Official government assessments have noted that when explosives become difficult to acquire, terrorists turn to incendiaries to create fires.

This interim report will be revised and peer-reviewed and will be published as a formal MTI report in spring 2010. The charts will be updated, based on MTI's most current data, and some of the preliminary conclusions in this study probably will change.

THE MTI DATABASE

OVERVIEW

MTI/NTSC started publishing chronologies of attacks on public surface transportation in 1997. These chronologies, which included some, but not all, such attacks between 1920 and 2000, were published in two MTI reports, the first in 1997[1] and the second in 2001.[2] These seminal publications on public surface transportation security helped to inform Congress; federal, state, and local government agencies; and transit operators. Serious criminal attacks were included because terrorist groups observe and learn from criminal tactics and also sometimes conduct criminal actions to finance their operations.

In 2009, MTI/NTSC began creating a database that includes its own chronologies and all attacks captured in the second release of the Global Terrorism Database (GTD) created by the National Consortium for the Study of Terrorism and Responses to Terrorism (START), based at the University of Maryland, a DHS Center of Excellence. The entries in this database, which we refer to as UMSTART, contain narratives of the details of surface transportation attacks between January 1, 1998, and December 31, 2007. MTI/NTSC regularly updates its database to include attacks found in lists created by U.S. and other government and industry entities. The lists either are not specifically designed for transportation threat and security analysis or lack details and require painstaking analysis and interpretation to sort aspects of each attack into sets that will facilitate trend analysis. The MTI database also includes attacks identified through open source searches, as well as attacks that are not captured in other lists. It seeks to include all attacks starting in 1970; its record of attempted train derailments goes back to 1920, and its most recent entry was an attempted bombing of a train station on February 12, 2010, in West Bengal, India.

Figure 1 summarizes the number and types of attacks in the database as of February 20, 2010. All attacks include terrorist attacks and serious crimes involving all methods, from arson and robbery to rocket-propelled grenades (RPGs) to grenades, mines, and unspecified improvised explosive devices (IEDs) to bomb attacks (attacks using only explosive or incendiary devices) against all public transportation targets. Attacks against public train, public bus, and public highway and road transportation targets are also considered separately. The time period covered is from 1970 to the present. The 181 derailment attacks in the database have been used to support a study on attempted derailments, particularly those relevant to high-speed rail transportation.[3]

The term “public” is important. The database does not include assassinations of individuals on trains, buses, or roads or attacks against private automobiles. The attacks recorded are those against assets created for use by the public, i.e., licensed trains or buses or constructed roads, bridges, and tunnels.[4]

Figure 2 lists the sources MTI has and will use, along with continuing data-collection efforts.

Since the database was first briefed on July 14, 2009, about 75 attacks have been added per month (Figure 3). Most of these additions came from concentrated searches of campaigns

against transportation targets in Israel, Russia, Turkey, India, Pakistan, Colombia, the Philippines, Indonesia, and Thailand, as well as the detailed review of various lists. MTI also gleans from two to four attacks a week from open sources. It is also examining the entries in the RAND Corporation chronology and will incorporate about 500 of those into the database.[5]

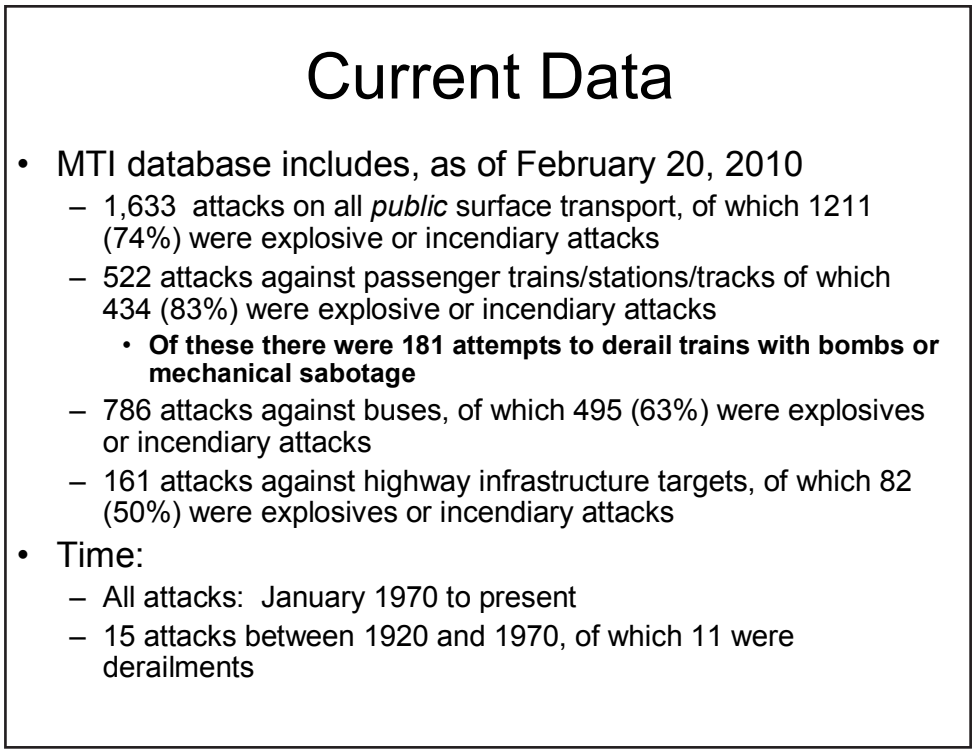

Figure 1

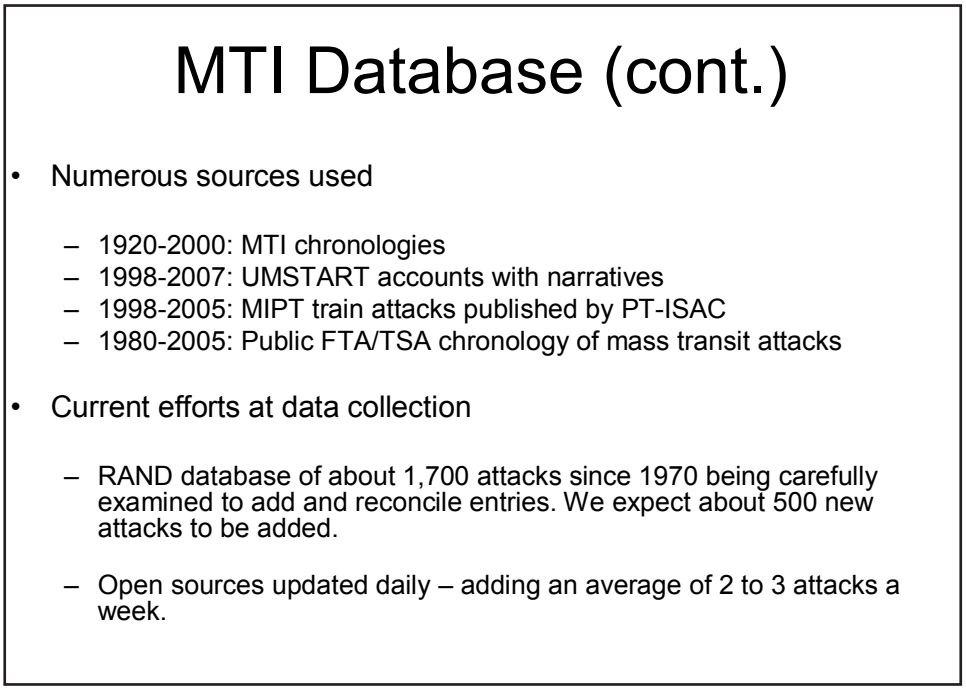

Figure 2

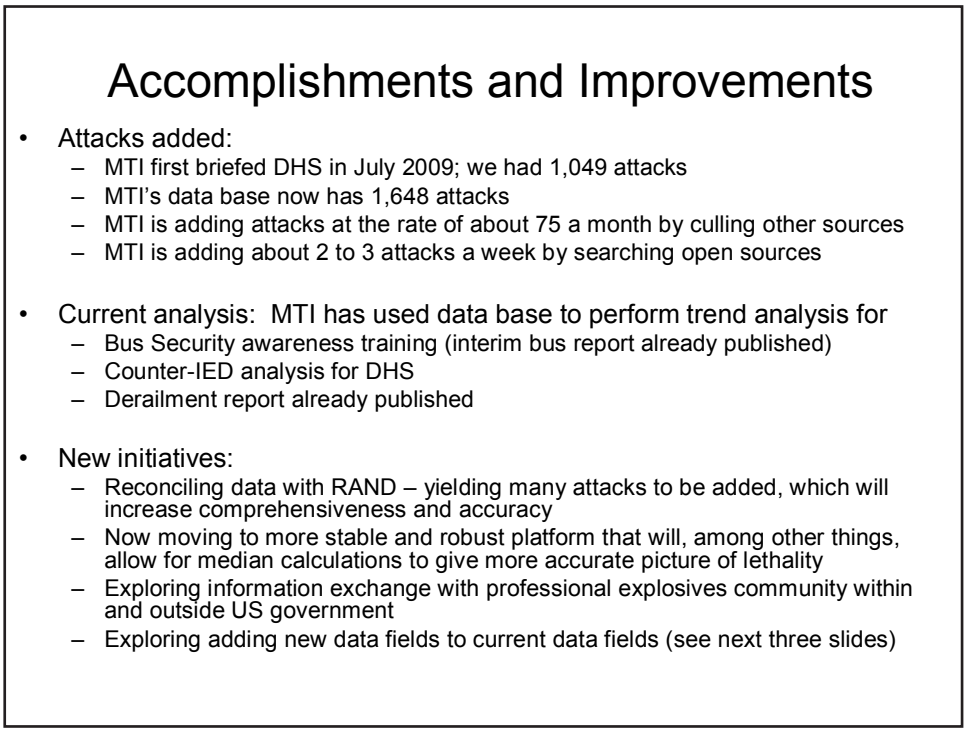

Figure 3

MTI is currently making the database more robust. It is working with explosives experts within and outside the government to increase and share information to enable better analyses of the effects of IEDs and improvised incendiary devices (IIDs). It is also testing the feasibility of adding new fields to a smaller set of data—including the data that will be used in the final MTI report on this topic. Those fields will require access to original data.

Finally, MTI is moving the database from its current Excel© platform to a platform that enables median calculations as well as mean (average) calculations to be conducted, to provide a truer picture of both the likelihood and the lethality of different kinds of attacks.

Figures 4 and 5 list some of the current fields in the system. They include 37 categories of targets and 26 categories of attacks and weapons, eight of which are considered "bombs or incendiaries." The database also has 16 categories of methods of delivering and concealing devices and six categories of outcome, e.g., whether the devices detonated on target and on time, malfunctioned, or were rendered safe.

New fields being tested for inclusion on entries of recent attacks, for which more detailed information is available, are listed in Figure 6.

As Figure 7 indicates, MTI is creating a unique resource. Current lists of terrorist attacks have inaccuracies or are not focused on transportation. With the addition of new entries from the RAND Corporation, the MTI database will contain more than 2,000 attacks. Consultations with officials in the United States, the United Kingdom, and Israel have reinforced our belief that we are creating a unique resource for government officials and transportation operators.

Some Current Fields

Targets (37 types):

- Bus (scheduled, school, tourist, government)
- Train (inter-city and commuter passenger, subway, trolley, elevated, government, tourist)
- Train infrastructure: track, bridge, tunnel, communications
- Stations (enclosed, open air) and bus stops
- Vehicle highway, road, bridge, tunnel

Weapon and Attack (26 types):

- IED & IID
- VBIED
- Assault automatic weapons
- Assault with RPG
- Arson
- Sabotage by derailing, or other sabotage
- Robbery, armed hijacking and kidnapping

Figure 4

Some Current Fields for Explosives

Explosives (8 types)

- **IED–unspecified**
- **Mines & Claymore mines**
- **Dynamite**
- **Grenades**
- **VBIEDS**
- **IIDs**
- **Other**

Location

- **Above or under ground**
- **In enclosed or open area**

Outcome (5 types)

- **Detonated or released on target**
- **Malfunctioned, detonated, released early or away from target**
- **Failed to detonate or release**
- **Detonated during unsuccessful EOD**
- **Rendered safe**

Delivery and Concealment (16 types)

- **On person (suicide)**
- **Left in bag or parcel in train or bus**
- **Left in station or bus stop**
- **Left outside station or bus stop**
- **Left in passenger compartment of train or bus**
- **Left in non-passenger compartment of train or bus**
- **Placed on tracks or near trains**
- **Placed near buses**
- **Physically thrown**
- **Other**

Figure 5

Some Future Data Fields

- **When attacks take place (peak versus off-peak)**
- **Size of cities in which attacks take place**
- **Type of train or bus, and type of service, and any other data on environment in which bombs detonate**
- **IED details: type and size of charge, type of detonator and timer**
- **Success in detecting attack/device:**
  - **Intelligence**
  - **Security personnel**
  - **Employees**
  - **Passengers**
  - **Canines**
  - **Technology**
- **Security measures before and after attack**

- **NOTE: Because accurate information is difficult to get, focus will be on more recent attacks and attacks in countries with more reliable public reporting.**

Figure 6

MTI Is Creating a Unique Resource

- Data exist on all terrorist attacks for periods of time (UMSTART and RAND); transportation details have to painstakingly culled out of data.

- Data exist on terrorist attacks against transportation for limited periods of time (MIPT and FTA/TSA list), but there are some inaccuracies.

- Consultations in the U.S. and abroad confirm that there is *no* known comprehensive list of accurate data that allows for empirical analysis of terrorist attacks against public surface transportation.

- With a database that will soon contain over 2,000 attacks and is refreshed daily, MTI is creating a unique resource for governments and transportation operators.

Figure 7

COMPARISON OF THE MTI DATABASE AND UMSTART

The MTI database does not compete with UMSTART; rather, it complements UMSTART. MTI's database is designed to allow for updated trend analysis of attacks on public surface transportation. UMSTART allows more-general analyses to be performed. The MTI database therefore serves a purpose that UMSTART does not provide because of its broad mandate and design.

Roughly 37 percent of the 1,633 attacks currently in the MTI database were obtained from UMSTART (which is credited as the source of the data). MTI also uses UMSTART's list of countries and regions, and for incidents for which it is the *sole* source, its information on fatalities, injuries, and perpetrators. Both UMSTART and the MTI database indicate whether attacks involve suicide and also provide other useful information. Most of the remaining 63 percent of the attacks come from MTI's own published chronologies, a few come from the National Memorial Institute for the Prevention of Terrorism (MIPT), many come from focused scans of open sources on particular campaigns, and an increasing number come from daily scans of news reports, a number that will inevitably grow.

But there are important differences.

First, MTI's database contains more early attacks against surface transportation and is continually being updated, whereas UMSTART's published data currently extend only to December 31, 2007.

Second, there are significant differences in the level of aggregation. UMSTART aggregates transportation attacks into two categories: transportation and aviation (airports and airlines). At the data analysis level, it does *not* distinguish between attacks against public buses, public trains, subway trains, and their stations and stops, or between highways, bridges, and tunnels. It also does not distinguish between attacks against public transportation and attacks against private citizens, or it does so inconsistently. Searching UMSTART for attacks against transportation will not capture all of those aimed at public surface transportation, nor will it allow the user to differentiate between train, bus, and road attacks. By contrast, MTI's database includes only attacks against public surface transport, and it differentiates between different types of public surface transportation targets. It therefore enables reliable data analysis on all terrorist attacks against public surface transport and against subsectors within it.

Third, UMSTART's data structure for targets and attacks is much less detailed than that in the MTI database**.** While UMSTART's data elements for targets relevant to public surface transportation are limited to "transportation," MTI divides its targets into 37 categories. UMSTART codes attacks into nine categories, whereas MTI codes them into 26 categories, including eight categories for further analysis of attacks using explosives or incendiaries. Again, this allows for detailed analysis of the frequency and lethality of attacks against various subtargets.

Fourth, UMSTART provides only generic descriptions of the bombs used in attacks, placing them in a single category, "explosives/bombs/dynamite." In contrast, MTI lists the number of devices used in an attack and indicates whether the detonation took place above or below ground; more important, it provides subcategories for number of devices, type of explosive or incendiary (eight subcategories), how it was delivered or concealed (sixteen subcategories), and the outcome of each device (seven subcategories). This allows MTI to provide critical analyses of the frequency and lethality of different combinations of bombs and incendiaries, delivered and concealed in different ways, against different targets. It also enables analysis of the frequency of use of single

versus multiple devices, and how frequently they detonated on target, malfunctioned, or were rendered safe through Explosive Ordnance Disposal (EOD).

Finally, the MTI database allows for separate analysis of train derailment attacks, coding them into instances in which it is known or suspected that bombs were placed on the tracks, or known or suspected that bolts or tracks were removed, or other methods were used. As of February 20, 2010, MTI's database contained 181 derailment events going back to 1920, captured separately and analyzed.

LIMITATIONS AND RELEVANCE OF THE DATA TO U.S. PUBLIC SURFACE TRANSPORTATION

This section presents data on the frequency and lethality with which trains, buses, and road and highway targets are attacked. It is important to understand the preliminary nature of these data and also to place the attacks in context for U.S. stakeholders.

DATA LIMITATIONS AND PRELIMINARY CONCLUSIONS

Information on some of the attacks in the database is limited, and much of it is unreliable. This is true for attacks that took place decades ago or as recently as 10 years ago. It is also true for some attacks that take place in developing countries or in countries without a tradition of open reporting by government agencies. Also, regardless of where attacks or attempted attacks take place, if they occur during a news cycle dominated by other events, the amount of information available from open sources can be surprisingly limited. Finally, some reporting by local press may be speculative, unverified, or editorial, and the cooperative exchange of information on surface transportation attacks between governmental authorities—relative to that in the world of commercial aviation—appears to be only in its beginning stages.

For all these reasons, the MTI database entries assume certain default characteristics until more data are collected and verified. These "default entries" are recorded as rules in the database. For example:

- The default entry for a bomb that explodes inside a bus is "concealed or placed in the passenger compartment." This is a reasonable assumption, but in many cases there are insufficient data to verify that this was actually the case. Similar default entries are made for bombs that explode in bus stations and at bus stops: "concealed/left in stations (trash bins, under benches, near trains or buses)" and "concealed/left at bus stop."

- The default entry for bombs or incendiary devices that detonate is "detonated or released on target." This probably overstates, to some degree, the success of the attacks, particularly when casualties appear to be low, and it assumes precise knowledge of what the target was.

- Armed assault is considered to be "assault with automatic weapons," since in the absence of information to the contrary, the prevalence of these weapons makes it likely that they were used.

- "IED–unspecified" describes any bomb for which there is no information detailing how it was constructed; and until more information is available on whether the targeted station was enclosed or open, it is similarly categorized as "bus (or train) station–unspecified."

Some default entries are fairly reliable. The method of delivery and concealment of weapons used in suicide attacks is coded as "carried on person," and a grenade is assumed (with

good reason, given the 4 seconds between the pulling of a pin and detonation) to be "physically thrown," unless there is information indicating that it was combined with other mechanisms as an IED.

Another important limitation of the database derives from the inability of the current data system to perform routine median calculations. Some of the averages (means) are actually based on only two or three attacks, and in one case, only one attack. To put these figures into context, we have included the actual numbers of attacks on nearly all charts that provide average lethality, and some basic information is provided to explain these events. In cases where there are few attacks and the lethality or the success of the attacks is particularly high, the average should therefore be seen as what terrorists were able to accomplish in a particular incident, not what they usually accomplish.

MTI researchers will continue to capture attacks individually, and existing lists of data will be discovered and searched. Questions about certain attacks will be answered, corrections will be made, and MTI's new data platform will allow more powerful analyses. The results of our analyses of these attacks—unique as they are—must be seen as preliminary. They answer some long-standing questions, but they raise many others.

Nevertheless, they serve an important purpose. They can help stakeholders—governments, transit managers, and employees—particularly in the United States, to focus on the ways the most frequent and/or most lethal attacks are carried out as they consider measures to prevent or mitigate attacks that may be considered likely to happen in the United States.

RELEVANCE TO THE UNITED STATES OF ATTACKS ON TRANSPORTATION IN OTHER COUNTRIES

Only 15 of the attacks in the MTI database occurred in North America (i.e., the United States, Canada, and Mexico):

1. **Three attacks on or threats to road infrastructure**. A 1984 threat to bomb the Sarasota-Bradenton Bridge in Florida; a 1977 explosion on the Route 1 bridge in Florida Homestead and Key West; and liquid explosives found underneath the Golden Gate Bridge in 1982.

2. **Four bus attacks**. One assault and one robbery on buses in Mexico; a 1989 Greyhound bus hijacking which was resolved peacefully; and a 2010 criminal hijacking in Edmonton, Canada.

3. **Eight train attacks or threats**. A 1980 bomb blast in New York's Penn Station; the 1984 detonation of a bomb in the Montreal train station; a 1993 bomb explosion in a train station in Guadalajara; two December 1994 detonations of an incendiary device in the New York subway system by a disgruntled individual; a 1995 Amtrak derailment in Arizona; a grenade found in a train station in 1982 in Chicago; and a 2009 detonation of a device in a rail signal bungalow in Sugar Grove, Illinois.

All of these were isolated events, and only three were conducted by or specifically associated with an organized group: the Amtrak derailment (Sons of Gestapo), the 1984 bomb threat to the bridge in Florida (Luis Boitel Commandos), and the 1980 Penn Station bombing (Puerto Rican Armed Resistance (RAP)). None involved jihadist terrorists.

The overwhelming majority of the attacks against public surface transportation took place outside the United States. It is important to understand the context of many of the attacks, because while they are important, some have limited relevance to the domestic U.S. environment.

Most of the attacks have been part of essentially local guerrilla or terrorist campaigns designed to bring down a government or achieve independence, autonomy, separation, and/or some kind of state governing the territory for which this independence, autonomy, or separation is sought. Public transportation has been routinely targeted by Hamas, Hizballah, Islamic Jihad, and the robust collection of groups seeking a Palestinian state or the destruction of Israel; Sikh and Islamic separatists in India; the Liberation Tigers of Tamil Eelam (LTTE) in Sri Lanka, also known as the Tamil Tigers; the Revolutionary Armed Forces of Colombia (FARC) and the New People's Army in Colombia; and the Moro National Liberation Front (MLF) in the Philippines. Yet the ideologies of these groups range from Islamism to Marxism, and the groups themselves can be religious (e.g., Hizballah and Hamas) or secular (e.g., LTTE and FARC).

Most of the attacks take place in countries in which train or bus transportation is either the primary means of public transportation (e.g., in Israel) or, along with trains, a large part of it, and in rural areas, the only public transportation. This is far from the situation in the United States, where aviation is the primary method of long-haul transportation, and with the exception of high-density urban centers such as New York, Boston, and San Francisco, the automobile is the primary method of local transportation. Where train or bus transportation is extremely important, it becomes an obvious terrorist target. Conversely, where it is not so important, it may be a less likely target.

Many of the tactics used in these attacks—some particularly lethal—are unlikely to be used in the United States. For example, Claymore mines were used exclusively in Sri Lanka and with particular effectiveness, and land mines have been used in rural areas of Latin America, Southeast Asia, and Southwest Asia. These weapons most likely become available to terrorist groups that are linked with active insurgencies, obtain military training, and have access to military equipment. In the United States, where military equipment is controlled but automatic weapons, including assault rifles, are widely available, it seems unlikely that military weapons would be used.

Finally, in the United States, actual terrorist acts are so far dominated not by Islamic or Middle Eastern groups, but by groups or individuals energized by specific domestic issues. The terrorist attacks in the United States for the 10 years in which narrative descriptions are provided in UMSTART (January 1, 1997, to December 31, 2007) illustrate this point (Figure 8).

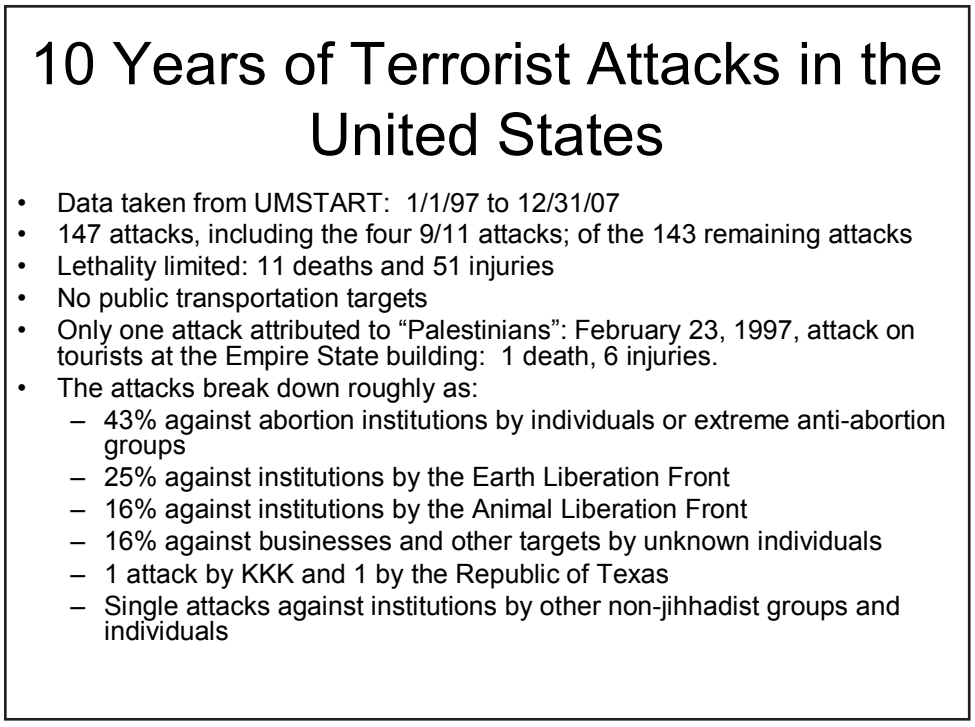

Figure 8

With the exception of the horrific attacks of September 11, 2001—which were conceived and orchestrated from outside the United States—U.S. "domestic terrorism" during this period has not been particularly successful. Although jihadist plots certainly have been aimed at producing high body counts, the 143 remaining attacks resulted in only 11 deaths and 51 injuries. Also, although those plots included public transportation targets—specifically, the heavy rail urban mass transportation systems of major U.S. cities—no attacks against public transportation targets were recorded.[6] Further, only one of the attacks could be considered "Middle Eastern." It was conducted by a 70-year-old Palestinian male whose writings reveal a set of grievances that included not only Israel, but individuals who had cheated him out of funds and tourists in the Empire State Building.

The greatest percentage of attacks (43 percent) involved extremist anti-abortion groups and individuals; 25 percent were conducted by the Earth Liberation Front and similar groups; and 16 percent were conducted by the Animal Liberation Front. One attack was conducted by the Ku Klux Klan and a similar group, the Republic of Texas, and a smattering of single attacks were conducted by individuals or groups, most of them against government or corporate institutions for one cause or another. Finally, a large percentage of the attacks (16 percent) were conducted by unknown persons.

Indeed, non-jihadist U.S. domestic terrorist groups have shown little inclination to cause civilian casualties, and most, in fact, have attempted to avoid them. This point is illustrated by Figures 9 and 10, taken from a recent MTI report.[7] Even the devastating 1995 Oklahoma City attack by Timothy McVeigh was aimed primarily at the U.S. government; McVeigh considered innocent civilians to be acceptable collateral damage.

From *Potential Terrorist Uses of Highway-Borne Hazardous Materials* (MTI Report #09-03)

- Other (non-jihadist) sources of terrorist attacks in the United States range from the Animal Liberation Front and violent environmental activists to right-wing extremists and white supremacists. For these groups, the priority of targets is primarily dictated by the specific objective of the attack, because these groups are motivated by narrowly defined issues.
- While the Oklahoma City bombing resulted in a significant number of casualties, it is important to realize that in the mind of the bomber, Timothy McVeigh, the objective was to destroy a federal government building with government employees, not civilian bystanders.

Figure 9

From *Potential Terrorist Uses of Highway-Borne Hazardous Materials* (MTI Report #09-03) (cont.)

- It is difficult to define precisely the ranking of targets for such a large range of groups. However, certain trends do emerge. Declarations, plots, and actions show that these attackers tend to:
  - **Focus on targets (individuals, infrastructure, or buildings) that are specifically associated, as part of the government or as part of a company, with the specific policies or entity being targeted.** Two examples are the bombings of IRS offices and the assaults on laboratories or individuals engaged in animal research.
  - **Focus on controlling economic damage and on limiting collateral casualties**. For example, recent environmental fires set in housing developments by environmental extremists specifically excluded occupied buildings. Attacks on animal testing labs have similarly avoided human casualties, although some animal-rights extremists have targeted individuals.
  - **Make no mention of transportation**.
  - **Almost never target bystanders, either in open-air public gatherings or inside residential or other public buildings**.

Figure 10

Nevertheless, many attacks that take place in other countries are relevant to the United States and to public transportation, for several reasons.

First, successful attacks against any target can be imitated. Terrorists seeking to attack public surface transportation have an extensive playbook of attacks against such targets. The description of successful results, particularly against very soft targets, simplifies the task for any terrorist seeking to make a similar attack and shortens the planning cycle. Attacks in London, Madrid, and Mumbai were considered major terrorist successes. Past success makes future attempts more likely.

Second, public transportation, particularly train transportation, fits the profile of a desirable terrorist target. As described in the following excepts from a recent MTI report,[8] terrorists are opportunists and are far more likely to attempt attacks that will, with high confidence, achieve a death toll of 25 to 50 than a risky, complicated operation that could kill 1,000 or more.

> *Forced to choose between undertaking a complex and demanding operation to cause massive death and destruction and executing a smaller-scale attack with certainty of success, terrorists seem generally to choose the latter. Terrorists may be willing to sacrifice their lives; they are far less willing to risk operational failure.*

* * * *

> *Operational success tends to be defined in terms of casualties. Terrorists seek targets that have emotional or symbolic value—widely recognizable icons, targets whose destruction would significantly damage or disrupt the economy, and high body counts. In recent attacks, terrorists have been willing to forgo iconic value in favor of high body counts, for example, by bombing subways or commuter trains. The economic impact of such attacks is indirect.*

* * * *

The following assessment from the same report indicates the likelihood of al Qaeda or other jihadist groups targeting public transportation:

> *The threat posed by al Qaeda and groups associated with it is somewhat easier to analyze than that of other groups because al Qaeda's declarations, plots, and attacks are fairly consistent and suggest a distinct prioritization of targets.*
>
> *Al Qaeda urges its followers to carry out attacks that will produce high body counts and will have symbolic value—in jihadist language, attacks on targets that have "emotional" value (iconic targets)—and attacks that will cause serious economic damage. The iconic component can refer either to the destruction of an internationally recognized icon or to an iconic venue. In the latter case, the destruction of the target would not necessarily be the goal. The venue would merely be a dramatic backdrop that would increase the psychological impact of the attack.*
>
> *In fact, however, few of the jihadist attacks and plots since 9/11 have included iconic targets or venues, although diplomatic facilities and even nightclubs the jihadists consider sinful do have symbolic content. And despite the continued drumbeat about economic warfare in al Qaeda communications, the economic impact of the terrorist attacks since 9/11 has been incidental—for example, attacks on hotels do adversely impact tourism.*

> *Almost all of the jihadist attacks since 9/11 have been directed against soft targets—that is, unprotected or lightly protected targets such as hotels (Indonesia, Kenya, Jordan, Egypt, Pakistan), restaurants and nightclubs (Indonesia, Morocco, United Kingdom), public surface transportation (Spain, United Kingdom, Philippines, India), residential compounds (Saudi Arabia), and high-profile individuals. Terrorist attacks on embassies, consulates, and commercial buildings (Indonesia, Pakistan, and Turkey) have used vehicle bombs on the street; in other words, they have not attempted to penetrate security. Only in a couple of instances have terrorists attacked government buildings or, in one case, a refinery (Saudi Arabia), which are likely to have higher levels of security. This again suggests a low tolerance for risk of failure. The detonation of the terrorist devices, even beyond any security perimeter, still resulted in casualties and destruction. The avoidance of security does not mean that the terrorists were averse to personal risk, since many of these were suicide attacks. We are talking about operational risks.*
>
> *A review of the terrorist plots that were uncovered during the same period reveals greater operational ambition (use of exotic substances, multipart operations) to attack more-diverse but still similar targets.* ***Most of the plots involved attacks on public surface transportation—the killing fields of terrorists bent upon slaughter.*** *Embassies figured in several plots, along with other government buildings and military headquarters. Several plots involved attacks on naval or civilian vessels, like the attacks on the USS Cole or the French supertanker Limburg. However, soft targets predominate. (emphasis added)*

Third, until very recently, radical jihadist plots involving attacks inside the United States have been fairly amateurish, but four of them have focused on public transportation. All four targeted heavy rail mass transit systems of major U.S. cities; none involved bus targets.

- **The 1997 Flatbush plot**. In this plot, a suicide vest was prepared for use against the New York subway system. One conspirator hesitated, however, and approached the transit police. Authorities in turn conducted a raid and foiled the plot before it could be implemented.

- **The 2003 New York poison gas plot**. In February 2003, a cell of terrorists were arrested on their way to Bahrain from Saudi Arabia. They had designed devices to be placed near air intakes in ventilation systems or in closed areas and had undertaken surveillance of the New York subway system in fall 2002. They requested permission from al Qaeda's central leadership, but the decision was made to cancel the operation because the leadership had "something better in mind." It is unclear what was meant by that comment.

- **The 2004 Herald Square plot.** In August 2004, two individuals, one born in the United States and the other a naturalized U.S. citizen, conspired to place a bomb in the Garden City subway station in New York City. Other targets in New York, particularly surface transportation targets, were discussed as well. A tip to the New York Police Department (NYPD) from an anonymous caller led the NYPD to pay an informant to work his way into the Islamic community (including mosques and book stores) to secure information about the plans of the conspirators. The informant taped conversations and provided key evidence. The NYPD also used an undercover officer and ended the plot before it could be put into operation. While the intelligence and emotional stability of the conspirators are questionable, the plot definitely included surveillance and operational planning.

- **The 2006 PATH Tunnels plot**. In July 2006, FBI online surveillance uncovered a plot involving eight suspects, one of them (Assem Hammoud) an al Qaeda loyalist living in Lebanon, to blow up New York City PATH tunnels. Hammoud was released on bail after serving 26 months in solitary confinement in Lebanon. Two other individuals were also arrested, one in Canada and the other in the United Kingdom. According to the FBI, the plan was to carry bombs on backpacks onto commuter trains and detonate them while moving through tunnels. Dates and the amounts of explosives were discussed, and financing was apparently secured. The plot was uncovered before an overseas operative could go to the United States to undertake serious operational planning. The conspirators also spoke of bombing New York subways, among other targets.

In addition, Bryant Neal Vinas, a U.S. citizen raised on Long Island who was captured by Pakistani authorities for taking part in al Qaeda operations in Pakistan, passed information to al Qaeda about the Long Island Rail Road system.

Fourth, the level of determination and sophistication of the plots, although still low in comparison with those originating and or conducted outside the United States, seems to be increasing, as illustrated by the recent Zazi plot, in which Najibullah Zazi pleaded guilty to planning to detonate bombs in the New York City subways; co-conspirators have also been charged.

Finally, while the pace of radical and violent jihadist radicalization has been slower in the United States than in other countries such as the United Kingdom and France, the cases of domestic radicalization and recruitment to jihadist terrorism and the plots that are sometimes involved appear to be increasing. Between September 12, 2001, and the end of 2009, 44 cases of domestic radicalization and recruitment to jihadist terrorism were reported in the United States. Thirty-two cases took place between 2002 and 2008, an average of four a year. But in 2009 there were 12 cases, a considerable increase.[9]

As Secretary of DHS Janet Napolitano recently told Congress, “Home-based terrorism is here…. And like violent extremism abroad, it is now part of the threat picture that we must confront.” Since public transportation is in the terrorist playbook and has yielded many successes, possible attacks against the public transportation system in the United States must be considered.

TRENDS IN ATTACKS ON SURFACE TRANSPORTATION

ATTACKS AGAINST ALL SURFACE TRANSPORTATION TARGETS

Fatalities and Injuries

Figures 11, 12, and 13 illustrate several fundamental points. Figure 11 demonstrates that while public surface transportation has been around for about 150 years, terrorist attacks against it have been a relatively recent phenomenon. MTI has recorded 15 attacks against surface transportation that occurred between 1920 and 1970, almost all of which were train bombings or attempted train derailments. Terrorist attacks started in earnest in about 1970 and then accelerated in the 1990s and the current decade. The apparent drop in attacks in the past several years, as shown in Figures 12 and 13, is not an indication that the tempo of attacks has dropped, but rather reflects a lag in official reporting.

Figures 12 and 13 illustrate the relationship between fatalities and attacks against surface transportation targets and injuries and attacks against those targets, respectively. The spikes in attacks correspond relatively well to the spikes in fatalities and injuries. More attention should be paid to fatalities than to injuries, however, for several reasons. Reporting on fatalities is generally more accurate than reporting on injuries; open source reports often provide a firm number of fatalities and "at least" a certain number of persons injured. The minimum number is recorded in the MTI database. In some cases, the account defines injuries as "several" or "many"; until an estimate is obtained, these are given the value of zero.[10] Also, some injuries later become deaths. Finally, different countries may use different definitions of serious injuries and may record only those or all injuries. The bottom line is that death is easier to define.

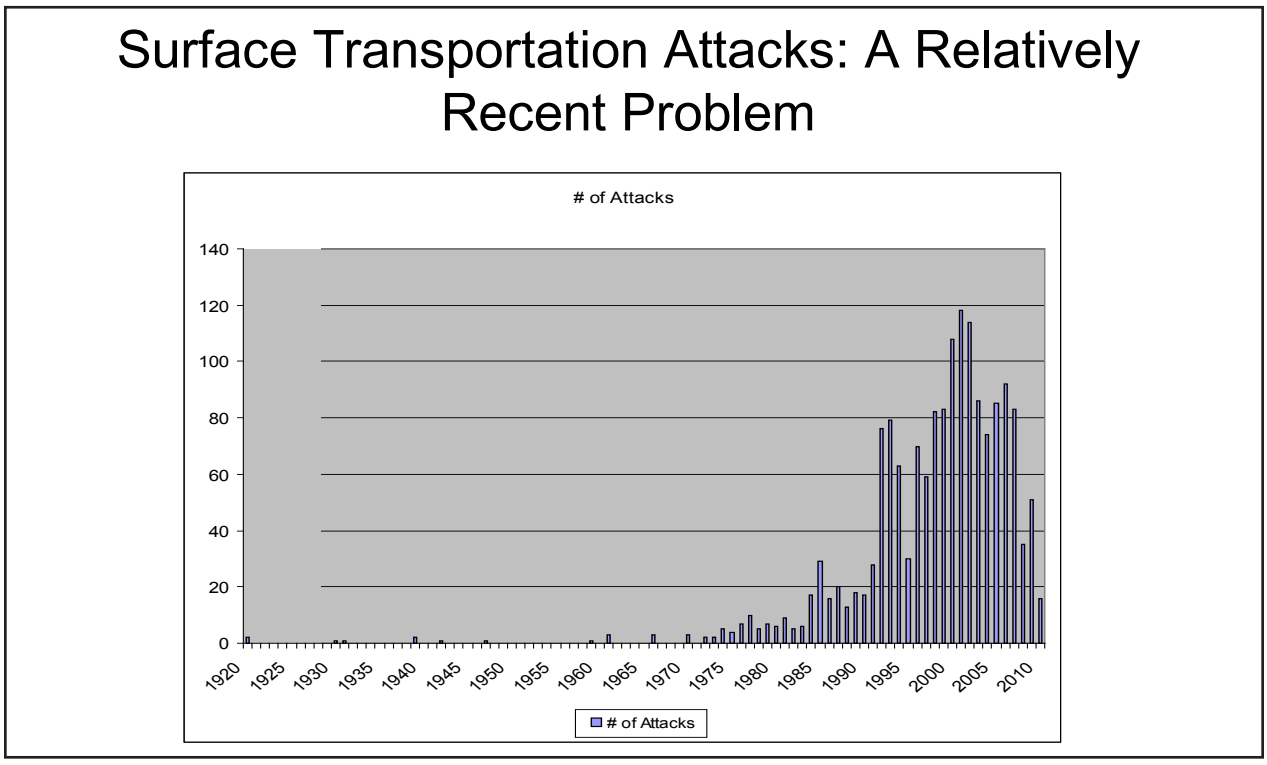

Figure 11

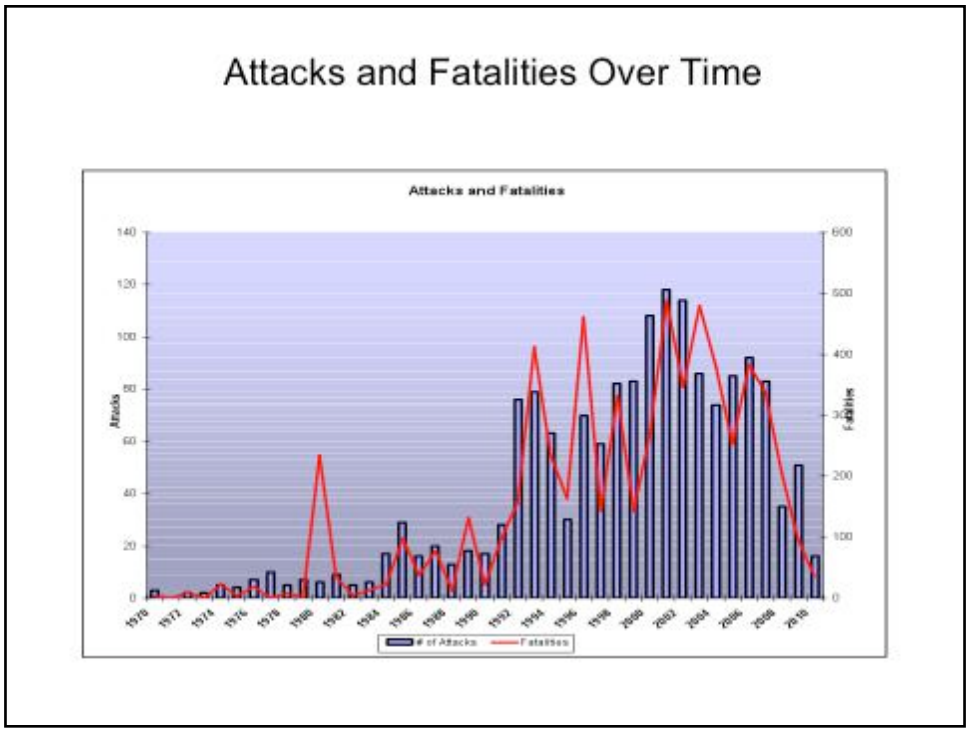

Figure 12

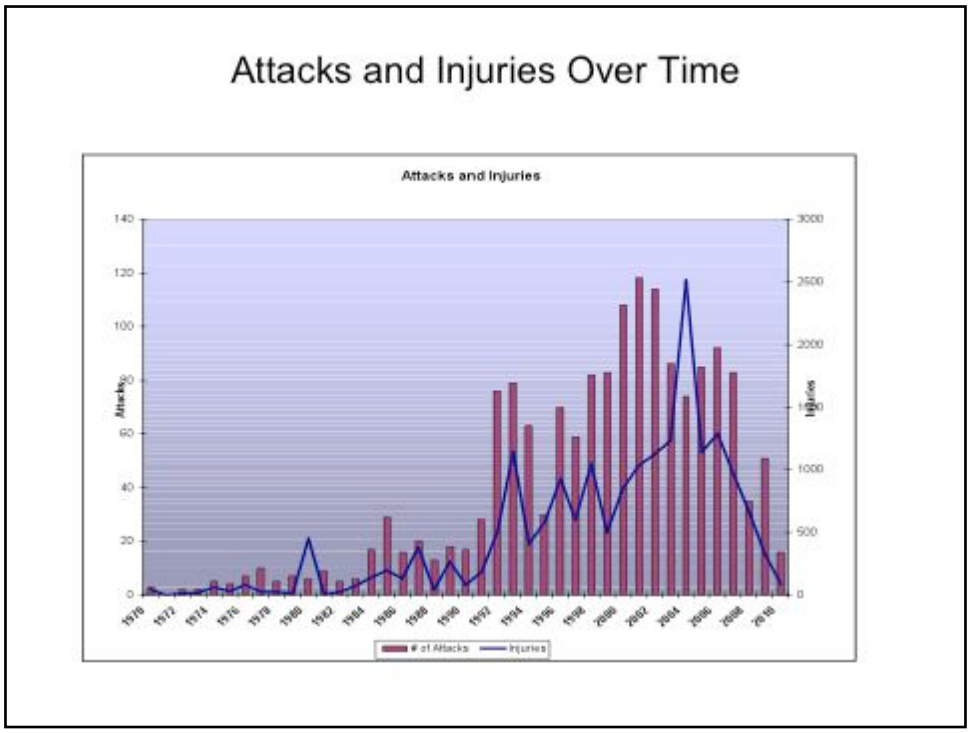

Figure 13

As shown in Figure 14, attacks on public surface transportation are usually and increasingly designed to kill, and major attacks provide a very good return on investment for the terrorist. While 62 percent of the attacks result in no casualties, the attacks are usually poorly executed or stopped and in some instances are designed to achieve economic disruption.

Body Counts "Count"

- **Terrorists seek slaughter; attacks with body counts of 50 to 100 considered good returns on investment**
- **Substantial percentage of *all* attacks against surface transport designed to kill, not to cause economic harm:**
  - **38% of attacks resulted in at least 1 death**
  - **17% of attacks resulted in at least 5 deaths**
  - **9% of attacks resulted in at least 10 deaths**
    - **Majority of recent attacks appear intended to kill**
  - **Most of remaining 62% of attacks**
    - **Failed or were stopped, or**
    - **Aimed at disruption (often in areas of insurgency), especially against road targets (e.g., FARC and also IRA campaigns against tracks and roads)**

Figure 14

Nine percent of the attacks yielded more than 10 deaths, on average. Major attacks against trains, such as those in Moscow, Israel, Mumbai, London, and Madrid, resulted in as many as 50 or more fatalities. The bottom line is that public surface transportation targets are generally easy to hit and lucrative. They, along with hotels and public assemblies, are killing fields for terrorists.

Suicide Bombers

Figure 15 presents the results of attacks on public transportation by suicide bombers, which are foremost in the minds of those concerned with security. Suicide bombers strike particular fear into officials and populations of countries that have been hit by or are likely targets of such attacks, and for good reason: Suicide bombing signals a level of commitment and hatred well beyond that which countries normally experience, and the suicide bomber has the unique advantage of guiding the bomb to its destination. However, although this method of delivering a weapon is particularly lethal for bus targets, it is less lethal for train targets. Moreover, suicide bombers and bombs are generally not the most lethal combination of attack and weapon. In most terrorist campaigns, it is far easier and therefore more common to attack targets and deliver bombs in other ways. And particularly for open targets, other methods produce good results for the terrorists.

As Figure 15 shows, only 4.96 percent of all attacks and 6.69 percent of bomb attacks were suicide operations, but they caused more than twice their proportionate share of fatalities (9.76 percent and 15.11 percent). They represent a much higher percentage of attacks against buses (12.32 percent) than of attacks against train targets (4.14 percent). The figures for bus targets are based largely on suicide bombings against buses in Israel, Sri Lanka, and South Asia. Suicide bombings against subways in London in 2005 and

passenger trains and subway stations in Moscow were also significant events.

What About Suicide Bombers?

All attacks	#	% of Total	Fatalities	% of Total	Injuries	% of Total
# of suicides	81		602		3068	
# of all attacks	1633	4.96%	6167	9.76%	19241	15.95%
# of bomb attacks	1211	6.69%	3984	15.11%	16466	18.63%

Train attacks	#	% of Total	Fatalities	% of Total	Injuries	% of Total
# of suicides	18		106		904	
# of train attacks	522	3.45%	2883	3.66%	10464	8.64%
# of train bomb attacks	434	4.14%	1858	5.71%	8957	10.09%

Buses	#	% of Total	Fatalities	% of Total	Injuries	% of Total
# of suicides	61		448		2144	
# of bus attacks	786	*7.76%*	3011	*14.88%*	8197	*26.16%*
# of bus bomb attacks	495	*12.32%*	1902	*23.55%*	7025	*30.52%*

Figure 15

Distribution and Lethality by Region and Country

Figures 16 and 17 show the regions in which most attacks take place and in which they are most lethal. Figure 16 provides these data for all 1,633 attacks in the database, and Figure 17 provides them for the 1,211 bomb attacks.

All Attacks: Regional Distribution and Lethality per Attack

Region	#	% of Total	FPA	IPA
South Asia	516	31.60%	5.0	16.1
Middle East and North Africa	310	18.98%	3.2	11.3
Western Europe	218	13.35%	1.8	15.3
Southeast Asia	156	9.55%	2.7	7.6
Russia and the NIS	137	8.39%	2.4	9.1
South America	112	6.86%	1.4	2.2
Sub-Saharan Africa	83	5.08%	10.2	10.1
Eastern Europe	33	2.02%	0.7	3.2
East Asia	31	1.90%	11.9	11.6
Central America & Caribbean	15	0.92%	1.1	2.1
North America	15	0.92%	0.2	2.1
Australasia & Oceania	4	0.24%	0	0.8
Central Asia	3	0.18%	0	0.7
Total	1,633	100.00%	3.8	11.8

Figure 16

All Bomb Attacks: Regional Distribution and Lethality per Attack

Region	#	% of Total	FPD	IPD
South Asia	433	35.7%	4.9	17.4
Middle East and North Africa	223	18.4%	2.6	13.4
Western Europe	173	14.4%	2.2	19.2
Russia and the NIS	117	9.7%	2.7	10.4
Southeast Asia	106	8.7%	1.6	6.1
South America	67	5.5%	0.7	2.3
Sub-Saharan Africa	30	2.5%	5.5	8.6
East Asia	25	2.0%	7.1	8.8
Eastern Europe	16	1.3%	0.9	4.6
North America	9	0.7%	0.3	3.8
Central America & Caribbean	5	0.4%	0	1.4
Australasia & Oceania	4	0.3%	0	0.8
Central Asia	3	0.2%	0	0.7
Total	1,211	100%	2.6	10.7

Figure 17

The largest percentage of all attacks have taken place in South Asia, followed by the Middle East and North Africa. Western Europe, Southeast Asia, Russia, and the Newly Independent States (NIS) also experienced a high percentage of attacks, followed by South America and Sub-Saharan Africa. Relatively few attacks occurred in Eastern Europe, East Asia, Central America, and the Caribbean, and only Australasia and Oceania and Central Asia had fewer attacks than North America.

When only bomb attacks are considered, there are relatively few shifts in regional distribution. The top three regions remain the same; Russia and the NIS have more attacks than Southeast Asia; and a few other regions switch places, but they do not involve a large number of attacks. North America ranks tenth among developed countries for all attacks and ninth for bomb attacks, but these rankings are very low in view of its large population.

Lethality follows a somewhat different track. Largely because of a single 2003 case of arson in a subway in South Korea (which resulted in 198 deaths), East Asia has a the highest fatality rate (11.9 FPA). The next highest rate is in Sub-Saharan Africa (10.2 FPA), the result of particularly deadly attacks against passenger trains (the single most lethal attack in the entire database is an attack on a passenger train by the National Union for the Total Independence of Angola (UNITA), in which a bomb and automatic weapons killed 259 people and injured 165). Except for these attacks, average lethality more closely follows distribution, with the highest FPA being in South Asia (5 FPA), followed by the Middle East and North Africa (3.2 FPA), Southeast Asia, (2.7 FPA), Russia and the NIS (2.4 FPA), and Western Europe (1.8 FPA), all of which are below average. The lethality of attacks in North America is exceedingly low (0.2 FPA and 2.1 IPA). The only region where a large

number of attacks have occurred that has a higher-than-average FPA is South Asia. Even attacks in the Middle East and North Africa—which includes Israel—do not have higher-than-average lethality.

When only bomb attacks are considered, few differences are seen between regions. East Asia still leads at 7.1 FPD (even though the subway arson attack is excluded), followed by Sub-Saharan Africa (5.5 FPD). As with all attacks, South Asia is the region hit frequently in which the average FPD is highest (4.9 FPD), followed by Russia and the NIS (2.7 FPD), and only then by the Middle East and North Africa (2.6 FPD). All other regions, including Western Europe (2.2 FPD) fall below the average of 2.6 FPD.

Figure 18 lists the ten developing and developed[11] countries in which most attacks have occurred, and Figure 19 lists the top ten for bomb attacks. For all attacks, the distribution among leading countries yields no real surprises. The countries that received the bulk of the attacks are India, Pakistan, and Sri Lanka in South Asia; the Philippines and Thailand in Southeast Asia; Israel, Turkey, Algeria, and Egypt in the Middle East and North Africa; Japan and China in East Asia; the United Kingdom, Spain, France, Germany, Italy, and Greece in Western Europe; Russia in Russia and the NIS; and the United States in North America. For bomb attacks, there are no real shifts of any significance, for the simple fact that bomb attacks constitute the majority of attacks.

The data on lethality for all attacks are somewhat surprising, probably because the international press generally reports only the major incidents. The average lethality for all attacks is 3.8 FPA, and the average injuries are 11.8 IPA. The countries that rise above this level are, in order, China at 9.5 FPA (reflecting a few serious bomb and bus attacks); Sri Lanka at 9.0 FPA (reflecting the intense and lethal campaign by LTTE); Italy at 7.9 FTA (again reflecting a few lethal train attacks); Algeria at 6.1 FPA (reflecting some execution-style assaults on buses, including throat slittings); and India at 5.3 FPA (which includes

All Attacks: Leading Countries – Distribution and Average Fatalities per Attack

Rank	Developing Country	#	% of Total	FPA	IPA	Developed Country	#	% of Total	FPA	IPA
1	India	267	16.35%	5.3	17.6	Israel	156	9.55%	3.2	15.7
2	Pakistan	149	9.12%	3.8	9.9	Russia	115	7.04%	2.6	9.5
3	Philippines	85	5.21%	1.8	7.3	U.K.	78	4.78%	1.0	12.3
5	Colombia	71	4.35%	1.3	1.4	Spain	47	2.88%	3.8	38.3
6	Sri Lanka	57	3.49%	9.0	27.7	France	27	1.65%	0.7	6.8
4	Turkey	54	3.31%	1.9	6.9	Germany	25	1.53%	0.1	0.9
7	Algeria	44	2.69%	6.1	9.5	Italy	14	0.86%	7.9	23.5
9	Thailand	42	2.57%	0.9	3.9	Greece	10	0.61%	0.1	1.6
8	Egypt	34	2.08%	1.3	6.5	Japan	8	0.49%	0.1	0.3
10	China	18	1.10%	9.5	11.6	U.S.	7	0.43%	0	0.3

Figure 18

Average Fatalities per Attack

Rank	Developing Country	#	% of total	FPD	IPD	Developed Country	#	% of total	FPD	IPD
1	India	222	18.32%	4.9	18.9	Israel	123	10.15 %	3.4	17.9
2	Pakistan	130	10.73%	3.6	10.8	Russia	102	8.42%	3.0	10.6
3	Philippines	64	5.28%	1.8	8.5	U.K.	73	6.02%	0.9	13.1
4	Sri Lanka	50	4.13%	8.6	29.9	Spain	36	2.97%	5.0	50.1
5	Turkey	41	3.38%	1.0	7.7	France	20	1.65%	1.0	9.2
6	Colombia	40	3.30%	0.8	1.8	Germany	12	0.99%	0.1	1.8
7	Algeria	29	2.39%	2.7	12.1	Italy	12	0.99%	9.3	27.4
8	Thailand	26	2.15%	0.9	3.8	Greece	8	0.66%	0.1	2.0
9	China	16	1.32%	10.7	13.1	U.S.	6	0.50%	0	0.7
10	Egypt	16	1.32%	1.2	7.3	Japan	5	0.41%	0	0.2

Figure 19

the Mumbai attack and other very lethal incidents). Countries that were at or slightly below average lethality were Pakistan and Spain (reflecting the March 11, 2004, bombings) at 3.8 FPA, followed by Israel at 3.2 FPA and Russia at 2.6 FPA, which reflects the continuing violence of Chechen separatists. Lethality for attacks in the United States is very low, 0 FPA and 0.3 IPA.

The lethality data for bomb attacks are similar. The average lethality for all attacks is 2.6 FPD and 10.7 IPD, but more countries rise above the average than in the findings for all attacks. China's average is 10.7 FTD, and Italy's is 9.3 FPD; next comes Sri Lanka at 8.6 FPD, Spain at 5.0 FPD (which reflects the Madrid attacks), India at 4.9 FPD, Pakistan at 3.6 FPD, Israel at 3.4 FPD, Colombia at 3.3 FPD, Russia at 3.0 FPD, and Algeria at 2.7 FPD. Lethality for the United States is again very low, 0 FPD and 0.7 IPD, a very slight rise over the averages for all attacks.

Distribution and Lethality by Target Group

Next we examine the frequency and lethality of attacks on bus, train, and road targets using all weapons and the comparable data for attacks using only explosive and incendiary devices.

Figures 20 and 21 place the nine passenger train target subcategories into three groups: passenger trains, train stations, and train tracks. Passenger trains include trolleys, subway trains, and intercity trains. Attacks on tracks are most often attempted derailments, and many, but not all, of these are aimed at passenger trains. The eight bus target subcategories are grouped into buses (including passenger bus, minivans, school buses, and tour buses), bus stations, and bus stops.

All Attacks: Distribution by Target Groups

Target Group	# Attacks	% of Total
Buses	662	40.54%
Passenger trains	352	21.56%
Train stations	172	10.53%
Bus stations/stops	155	9.49%
Railway tracks	124	7.59%
Vehicle bridge or tunnel	57	3.49%
Freight train	45	2.76%
Highway or road	31	1.90%

Figure 20

Bomb Attacks: Distribution by Target Groups

Target Group	# Attacks	% of Total
Buses	372	30.72%
Passenger trains	277	22.87%
Train stations	158	13.05%
Bus stations/stops	146	12.06%
Railway tracks	106	8.75%
Vehicle bridge or tunnel	56	4.62%
Freight train	40	3.30%
Highway or road	23	1.90%

Figure 21

In the figures, the data on all attacks include all 26 categories of attacks, ranging from IEDs to sabotage by derailing to assault with automatic weapons to kidnapping. Data on bomb attacks include only the eight categories of explosive and incendiary devices.

Combining all train and bus targets into a single group, we observe the following for all attacks: First, bus targets are involved in 50 percent of all attacks; passenger train targets are involved in roughly 40 percent, followed by track attacks (7.5 percent), many of which are aimed at passenger trains, and road attacks (mostly bridge attacks) at 5.4 percent.

Second, we calculate lethality by attack for both all attacks and bomb attacks. Lethality is higher for passenger train attacks than for bus attacks. The average FPA and IPA for train targets are 5.4 FPA and 19.5 IPA, whereas the averages for bus targets are 3.8 FPA and 10.4 IPA. Track attacks achieved only 0.9 FPA and 0.9 IPA, and road attacks resulted in almost no fatalities or injuries, as they are usually aimed primarily at destroying infrastructure, not at creating casualties.

The corresponding observations for bomb attacks are as follows. First, bus targets still predominate, being involved in 42.7 percent of attacks, but the difference between the percentage of attacks on buses and the percentage on trains decreases from 10 percent to 6 percent, as the percentage of attacks directed at bus targets decreases from 50 percent to 40 percent, and the percentage of attacks against trains decreases only from 40 percent to 36 percent. Track attacks increase slightly, to 8.75 percent, and road attacks increase slightly, to 6.52 percent.

The difference in lethality between train and bus targets is less for bomb attacks than for all attacks. Average lethality for passenger train bomb attacks is 4.2 FPA and 16.4 IPA, less than for all attacks, while average lethality for bus targets increases to 3.9 FPA and 11.5 IPA. Further, the lethality of track attacks decreases to 0.1 FPA and 0.5 IPA, reflecting the lethality of mechanical sabotage. Finally, the lethality of road fatalities increases somewhat, to 0.8 FPA and 0.5 IPA. This probably reflects the fact that some attacks using both IEDs and assault weapons take place on roads and are classified as road attacks.[12]

Distribution and Lethality by Target Type

Figures 22 and 23 present data on the distribution and lethality of all attacks against various types of public surface transportation targets.

Attacks on scheduled buses and passenger trains dominate, followed by attacks on train and bus stations and railroad tracks, then on tourist buses and bus stops and vehicle bridge targets. Lethality of all attacks is greatest for subway train attacks, at 13.2 FPA, no doubt reflecting not only the attacks in London and Russia, but also the arson attack in South Korea (a non-bomb event). Lethality of attacks on passenger trains is 6.7 FPA. Next are scheduled passenger and company or government buses at 4.8 FPA, followed by trucks (rare but often deadly attacks, at 4.7 FPA). All other targets result in below-average lethality, with train stations at 3.3 FPA.

The distribution and lethality of bomb attacks against all targets is shown in Figures 24 and 25.

Target Distribution and Average Lethality for All 1,633 Attacks

Target	#	% of Total	FPA	IPA
Bus, scheduled	516	31.60%	4.8	11.4
Passenger train	318	19.47%	6.7	24.5
Train station - unspecified	126	7.72%	3.3	12.1
Railway tracks	124	7.59%	0	0.4
Bus station - unspecified	110	6.74%	1.3	9.5
Bus, tourist	64	3.92%	2.3	4.3
Vehicle bridge	56	3.43%	0.3	0.4
Bus stop	45	2.76%	1.8	14.4
Train, freight	36	2.20%	0.7	1.9
Minivan or minibus	35	2.14%	3.5	5.7
Highway or road	34	2.08%	0.9	1.1
Bus, company or gov't	31	1.90%	4.8	11.1
Train, subway	21	1.29%	13.2	38.7
Subway station - unspecified	20	1.22%	0.9	4.7

Figure 22

Target Distribution and Average Lethality for All 1,633 Attacks (cont.)

Target	#	% of Total	FPA	IPA
Railway bridge	17	1.04%	0	0
Bus, school	16	0.98%	2.4	9.7
Train station-enclosed building	13	0.80%	0.2	4.9
Truck	10	0.61%	4.7	3.3
Station - train and bus	8	0.49%	1.0	6.8
Other (not yet categorized)	7	0.43%	0	0.9
Train, trolley	6	0.37%	0	9.6
Train, tourist	5	0.31%	2.0	11.4
Subway station – enclosed building	5	0.31%	1.6	0
Railway signals or COM system	3	0.18%	0	0
Transportation company office	2	0.12%	0	0
Train, troop	2	0.12%	0	11.0
Vehicle tunnel	1	0.06%	0	0
Railway - unspecified	1	0.06%	0	0
Multiple targets	1	0.06%	0	0
Total	1,633	100.00%	3.8	11.8

Figure 23

Target Distribution and Average Lethality
for all 1,211 Bomb Attacks

Target	# Attacks	% of Total	FPD	IPD
Bus, scheduled	297	24.5%	5.3	16.8
Passenger trains	251	20.7%	5.3	25.9
Train station - unspecified	119	9.8%	3.3	12.5
Railway tracks	109	9.0%	0	0.3
Bus station - unspecified	106	8.7%	1.3	9.8
Vehicle bridge	56	4.6%	0.3	0.4
Bus stop	40	3.3%	2.0	15.7
Train, freight	35	2.9%	0.7	1.9
Bus, tourist	24	2.0%	0.9	4.3
Highway or road	25	2.1%	0.9	0.9
Bus, company or gov't	23	1.9%	5.9	14.7
Train, subway	20	1.6%	4.0	33.3
Minivan or minibus	18	1.5%	2.6	7.9
Railway bridge	17	1.4%	0	0
Subway station - unspecified	16	1.2%	1.1	5.8

Figure 24

Distribution and Average Lethality
for all 1,211 Bomb Attacks (cont.)

Target	# Attacks	% of Total	FPD	IPD
Enclosed train station	11	0.9%	0.3	5.8
Bus, school	10	0.8%	3.2	13.0
Station - train and bus	7	0.6%	1.1	5.8
Truck	5	0.4%	6.8	1.8
Enclosed subway station	5	0.4%	1.6	0
Train, trolley	4	0.3%	0	11.1
Other (not yet categorized)	4	0.3%	0	0.8
Railway signals or COM system	2	0.2%	0	0
Transportation company office	2	0.2%	0	0
Multiple targets	1	0.1%	0	0
Train, tourist	1	0.1%	8	40
Train, troop	1	0.1%	0	0
Vehicle tunnel	1	0.1%	0	0
Railway - unspecified	1	0.1%	0	0
Total/average	1211	100.0%	2.6	10.7

Figure 25

There are no significant differences in distribution between all attacks and bomb attacks, but there are some differences in lethality. Attacks against truck convoys and government or company buses have the greatest lethality (6.8 FPD and 5.9 FPD, respectively), but again the data represent relatively few, highly focused attacks. The lethalities of bomb attacks against passenger train and bus targets are almost identical (both at 5.3 FPD), and subway trains follow at 4.0 FPD (still reflecting Madrid, London, and Moscow, but now without the South Korean arson event). The only target against which attacks are at or above average lethality is train stations (3.3 FPD), followed closely by school buses (3.2 FPD). Lethality of attacks against bus stations is low for both all attacks and bomb attacks at 1.3 FPA and 1.3 FPD, respectively.

The average lethality for all attacks is 3.8 FPA and 11.8 IPA. This is higher than the average lethality for bomb attacks (3.3 FPA and 13.6 IPA), probably because of the frequency and lethality of assaults with automatic weapons, multiple weapons (e.g., the use of an IED or a blockade), and high-lethality attacks such as execution-style killings. While bombs may be the preferred method of conducting terrorism, they are not the most lethal means of attacking public surface transportation.

Distribution and Lethality by Type of Attack and Weapon

Figures 26 and 27 show distribution and lethality of all categorized means of attacking public surface transportation.[13]

Explosive and incendiary devices are used in the most attacks, as noted above. Unspecified IEDs are used in 62 percent of the attacks, and 74 percent of all attacks involve IEDs, IIDs, or vehicle-borne IEDs (VBIEDS). The next most common method is the use of readily available (in some countries) automatic assault weapon (10 percent), followed by arson

All Attacks: Distribution and Average Lethality by Attack and Weapon

Attack and Weapon	#	% of Total	FPA	IPA
IED - unspecified	1,015	62.16%	3.2	14.4
Assault with automatic weapons	163	9.98%	5.5	6.6
Arson	56	3.43%	3.6	3.2
IED - mine	47	2.88%	5.4	11.1
IED - grenade	45	2.76%	2.1	12.4
IID (improvised incendiary device)	45	2.76%	2.3	3.8
Armed hijacking	34	2.08%	0.9	0.8
Multiple weapons	34	2.08%	19.8	25.4
VBIED	31	1.90%	3.3	12.6
Robbery	30	1.84%	0.7	0.8
Assault - other or unspecified	21	1.29%	5.9	4.8
Sabotage through derailing	20	1.22%	8.0	20.2

Figure 26

All Attacks: Distribution and Average Lethality by Attack and Weapon (cont.)

Attack and Weapon	#	% of Total	FPA	IPA
IED - dynamite	20	1.22%	1.2	1.1
Kidnapping	17	1.04%	0.8	0.5
Sabotage, other	17	1.04%	2.1	0.4
Assault with RPG	12	0.73%	0.9	2.0
IED – Claymore mine	7	0.43%	19.3	25.9
Other (not yet categorized)	6	0.37%	1.8	5.2
Unknown (no description found)	4	0.24%	0.3	0.8
Threat, bomb	3	0.18%	0	0
Mortar	3	0.18%	0.7	3.3
IED - other	1	0.06%	0	0
Unconventional weapons	1	0.06%	0	0
Sniperor other standoff attacks	0	0.00%	0	0
Total/average	1,633	100.00%	3.8	11.8

Figure 27

(3.4 percent), then armed hijacking and multiple-weapons assault—which often starts with an IED (2 percent). A few methods account for most of the attacks.

Trends in lethality are different. Attacks with multiple weapons (19.8 FPA) and Claymore mines (19.3 FPA) are the most lethal, followed by sabotage through derailing (i.e., mechanical sabotage), which can be surprisingly lethal (8.0 FPA), and other assaults, which include executions in which all the occupants of a bus or train are killed (5.9 FPA). The more commonly used automatic assault weapons and mines planted on roads or on railway tracks are about equally lethal (5.5 FPA and 5.4 FPA, respectively). Slightly below the average are arson (3.6 FPA) and the most commonly used attack method, unspecified IED (3.2 FPA).

BOMB ATTACKS AGAINST ALL SURFACE TRANSPORTATION TARGETS

As shown in Figure 28, 85.5 percent of all bomb attacks involve a single bomb; this seems to be a constant with no evolving trend over time. It should be noted that some of the attacks involving multiple devices were aimed at the same target, possibly indicating attempts at redundancy, and because of the way the data are entered in the database, a few are single-device attacks against identical targets at the same time. Also, some of the multiple-device attacks were designed so that one or more devices detonated just as responders or explosives personnel arrived on the scene.

Single or Multiple Bombs

85% are single bomb attacks, no trends over time

Bomb Attacks	#	% of Total
Single bombs	1,036	85.5%
Multiple bombs	175	14.5%
All bomb attacks	1,211	100.0%

Figure 28

Figure 29 provides more detail on the number of bombs used in various attacks. The highest number, 10, was recorded in the attack in Madrid on March 11, 2004.

Number of Devices: Number and Percentage of All Bomb Attacks

# of Devices	# of Attacks	% of Attacks
1	1,037	85.63%
2	82	6.77%
3	63	5.20%
4	13	1.07%
5	5	0.41%
6	5	0.41%
7	4	0.33%
10	1	0.08%
Total	1,211	100.00%

Figure 29

Figure 30 illustrates the "outcomes" of explosive and incendiary devices used in attacks. The majority (77 percent) of devices are presumed to have detonated or been released on target. However, 6 percent of the devices did not work as planned, and 16.8 percent were found and rendered safe. These findings suggest that devices can be found and defused and passengers can be evacuated before an explosion when drivers, conductors, intelligence, police and security officials, and passengers are alert. In some instances, devices were also poorly designed. It appears that fatalism is not an appropriate response to explosive and incendiary devices used against public transportation.

The lethality calculations in this interim report are based on either attack or device; they are not yet based on explosions—where we would count only the bombs that detonated or were released on target. The basis of calculation can have important effects when comparing the lethality of different means of concealment and delivery, particularly in suicide attacks. Since the overwhelming majority of suicide attacks in the database detonated on target and on time and because suicide bombers can guide their bombs to the target, a comparison of lethality between bombs placed in parcels or bags or in passenger compartments of buses and trains with bombs carried on persons may be misleading. If we compare only bombs that exploded on target, as we intend to do in further work, we may find that the difference in lethality between bombs placed in bags or parcels or hidden in passenger compartments and bombs carried on persons decreases significantly.

Outcome of All Bomb Attacks

77% on target, 16.7% detected and rendered safe, 6% didn't work as planned

Bomb Results	#	% of Total
Detonated or released on target	1,184	76.73%
EOD successful - rendered safe	259	16.79%
Detonated early or away from target, or malfunctioned	91	5.90%
Failed to detonate or release	4	0.26%
Unknown	5	0.32%
Detonated during unsuccessful EOD	0	0.00%
Total bombs	1,543	100.00%

Figure 30

Distribution and Lethality by Target

The following calculations of distribution and lethality combine target, device, and concealment method, as was shown in Figures 24 and 25. The lethalities of bomb attacks against passenger train and bus targets are almost identical (5.3 FPD), and attacks on

subway trains follow at 4.0 FPD (reflecting Madrid, London, and Moscow, but not the South Korean arson incident). Train stations are the only target with at or above average lethality (3.3 FPD), followed closely by school buses (3.2 FPD). Bus station lethality is low for both all attacks and bomb attacks—1.3 FPA and 1.3 FPD, respectively.

Distribution and Lethality by Device

Figure 31 shows the lethality of each device. Unspecified IEDS are the most widely used (83.8 percent of all devices), but Claymore mines, land mines, and VBIEDS have higher-than-average lethality, whereas unspecified IEDs are of average lethality with 2.6 FPD and 11.6 IPD.

Distribution and Lethality per Device

Distribution: Unspecified IEDs dominate

Lethality: Claymore mines, mines and VBIEDs more lethal than average; unspecified IEDs at average lethality

Device	#	% of Total	FPD	IPD
IED - unspecified	1,015	83.82%	2.6	11.6
IED - mine	47	3.88%	4.6	9.5
IED - grenade	45	3.72%	1.7	9.8
IID (improvised incendiary device)	45	3.72%	1.1	1.9
VBIED	31	2.56%	3.2	12.3
IED - dynamite	20	1.65%	0.9	0.8
IED - Claymore	7	0.58%	19.3	25.9
IED - other	1	0.08%	0	0
Total/average	1,211	100%	2.6	10.7

Figure 31

Distribution and Lethality by Delivery and Concealment Method

Figure 32 provides distribution and lethality statistics for different methods of delivery and concealment.

The most frequently used delivery method is placement in a bus or train passenger compartment, followed by placement on a train track. Concealing bombs in stations or placing them on vehicle roads are next most common. Placing a bomb in a parcel or bag, physically throwing a device (usually a grenade), or carrying one (always a suicide operation) follow, being used at about the same frequency. Although suicide attacks account for only 6.68 percent of all bomb attacks, they cause 15 percent of the fatalities and 18.6 percent of the injuries; they are the most lethal method of delivery and concealment at 6.85 FPD and 34.86 IPD. This may be because relatively few suicide bombs fail to detonate on target and on time. It certainly reflects their greater effectiveness against bus targets than against train targets.

Lethality per Placement by Delivery/Concealment

Method	#	% of Total	FPD	IPD
Concealed/left in passenger compartments	324	26.73%	3.86	14.50
Placed on railroad track or bridge, or near a train	273	22.59%	.81	3.61
Concealed/left in stations	157	12.95%	2.44	10.10
Placed on vehicle road, bridge, or in tunnel	111	9.16%	2.14	4.50
Physically thrown	84	6.93%	.90	5.17
Carried on person	81	6.68%	6.84	34.86
Concealed in parcel or bags	59	4.87%	4.70	25.84
Placed near the bus or other target - unspecified	40	3.30%	5.38	14.56
Concealed/placed outside of stations	34	2.81%	.35	1.87
Concealed/left at bus stop	23	1.90%	.80	8.80
Unknown	9	0.74%	1.62	9.38
Concealed/placed in non-passenger areas	8	0.66%	2.75	.06
Concealed in or on vehicle	5	0.41%	1.55	9.73
Concealed/placed inside of building or office	3	0.25%	0	0
Total/average	1,211	100.00%	2.6	10.72

Figure 32

Bombs (usually VBIEDs) placed near the target are the next most lethal method of delivery, achieving 5.38 FPD and 14.56 IPD. Some attacks using VBIEDs are also suicide operations. Bombs left in parcels or bags (as was done in Madrid in 2004) follow at 4.70 FPD and 25.84 IPD. The only other method that is significantly above the average—concealment in the passenger compartment of trains or buses—is also the most commonly used, and it achieves 3.86 FPD and 14.5 IPD. Other methods that have nearly average lethality include concealment in stations (2.44 FPD and 10.10 IPD) and placement (usually mines) on vehicle roads (2.14 FPD and 4.50 IPD). Placing a bomb in the non-passenger area of a train or bus has higher-than-average lethality (2.75 FPD), but this largely reflects a single attack against a bus that will be described later.

The Twelve Most Lethal Combinations

We combine all three factors—devices, method of delivery and concealment, and target—to derive the 12 most lethal combinations (Figure 33). Again, some of these findings are based on very few attacks and therefore show what terrorists have achieved in particular incidents, not what they normally do achieve.

Concealing an unspecified IED in a parcel or bag and placing it in a passenger train is the only combination that was used more than 10 times in the attacks in the database and therefore is considered the most common. Attacks using other combinations of concealment and delivery include

- A 1996 attack in Pakistan in which a bomb was placed in the gas tank of a passenger bus (40 FPA).

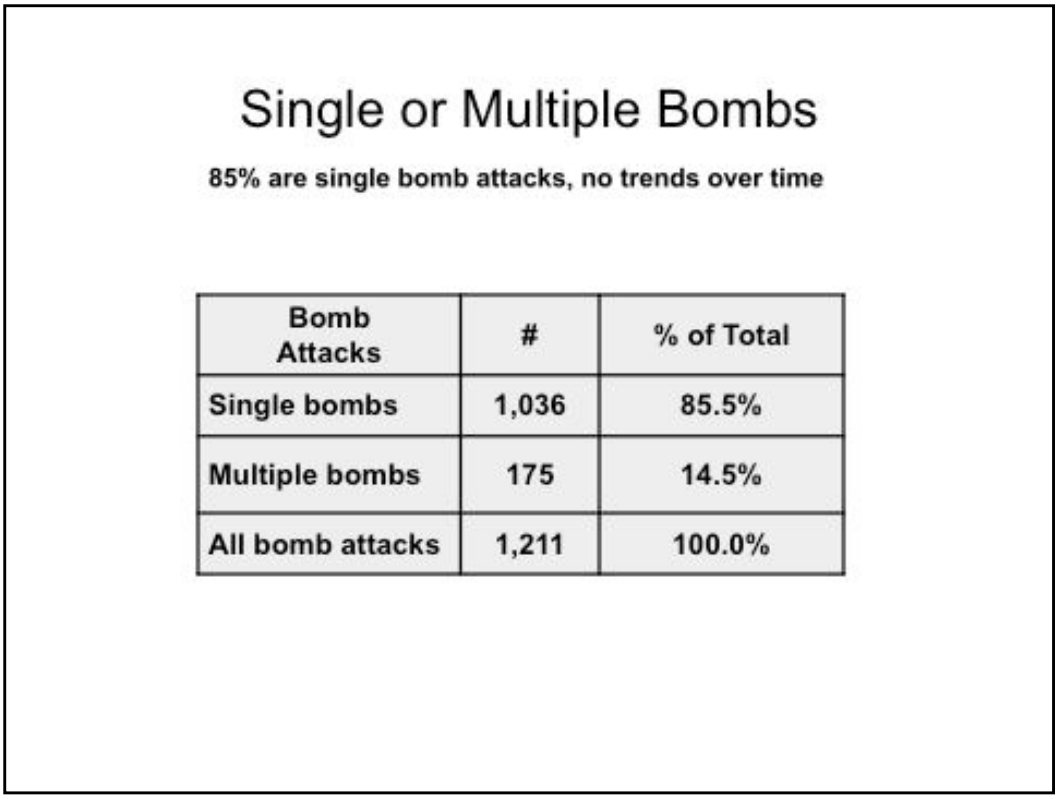

Figure 33

- A 2007 attack against the Peace Train in India, in which four gasoline bombs were used (68 FPA).
- A single suicide bomb used against a truck convoy carrying Chinese workers in Pakistan (30 FPA).
- Two attacks in Sri Lanka in which a Claymore mine was exploded on the side of the road (21 and 16 FPA) (our data indicate that this method has been used thus far only in that campaign).
- A 1989 train attack in China in which dynamite was hidden in a toilet (20 FPA).
- A 2007 suicide operation against a bus carrying police in Pakistan (18 FPA).
- A motorcycle bomb used against a bus carrying military personnel in Sri Lanka (13 FPA).
- Mines used once in Russia and twice in India against government buses (12 FPA).

Only three suicide bombings against passenger trains have been recorded; two of them were not successful, and one—conducted by the Black Widows against a commuter train in Moscow in 2003—killed 35 people and injured 170. (The London attacks targeted subway trains, and a suicide bomber attacked a subway station in Moscow in 2004.)

Attacks Against Trains

As Figure 34 indicates, body counts are certainly a factor in attacks on trains. The percentage of attacks with more than 10 fatalities is slightly higher than the percentage for all attacks, and some bomb attacks on trains have yielded an average lethality of 24 fatalities per bomb.

Body Counts Count

- **True also for passenger trains; but % of attacks with highest death rates is slightly higher:**
  - **34% (vice 38%) of attacks resulted in at least 1 death**
  - **17% (also 17%) of attacks resulted in at least 5 death**
  - **11% (vice 9%) of attacks resulted in at least 10 deaths**
  - **Most of the remaining 66% failed or were stopped**
  - **Some railway bridge or track bombings in South Asia, Southeast Asia, and some (IRA) in UK appear designed to disrupt rail systems**
- **Average deaths and injuries against passenger rail targets:**
  - **for all attacks are 5 and 20 per attack**
  - **for all bomb attacks are 4 and 16 per attack, and 3 and 16 per explosion**
- **However, 68% of bomb attacks failed or resulted in no casualties**
- **Some of the most deadly bomb attacks have yielded an average body count of 24 per bomb**

Figure 34

Distribution and Lethality by Region and Country

Figure 35 shows the regional distribution and lethality of all the train attacks in the database.

All Train Attacks: Regional Distribution and Lethality

Region	#	% of Total	FPA	IPA
South Asia	180	34.48%	7	25
Western Europe	124	23.75%	3	25
Russia and the NIS	60	11.49%	3	15
Middle East and North Africa	57	10.92%	3	8
Southeast Asia	32	6.13%	7	18
South America	23	4.41%	1	4
Sub-Saharan Africa	17	3.26%	28	33
Eastern Europe	12	2.30%	0	1
East Asia	8	1.53%	28	20
North America	7	1.34%	1	14
Australasia & Oceania	2	0.38%	0	2
Central America & Caribbean	0	0.00%	0	0
Central Asia	0	0.00%	0	0
Total/average	522	100.00%	4	12

Figure 35

As shown in Figure 36, there are some differences in regional distribution between all attacks against trains and all attacks against all targets. Although trains have not yet been attacked in the United States with great frequency or lethality, recent plots involving the subway or commuter rail systems of major U.S. cities have been uncovered.

With the exception of South Asia, the four regions where attacks have had above-average lethality, shown in Figure 37, were not where the bulk of the attacks took place. Obviously, the lethality of attacks in North America is very low.

Figures 38 and 39 show the distribution and lethality of all train attacks and bomb attacks on trains in the countries where the most incidents have occurred.

For all train attacks, distribution follows a fairly predictable pattern. Among developing countries, India and Pakistan have the highest percentage of attacks, followed by Turkey, Thailand, Sri Lanka, Egypt, and Algeria. India experiences a large number of train attacks, but that is not surprising given the extensive use of railroads in India and the size of the country. Among developed countries, Russia—which has been dealing with Chechen separatists—has had the largest number of train attacks, followed by the United Kingdom (dealing with IRA and IRA dissident groups, and now with al Qaeda affiliates), Spain (dealing with the Basque separatist organization ETA and also jihadist groups), and then Germany, Israel (with a small but important train system), and Italy. Only five attacks have occurred in North America.

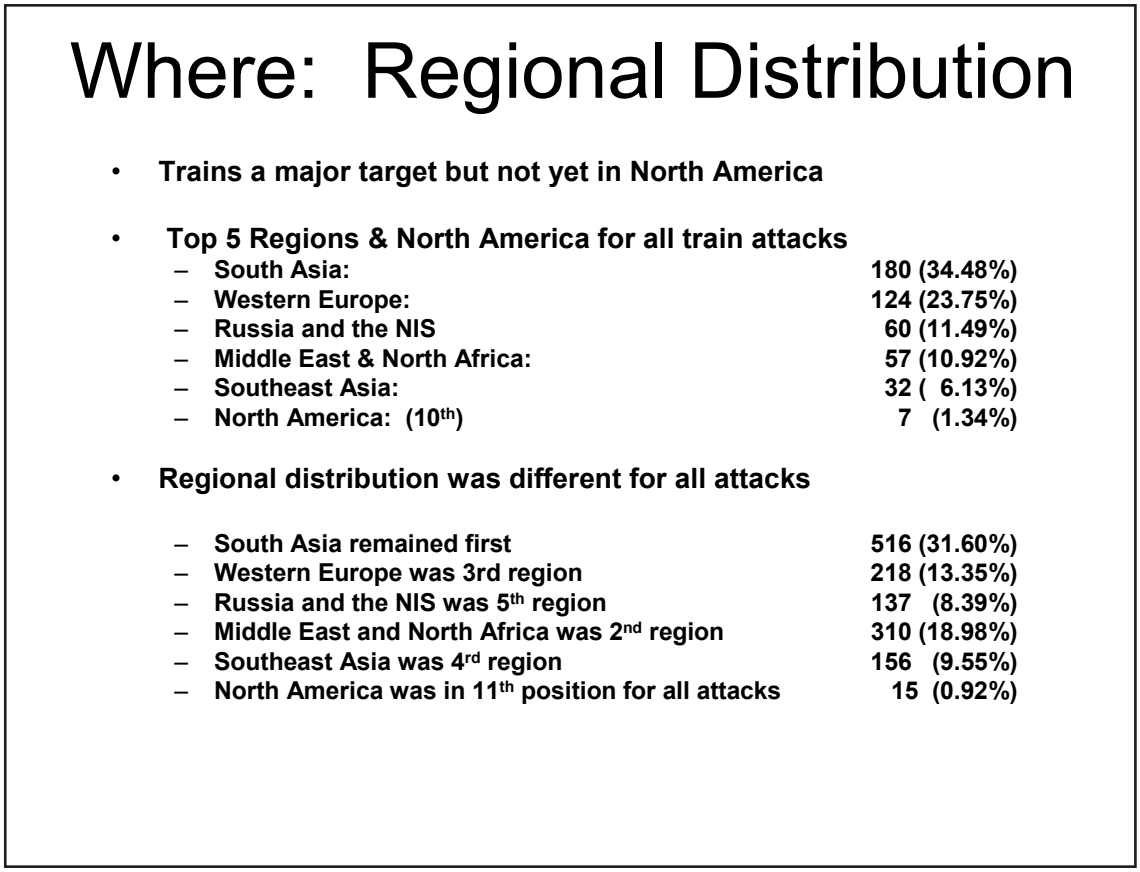

Figure 36

Where: Regional Lethality

- **Four regions are above average lethality (4 FTA and 12 IPA) and except for South Asia are *not* where the bulk of the attacks take place**
  - **Sub-Saharan Africa** **28 FTA/33 IPA**
  - **East Asia** **28 FTA/20 IPA**
  - **South Asia:** **7 FTA/25 IPA**
  - **Southeast Asia** **7 FTA/18 IPA**
- **Lethality in North America fairly low but not as low as other regions**
- **Regional lethality for all attacks less (and only 2 above average) but relative ranking fairly similar**
  - **East Asia was first** **12 FTA/12 ITA**
  - **Sub-Saharan Africa was second** **10 FTA/10 ITA**
  - **South Asia was third** **5 FTA/16 ITA**
  - **The Middle East and North Africa was fourth (and below**
  - **Average)** **3 FTA/11ITA**
  - **Southeast Asia was fifth** **3 FTA/8 ITA**
- **North America was lower relative to other regions** **0 FTA/2 ITA**

Figure 37

All Train Attacks – 10 Leading Countries

Rank	Developing	#	% of Total	FP A	IPA	Developed	#	% of Total	FP A	IPA
1	India	127	24.42%	8.0	27.5	Russia	52	10.00%	3.3	16.6
2	Pakistan	37	7.12%	3.9	12.5	U.K.	39	7.50%	1.1	18.9
3	Turkey	18	3.46%	0.9	5.9	Spain	23	4.42%	7.8	78.3
4	Thailand	14	2.69%	0.5	5.1	France	22	4.23%	0.9	8.3
5	Sri Lanka	13	2.50%	9.8	31.5	Germany	13	2.50%	0.2	0.9
6	Egypt	12	2.31%	1.5	9.8	Israel	11	2.12%	0.6	5.5
7	Algeria	11	2.12%	5.8	15.3	Italy	10	1.92%	11.1	32.9
8	Cambodia	7	1.35%	27.6	55.4	U.S.	5	0.96%	0.2	13.8
9	Peru	5	0.96%	2.2	10.6	Switzerland	5	0.96%	0	0.8
10	Bangladesh	4	0.77%	6.3	21.8	Austria	3	0.58%	0	2.0

Figure 38

Train Bomb Attacks – 10 Leading Countries

Rank	Developing	#	% of Total	FPD	IPD	Developed	#	% of Total	FPD	IPD
1	India	110	25.35%	7.7	28.5	Russia	50	11.52%	3.4	17.3
2	Pakistan	28	6.45%	3.5	14.1	U.K.	38	8.76%	1.1	19.4
3	Turkey	15	3.46%	1.0	6.5	Spain	18	4.15%	10.0	100.1
4	Sri Lanka	12	2.76%	7.6	34.1	France	16	3.69%	1.3	11.4
5	Thailand	10	2.30%	0.5	6.7	Germany	9	2.07%	0	1.2
6	Algeria	10	2.30%	6.4	16.8	Italy	9	2.07%	12.3	36.6
7	Egypt	7	1.61%	2.6	14.3	Switzerland	5	1.15%	0	0.8
8	Ethiopia	6	1.38%	1.2	2.8	U.S.	4	0.92%	0	1.0
9	Philippines	5	1.15%	2.2	23.0	Greece	3	0.69%	0	0
10	Brazil	4	0.92%	0	7.8	Japan	3	0.69%	0	0.3

Figure 39

Lethality follows a somewhat different pattern. The average lethality for all train attacks is 5.5 FPA, and the country with the highest FPA is Cambodia. A number of attacks were made against Cambodian trains by the Khmer Rouge, including an attack involving a bomb and assault weapons used against a passenger train in 1980 in which 150 people were killed and 250 people were injured. The next most lethal attacks occurred in Italy (11.1 FPA), largely reflecting a deadly bombing in the Bologna train station in 1980, followed by Sri Lanka, which suffered lethal bombings and multiple attacks by LTTE. India, which suffered the largest percentage of attacks, had an average fatality rate of 8.0 FPA, followed by Spain at 7.8 FPA (reflecting the 2004 Madrid attacks), then Algeria (5.8 FPA), where multiple attacks have been made against trains. All other countries, including the United Kingdom, had below-average lethality, demonstrating the extent to which the IRA targeted trains to create economic havoc and not to generate body counts.

The relative ranking of both developing and developed countries having more than 10 bomb attacks against trains are similar to those for all train attacks. However, Israel drops off the list. North America experienced only four attacks.

The highest lethality was recorded in Italy (12.3 FPD), again reflecting the Bologna station bombing, followed by Spain (10.0 FPD), reflecting the Madrid bombings. The next most lethal attacks took place in India (7.7 FPD), Algeria (6.5 FPD), Pakistan (3.5 FPD), and Russia (3.4 FPD). The average lethality was 3.5 FPD.

Train bombings are the only incidents in which developed countries (Italy and Spain) suffered the highest lethality, and in which developed countries such as Russia have suffered lethality close to that of developing countries such as Pakistan.

Distribution and Lethality by Method of Attack

Distribution and lethality by method of attack are shown in Figure 40.

How: Distribution and Lethality of All Attacks

Attack and Weapon	#	% of Total	FPA	IPA
IED - unspecified	396	75.86%	4	22
Assault with automatic weapons	26	4.98%	6	13
Sabotage through derailing	15	2.87%	11	27
IID (improvised incendiary device)	11	2.11%	6	6
IED - mine	11	2.11%	4	8
Arson	9	1.72%	22	16
Multiple weapons	10	1.92%	48	57
IED - grenade	6	1.15%	0	2
Assault - other or unspecified	6	1.15%	0	9
Sabotage, other	6	1.15%	0	0
IED - dynamite	5	0.96%	4	2
VBIED	5	0.96%	1	6
Assault with RPG, armed hijacking	4	0.77% each	1 each	1 each
Robbery	3	0.57%	1	0
Threat, bomb, other (not yet categorized)	2	0.38% each	0 each	0 each
Unconventional weapons	1	0.19%	0	0
Total/average	522	100.00%	6	20

Figure 40

As shown in Figure 41, explosive attacks dominate frequency in passenger train attacks more than in all attacks. Still, explosives are not the most lethal method of attack, and in fact the lethality of unspecified IEDs is below the overall average (Figure 42).

Distribution and Lethality by Target

Figure 43 shows the distribution and lethality of attacks on specific train targets. Attacks on subway trains and passenger trains are the most lethal, and these are the only targets for which lethality of attacks is above average.

BOMB ATTACKS AGAINST TRAINS

In contrast to attacks against buses (discussed below), suicide bombers may not be the greatest threat against trains, as indicated in Figure 44.

The suicide method of delivering a bomb (“carried on person”) is more lethal than average, but so are bombs concealed in passenger compartments or in parcels or bags (see Figure 45). Data on the other aspects of bombs placed on trains are roughly the same as those for all bomb attacks against all targets.

How: All Attacks and Train Attacks – Distribution

– **All attacks: Explosives and incendiaries dominate. Automatic weapons and fire are used next. Multiple weapons often include bombs. Top 6:**

• IEDs, IIDs & 31 VBIEDS:	74.16%
• Automatic weapons:	9.93%
• Arson	3.43%
• Armed hijacking	2.08%
• Multiple weapons (often include bombs)	2.02%
• Robbery	1.84%

– **Passenger train attacks: Explosives *really* dominate, followed by automatic weapons, mechanical derailing, and then fire. Top 6:**

• IEDs, IIDs & 4 VBIEDS:	83.14%
• Automatic weapons:	4.98%
• Mechanical derailing:	2.87%
• IIDs	2.11%
• Arson	1.72%
• Multiple weapons (often includes bombs)	1.92%

Figure 41

How: All Attacks and Train Attacks – Lethality

All attacks: Most lethal attacks (above average of 4 FPA and 12 IPA)

• Multiple weapons (bombs/assault weapons)	20 FPA/25 IPA
• Claymores – Sri Lanka exclusively	19 FPA/26 IPA
• Mechanical sabotage	8 FPA/20 IPA
• Assault (other) – usually executions)	6 FPA/ 5 IPA
• Mines	5 FPA/11 IPA
• Assault with automatic weapons	5 FPA/ 7 IPA

Passenger train attacks: Most lethal attacks (above average of 6 FPA and 20 IPA)

• Multiple weapons even more lethal	48 FPA/57 IPA
• Arson (includes 2003 South Korea subway fire)	22 FPA/16 IPA
• Mechanical sabotage	11 FPA/27 IPA
• Assault with automatic weapons	6 FPA/13 IPA
• Improvised incendiary device	6 FPA/ 6 IPA

• **All other attack methods, including IED – unspecified (4 FPA/22 IPA) *below* overall average**

Figure 42

Most Lethal Train Targets

Enclosed locations most lethal; subway and then passenger trains most lethal and above average

Target	#	% of Total	FPA	IPA
Train, passenger (intercity or commuter)	318	60.92%	6.7	24.5
train station - unspecified	126	24.14%	3.3	12.1
Subway station - unspecified	20	3.83%	0.9	4.7
Train, subway	21	4.02%	13.2	38.7
Train station – enclosed building	13	2.49%	0.2	4.9
Station - train and bus	8	1.53%	1.0	6.8
Train, trolley	6	1.15%	0	9.6
Train, tourist	5	0.96%	2.0	11.4
Subway station – enclosed building	5	0.96%	1.6	0
Total overall average	522	100.00%	5.5	20

Figure 43

Passenger Train Attacks Using Explosives: The Bombs and Bombers

- **Suicide bombers may not be our biggest problem: suicides constitute a small percentage of attacks, even fewer than for all attacks against surface transport:**
  - **4.96% of all attacks**
  - **3.45% of all attacks on trains**
  - **6.69% of all explosive attacks on trains**
- **For all attacks, they cause a somewhat disproportionate percentage of casualties; but for attacks on trains and explosives attacks on trains, fatalities are roughly proportional to attacks:**
  - **9.76% of all fatalities and 15.95% of all injuries for all attacks**
  - **3.68% of all fatalities and 8.64% of all injuries for all attacks on trains**
  - **5.71% of all fatalities and 10.09% of all injuries for train attacks using explosives**

Figure 44

The Bombs and Bombers (cont.)

- **In train attacks, suicide yields an average of 1.5 FPD more than the average (3.5 FPD), but so do bombs concealed in passenger compartments or in parcels or bags**
- **Number of bombs used:**
  - **Only 12.7% of attacks used more than 1 device**
  - **No discernible trends over time**
- **Successful Bombs:**
  - **72.35% of bombs successful**
  - **17.28% percent found – EOD successful**
  - **7.83% detonated early or away from primary target**
  - **1.84% failed to detonate**
  - **0.23% (1) detonated during unsuccessful EOD**

Figure 45

Distribution and Lethality by Target

The distribution and lethality of bomb attacks against train targets are shown in Figure 46.

What: Distribution and Lethality by Train Targets

Subtarget	#	% of Total	FPA	IPA
Train, passenger (intercity or commuter)	251	57.83%	4.2	20.3
Train station - unspecified	119	27.42%	2.7	10.3
Train, subway	20	4.61%	3.3	27.7
Subway station - unspecified	16	3.69%	1.1	5.8
Train station – enclosed building	11	2.53%	0.2	4.6
Station - train and bus	7	1.61%	0.9	6.0
Subway station – enclosed building	5	1.15%	1.6	0
Train, trolley	4	0.92%	0	11.1
Train, tourist	1	0.23%	8.0	40.0
Total/average	434	100.00%	3.5	16.7

Figure 46

Attacks on passenger and subway trains dominate distribution and, except for attacks on tourist trains (which are relatively rare), also are the most lethal train attacks (see Figure 47). These figures reflect the Madrid and London attacks, showing the effect of recent and major attacks on overall lethality.

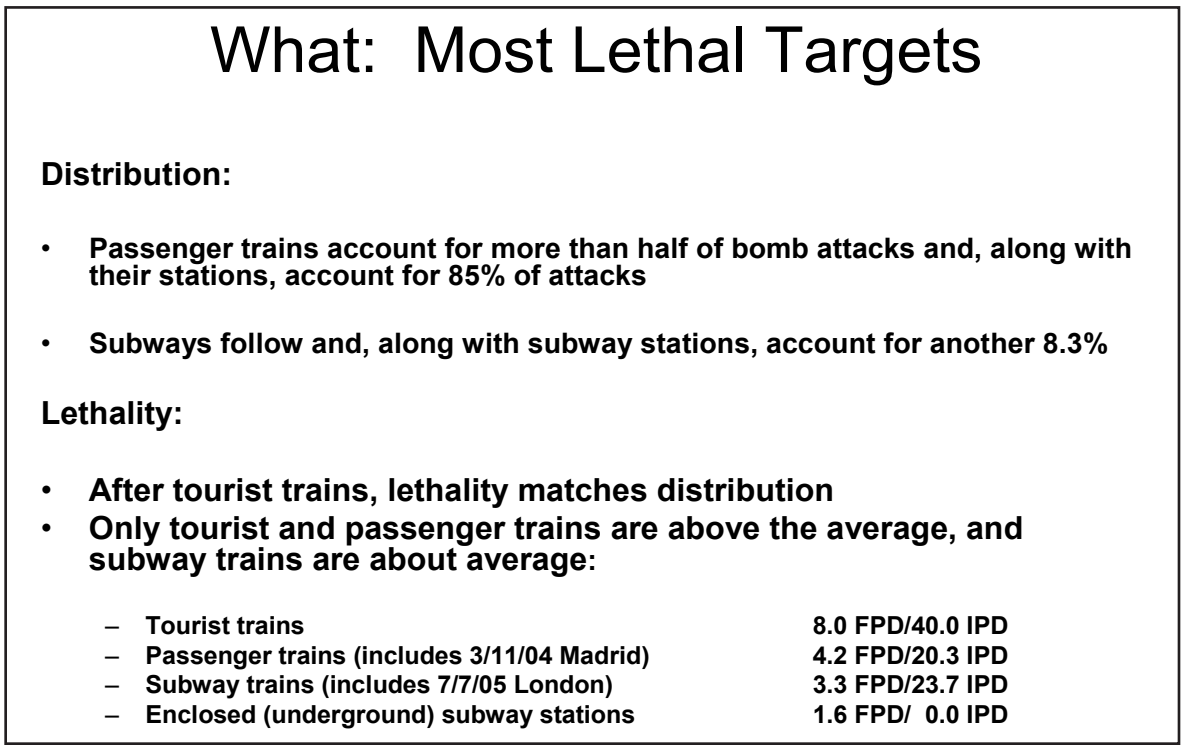

Figure 47

Distribution and Lethality by Device

Figure 48 shows the distribution and lethality of explosive and incendiary devices used against train targets. The overall lethality of these devices—often used in enclosed areas—is greater than average. Unspecified IEDs are more lethal in train attacks than in all bomb attacks, and not only do they dominate distribution, they are the only device with above-average lethality for such attacks.

Distribution and Lethality by Delivery and Concealment Method

Figure 49 provides distribution and lethality figures for methods of delivery and concealment of devices used in train bomb attacks.

The most frequent method of concealment of bombs is placement in passenger compartments (31.8 percent), then placement on tracks (25.1 percent), then concealment or placement in stations (21.2 percent). Other methods with more than 10 recorded attempts include leaving bombs in parcels or bags (7.8 percent), placing a bomb (or VBIED) outside of a station (5.3 percent), and finally, suicide bombers (4.15 percent). The rest of the methods have been used fewer than 10 times in events in the database. Thus, concealment methods for trains have about the same distribution as that for all bomb attacks.

How: Most Lethal Devices – Trains

Device	#	% of Total	FPD	IPD
IED - unspecified	396	91.24%	3.6	18.2
IID (improvised incendiary device)	11	2.53%	3.4	3.3
IED -mine	11	2.53%	2.7	5.9
IED - dynamite	6	1.38%	2.0	1.1
VBIED	5	1.15%	1.4	6.4
IED - grenade	5	1.15%	0.3	1.5
Total/overall average	434	100%	3.5	16.7

Distribution: Unspecified IEDs dominate

Lethality: Overall lethality about the same – 3 FPD

- **Unspecified IED more lethal (3.6 FPD versus 2.6 FPD)—only device above average; for all attacks, only device above average was mines (3.5 FPD versus 4.6 FPD)**
- **IIDs next most lethal for trains and more lethal than for all attacks (3.4 FPD versus 1.1 FPD); VBIEDS understandably less lethal (1.4 FPD versus 3.2 FPD)**

Figure 48

Delivery/Concealment Method – Train Bomb Attacks

Concealment/Delivery Method	#	% of Total	FPD	IPD
Concealed/left in pax compartments	138	31.80%	5.0	20.2
Placed on railroad track	109	25.12%	1.9	9.0
Concealed/left in stations	92	21.20%	3.4	12.4
Concealed in parcel or bags	34	7.83%	5.5	38.9
Concealed/placed outside of stations	23	5.30%	0.4	2.0
Carried on person	18	4.15%	5.3	45.2
Physically thrown	7	1.61%	0.1	3.1
Concealed/placed in non-pax areas	5	1.15%	0.6	0.1
Unknown (not described)	3	0.69%	3.0	28.0
Concealed in or on vehicle	2	0.46%	0	1.5
Placed near target - unspecified	2	0.45%	0.5	9.5
Concealed inside of building or office	1	0.23%	0	0
Total/average	434	100.00%	3.5	16.7

Figure 49

The most notable difference between lethality in train bomb attacks and that in all bomb attacks is that concealing a bomb in the passenger compartment of a train or in a bag or parcel is about as lethal as a suicide bombing.

The Twelve Most Lethal Combinations

The 12 most lethal combinations of target, device, and delivery and concealment method for passenger train targets are shown in Figure 50.

As in the case of all bomb attacks, the most lethal combinations in train attacks (e.g., the 2007 Peace Train attack, the dynamite bombing in China, and the female suicide bomber in the Moscow subway) are not necessarily the most commonly used. Attacks against tourist trains are rare (with an average lethality of 8 FPA), and the unknown attacks include one particularly lethal attack against a train station in Sri Lanka (5 FPA) in which the attackers used a method that is not described in the source material.

The methods of concealment and delivery that are used most commonly or that have been used in particularly notorious attacks include the following:

- The most lethal method that has been used in more than 10 attacks is concealment of bombs in parcels or bags in passenger trains, yielding an FPD of 13, higher than that of the suicide bombings. This method was used in the Madrid subway bombings.
- Suicide bombing was used in the 2003 attack on a commuter train in Moscow (12 FPD), and also in the three London subway bombs on July 7, 2005 (11 FPD) and attacks in India, China, Sri Lanka, Israel, Turkey, and Indonesia that yielded a relatively low FPD of 3.
- The most commonly used concealment methods for train attacks are placement of a bomb in the passenger compartment, used in 118 attacks in the database (6 FPD), and placement of a bomb in the station, used in 66 attacks (5 FPD). These data derive from a large enough number of attacks to be particularly relevant.

12 Most Lethal Combinations: Trains

FPA	#	Target	Device	Delivery/Concealment
34	2	Passenger train	Improvised incendiary device (IID)	Carried in parcel or bags
20	1	Passenger train	IED-dynamite	Concealed in pax compartment
13	17	Passenger train	IED - unspecified	Concealed in parcel or bags
12	3	Passenger train	IED - unspecified	Carried on person
11	1	Subway station	IED - unspecified	Carried on person
10	4	Subway train	IED - unspecified	Carried on person
8	1	Tourist train	IED - unspecified	Placed on railroad track
6	118	Passenger train	IED - unspecified	Concealed in pax compartment
5	66	Train station, unspecified	IED - unspecified	Left in station
5	2	Passenger train	IED - unspecified	Unknown (not described)
4	11	Subway train	IED - unspecified	Left in passenger compartment
3	8	Train station - unspecified	IED - unspecified	Carried on person

Figure 50

Attacks, Fatalities, and Injuries Over Time

Figures 51 and 52 show the pattern of attacks and fatalities and attacks and injuries, respectively, over time. There is a curious difference between attacks and fatalities between 1998 and 2003, and a confluence that starts again in 2005. The same pattern seems to exist for injuries. Further analysis is needed to explore the reasons for this.

Explosives Train Attacks and Fatalities Over Time

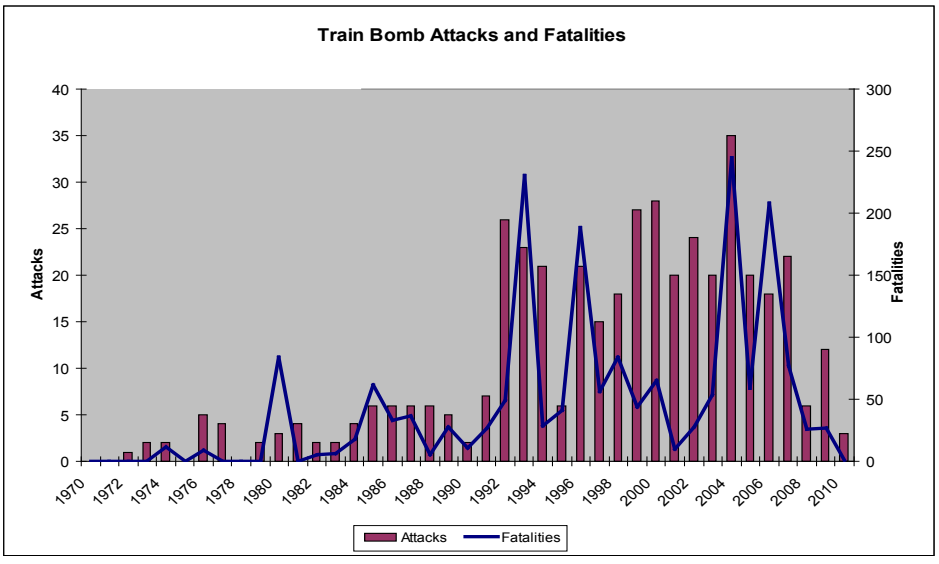

Figure 51

Explosives Train Attacks and Injuries Over Time

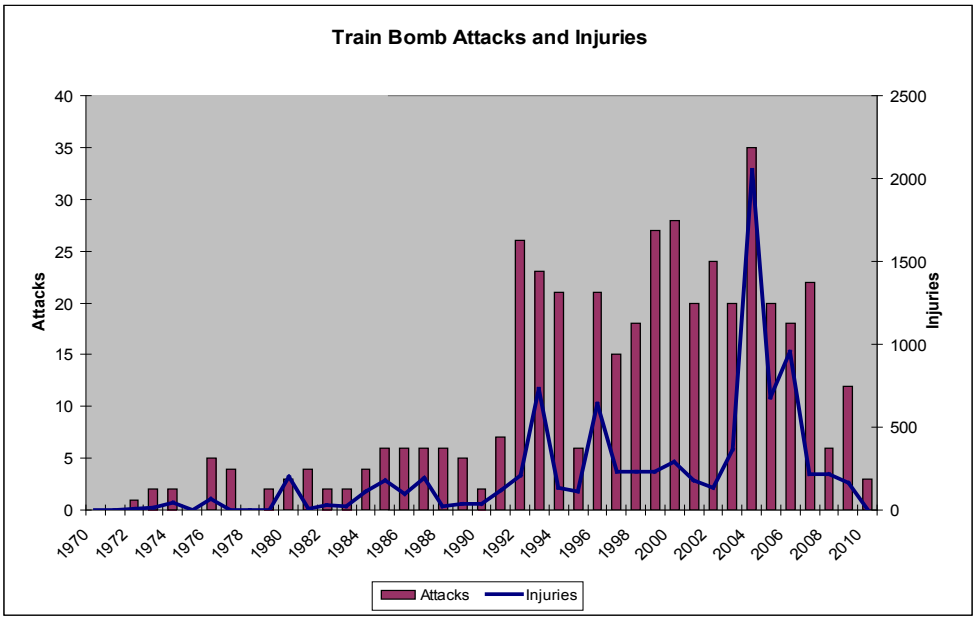

Figure 52

ATTACKS AGAINST BUSES

Distribution and Lethality by Region and Country

Figures 53 and 54 provide regional distribution and lethality calculations for all bus attacks and for bombing attacks against bus targets.

All Bus Attacks: Regional Distribution and Lethality

Region	#	% of Total	FPA	IPA
South Asia	241	30.66%	4.9	14.4
Middle East and North Africa	220	27.99%	3.7	13.4
Southeast Asia	90	11.45%	2.1	6.0
Sub-Saharan Africa	52	6.62%	6.9	4.6
South America	50	6.36%	2.4	2.1
Russia and the NIS	47	5.98%	2.7	6.6
Western Europe	30	3.82%	1.2	8.2
East Asia	20	2.54%	7.5	9.9
Eastern Europe	18	2.29%	1.1	4.9
Central America & Caribbean	12	1.53%	1.4	3.0
North America	4	0.51%	0	0
Central Asia	1	0.13%	0	2.0
Australasia & Oceania	1	0.13%	0	0
Total	786	100.00%	3.8	10.4

Figure 53

Bus Bomb Attacks: Regional Distribution and Lethality

Region	#	% of Total	FPD	IPD
South Asia	192	38.79%	4.7	16.9
Middle East and North Africa	149	30.10%	3.2	16.7
Southeast Asia	59	11.92%	2.1	7.2
Russia and the NIS	31	6.26%	3.9	9.2
Western Europe	18	3.64%	1.5	13.6
East Asia	15	3.03%	9.9	13.0
South America	16	3.23%	0.9	1.6
Sub-Saharan Africa	7	1.41%	9.6	6.0
Eastern Europe	4	0.81%	3.0	14.3
Central America & Caribbean	2	0.40%	0	3.5
Central Asia	1	0.20%	0	2.0
Australasia & Oceania	1	0.20%	0	0
North America	0	0.00%	0	0
Total	495	100.00%	3.1	11.6

Figure 54

Figures 55 and 56 compare the distribution and lethality of bomb attacks against buses with those of bomb attacks against all targets. Although the Middle East and North Africa dominate at least the Western consciousness about terrorism, this is not the most lethal region for either all attacks or bomb attacks against buses; its lethality is actually below average for all attacks and only slightly above average for bomb attacks.

All Attacks: Regional Distribution and Lethality

Distribution:

- **The regions with the greatest share of attacks are: South Asia (30.6%), the Middle East and North Africa (27.9%), and Southeast Asia (11.4%).**
- **Another set of regions follow: Sub-Saharan Africa (6.6%), South America (6.4%), and Russia and the NIS (5.9%).**
- **Western Europe follows at about 3%, then East Asia at 2.5% and Eastern Europe at 2.3%.**
- **Other regions have few attacks; North America is in 11th place with less than 1%.**

Lethality:

- **The leading region is East Asia (7.5 FPA), and Sub-Saharan Africa follows (6.9 FPA). These are influenced by lethal bomb attacks in China and multiple weapons attacks in Africa.**
- **The only region above average is South Asia (4.9 FPA), with the Middle East and North Africa slightly below average lethality at 3.7 FPA.**

Figure 55

Bomb Attacks: Regional Distribution and Lethality

- **Distribution is close to bomb attacks against all targets:**
  - **The regions with the greatest number of attacks are South Asia (39%), the Middle East and North Africa (30%), Southeast Asia (12%).**
  - **Next comes Russia and the NIS (6%), followed by a set of three regions: Western Europe, East Asia, and South America—figures somewhat over 3%.**
- **Lethality follows a different track. The most lethal regions are**
  - **East Asia (9.9 FPA), which includes some deadly bus attacks in China.**
  - **Sub-Saharan Africa (9.6 FPA), with multiple weapons attacks.**
  - **South Asia at 4.7 FPA, and then Russia and the NIS at 3.9 FPA.**
  - **Finally, once again, the Middle East and North Africa, which dominates Western consciousness about terrorism directed against public transport because of the bus bombings in Israel, but is actually only slightly above average lethality at 3.2 FPA.**

Figure 56

Figure 57 lists the 10 developed and developing countries that have experienced the most bus attacks of all types, and Figure 58 lists those that have had the most bomb attacks on bus targets.

All Bus Attacks – Leading Countries

Developing countries suffer more; major campaigns in developed countries are in Israel (current) and UK (mostly past - IRA)

Rank	Developing	#	% of total	FPA	IPA	Developed	#	% of total	FPA	IPA
1	India	93	11.83%	4.0	12.2	Israel	143	18.19%	3.5	16.6
2	Pakistan	75	9.54%	4.5	12.0	Russia	37	4.71%	3.0	5.8
3	Philippines	71	9.03%	2.0	7.1	U.K.	11	1.40%	3.2	19.8
4	Colombia	37	4.71%	2.0	1.2	Greece	7	0.89%	0.1	2.3
5	Sri Lanka	35	4.45%	9.6	10.3	France	4	0.51%	0	0
6	Turkey	23	2.93%	3.7	10.3	Spain	3	0.38%	0	0
7	Algeria	23	2.93%	8.3	10.1	Japan	2	0.25%	0	0.5
8	Egypt	20	2.54%	1.3	5.1	Poland	2	0.25%	0	0
9	China	16	2.04%	9.3	12.2	Canada	2	0.25%	0	0
10	Indonesia	13	1.65%	1.0	2.7	Bosnia	1	0.13%	0	0

Figure 57

Bus Bomb Attacks – Leading Countries

Some changes in developing countries; no significant changes in developed countries

Rank	Developing	#	% of Total	FPA	IPA	Developed	#	% of Total	FPA	IPA
1	India	70	14.14%	3.0	14.5	Israel	110	22.22%	3.8	19.3
2	Pakistan	65	13.13%	4.4	13.7	Russia	26	5.25%	4.2	8.0
3	Philippines	52	10.51%	2.0	8.3	U.K.	7	1.41%	3.6	31.0
4	Sri Lanka	30	6.06%	9.6	13.9	Greece	5	1.01%	0.2	3.2
5	China	14	2.83%	10.6	13.9	France	3	0.61%	0	0
6	Turkey	14	2.83%	1.8	13.7	Estonia	1	0.20%	1.0	10.0
7	Colombia	12	2.42%	1.0	1.8	Italy	1	0.20%	0	0
8	Algeria	10	2.02%	0.8	16.2	Sweden	1	0.20%	0	0
9	Egypt	8	1.62%	0.1	2.1					
10	Indonesia	8	1.62%	1.6	3.4					

Figure 58

Clearly, with the exception of Israel, the majority of the attacks have taken place in developing countries. Also notable are campaigns in Russia (largely by Chechen separatists) and the United Kingdom. Attacks in the United Kingdom included a jihadist attack on July 7, 2005, and—although the IRA generally avoided transportation attacks that generated large civilian casualties, particularly in Great Britain itself—one IRA bus bomb in 1974 in England that killed 11 soldiers, and another execution-style assault in Northern Ireland in 1976 that killed 10 Protestant workers.

For developing countries, the only significant shift in ranking (more than two positions) occurred as a result of the increase in bomb attacks in China and the decrease in Colombia and Egypt. For developed countries, the rankings shifted very little when there were more than three attacks.

The list of countries with the most attacks reflects the presence of terrorist campaigns that have included public bus transportation targets. While the largest single terrorist group listed in the MTI database is “unknown,” because of the lack of claims or suspicions confirmed by authorities, specific organizations and generic groups seem to be primarily responsible for attacks against bus targets in these countries. In developing countries, campaigns appear to be dominated by the following organizations and groups:

- **India**. Kashmiri and Sikh separatists, Naga and other tribal separatists, Islamic extremists and Lashkar-e-Taiba (LeT), United Liberation Front of Asom (ULFA), and Maoists.
- **Pakistan**. Baloch Liberation Army, Islamic extremists and separatists, and, in earlier decades, Afghan government agents.
- **The Philippines**. The MLF and the New People's Army, particularly in Mindanao.
- **Colombia**. FARC and the National Liberation Army.
- **Sri Lanka**. LTTE.
- **Turkey**. PKK (Kurdish separatists).
- **Algeria**. The Armed Islamic Group (GIA) and Islamic extremists.
- **Egypt**. Al-Gamya and other Islamic extremists.
- **China**. Muslim separatists.
- **Indonesia**. The Free Aceh Movement (GAM).

In the developed countries, the following organizations and groups—in addition to deranged individuals—are primarily responsible for attacks on public transportation:

- **Israel, the West Bank, and Gaza Strip**. Hamas, Hizballah, Palestinian Jihad, the Popular Front for the Liberation of Palestine and its various factions, and the Al-Aqsa Martyrs Brigade.
- **Russian Federation**. Chechen separatists.
- **The United Kingdom of Great Britain and Northern Ireland**. the Provisional, Real, and Continuity IRA, al Qaeda-inspired conspiracies.
- **Greece**. ELA and other left-wing groups.
- **Spain, France, and Italy**. Basque separatists.
- **Poland**. Robbers.
- **Estonia**. One bomber.
- **Japan**. Deranged individuals.
- **Canada**. A disturbed Lebanese Christian who hijacked a bus (the incident was resolved peacefully in front of Parliament Square in Ottawa) and a recent criminal hijacking of a bus in Edmonton.

For U.S. stakeholders who have a tendency to see all terrorism as directed against Americans and their allies by "Middle Easterners," these figures provide some interesting contrasts.

First, terrorist attacks have taken place in a number of Islamic countries, including Egypt, Algeria, Indonesia, and Pakistan.

Second, the ideological motivation of the attacking groups runs from religious (Hamas and Hizballah in Israel, LeT in Pakistan, and al Qaeda), to groups advocating secular independence (LTTE in Sri Lanka, PKK in Turkey, Chechen fighters in the Russian Federation), to Marxist or left-wing groups (FARC and NLA in Colombia, MLF in the Philippines, and ELA in Greece).

Third, if there is a common thread, it is the desire for some kind of local, regional, or national independence or autonomy. Although groups communicate, observe and imitate tactics, sometimes provide funding, and even form alliances (often uneasy), most terrorist campaigns, like politics and many wars, are local in their objectives and have to be understood locally, not simply with broad brushstrokes.

Fourth, some of most bloody campaigns have been conducted outside of the Islamic orbit, most notably by LTTE in Sri Lanka.

Thus, while terrorism against public transportation, including and perhaps especially bus transportation, has increased, this is the result of different campaigns, born out of different grievances. Nevertheless, the tactics are known, communicated, imitated, or improved upon as the general threshold against attacks involving innocent civilians erodes. It is alleged, for example, that LTTE in Sri Lanka, which may have observed Hamas's first suicide car bombs during the Israeli invasion of Lebanon in 1982, invented the suicide belt and first used female suicide bombers, two tactics that were then adopted and enhanced by Hizballah, Hamas, and other groups in Israel, Gaza, and the West Bank.

Distribution and Lethality by Type of Attack and Weapon

Figures 59 and 60 show distribution and lethality by type of attack for all bus attacks. Figure 59 indicates that explosives and incendiary devices are the weapons most widely used in bus attacks, being used in 63 percent of the attacks since 1970; automatic weapons were used in about 16 percent, arson in 5 percent, and armed hijacking and robbery (combined) in 7 percent. Many of the "multiple attacks" involve a combination of explosives and sometimes incendiaries, followed by assault with automatic weapons.

The highest lethality was achieved by LTTE's use of Claymore mines in Sri Lanka, yielding an FPD of 10.8. The next highest figure comes from two attacks, one of which was the sabotage of a tour bus (which sources do not describe) in Istanbul in which 36 people were killed. Multiple weapons follow at 8.6 FPA, and execution-style "other assaults" at 8.1 FPA.

The more commonly used attack methods that are above average include mines placed on vehicle roads (7.1 FPA), assault with automatic weapons 5.5 FPA), and VBIEDS used against buses (5.3 FPA). All of these are roughly two or more times as lethal as the most

Distribution and Lethality of All Attacks

Weapon	#	% of Total	FPA	IPA
IED - unspecified	378	48.09%	3.7	14.6
Assault with automatic weapons	126	16.03%	5.5	5.6
Arson	39	4.96%	0.2	0.8
IED - grenade	37	4.71%	2.5	14.1
IID	31	3.94%	1.2	3.4
Armed hijacking	30	3.82%	0.9	0.8
Robbery	25	3.18%	0.7	1.0
IED - mine	23	2.93%	7.1	15.5
VBIED	16	2.04%	5.3	20.2
Kidnapping	16	2.04%	0.8	0.6

Figure 59

Distribution and Lethality of All Attacks (cont.)

Weapon	#	% of Total	FPA	IPA
Multiple weapons	21	2.67%	8.6	12.5
Assault - other or unspecified	15	1.91%	8.1	3.2
Assault with RPG	8	1.02%	1.1	2.8
IED - dynamite	5	0.64%	0.8	2.0
IED – Claymore mine	5	0.64%	20.8	36.2
Other (not yet categorized)	4	0.51%	2.8	7.8
Unknown (not described)	3	0.38%	0.3	1.0
Mortar	2	0.25%	1.0	5.0
Sabotage, other	2	0.25%	18.0	3.5
IED - Other	0	0.00%	0	0
Total	786	100.00%	3.8	10.4

Figure 60

commonly used device, the unspecified IED (3.7 FPA). This is not what one would expect, but it reflects the reality of bus attacks since 1970.

Distribution and Lethality by Target

We next consider the frequency with which various public bus transportation targets have been attacked since 1970, first by all methods, and then by only explosives and incendiaries.

Figure 61 provides distribution and lethality calculations by attack and weapon for all bus attacks. Scheduled passenger buses—including minivan and minibus scheduled service—have been the targets of roughly 70 percent of the attacks, and when tourist and school buses are included, they constitute 80 percent of the targets. Bus stations and bus stops have been the targets of about 20 percent of the attacks. Lethality generally follows distribution, with only scheduled buses, school buses, and minivans and buses (often a part of scheduled bus transportation in developing countries) above or close to the average FPA. The lethality of attacks on bus stations and bus stops is low, but interestingly, the lethality for bus stops (1.8 FPA) is greater than that for bus stations (1.3 FPA).

Figure 62 provides distribution and lethality figures for bus bomb attacks.

When only bomb attacks are considered, the percentage of attacks against scheduled bus service decreases to 63 percent, and that of attacks against all buses decreases to around 70 percent; the percentages against stops and stations increase correspondingly.

Attacks on scheduled buses (including minivans) continue to have the highest lethality, though somewhat less, not more, than when all attacks against buses are considered, and these remain the only targets above or nearly at average lethality. Tourist and school buses, less often hit, follow at around 2.4 FPA. Attacks on bus stops remain at 1.8 FPD, and attacks on bus stations fall to 1.0 FPD.

Distribution and Lethality of All Bus Attacks by Target

Subtarget	#	% of Total	FPA	IPA
Bus, scheduled	516	65.65%	4.8	11.4
Bus station - unspecified	110	13.99%	1.3	9.5
Bus, tourist	64	8.14%	2.3	4.3
Bus stop	45	5.73%	1.8	14.4
Minivan or minibus	35	4.45%	3.5	5.7
Bus, school	16	2.04%	2.4	9.7
Enclosed or open station	0	0.00%	0	0
Total/overall average	786	100.00%	3.8	10.4

Figure 61

Distribution and Lethality of Bus Bomb Attacks by Target

Subtarget	#	% of Total	FPD	IPD
Bus, scheduled	297	60.00%	4.4	14.1
Bus station - unspecified	106	21.41%	1.0	7.5
Bus stop	40	8.08%	1.8	13.9
Bus, tourist	24	4.85%	0.6	2.6
Minivan or minibus	18	3.64%	2.5	7.5
Bus, school	10	2.02%	3.2	13.0
Enclosed or open bus station	0	0.00%	0	0
Total/overall average	495	100.00%	3.1	11.6

Figure 62

In the database, the terms “bus station–enclosed building” and “bus station–open air” are used only when there is enough information to determine that they are in fact enclosed or open air. If the type of station cannot be determined from the available evidence, the station is coded as “unspecified.” Since most of the attacks occur in developing countries, it is likely that the majority of the stations are open air.

Bomb Attacks Against Buses

Figure 63 shows the proportions of attacks in which single and multiple explosive and incendiary devices are used and the percentage of attacks involving bombs that are conducted by suicide bombers.

The proportion of attacks involving a single device is quite high—about 87 percent, which is the same as the equivalent figure for trains. Again, multiple devices are sometimes used in attacks on the same target, demonstrating an attempt at redundancy, and a few—because of how the data are entered in the database—are single-device attacks against identical targets at the same time. Also, some of the multiple-device attacks were designed so that one or more devices detonated just as responders or explosives personnel arrived on the scene.

More than 12 percent of the attacks on buses have been suicide attacks. As noted earlier, the percentage of bomb attacks that are suicides is far higher for bus targets than for all targets and especially for train targets, a reflection primarily of the campaigns in Israel, Sri Lanka, and, to a lesser degree, Russia.

Bombs and Bombers

The % of single bombs is about the same as for all bomb attacks and all train bomb attacks

Single or Multiple	#	% of Total
Single	63	12.73%
Multiple	432	87.27%
Total	495	100.00%

The % of suicides is considerably higher than in all bomb attacks (6.69%) and much higher than in bomb attacks against trains (3.45%), most likely attributed to suicide campaigns in Israel, Sri Lanka, and Russia

Type	#	% of Total
Suicide	61	12.32%
Non-suicide	434	87.68%
Total	495	100%

Figure 63

Figure 64 illustrates the "outcomes" of explosive and incendiary devices used in bus attacks. The majority (87 percent) of devices are presumed to have detonated or been released on target, considerably higher than the average for trains (72.8 percent) and for all targets (72.3 percent). Nevertheless, for bus targets, 8 percent of the devices were rendered safe, and 4.6 percent detonated early or away from the target or malfunctioned. Once again, it is important to note that devices can be found and defused and passengers can be evacuated before an explosion when drivers, conductors, intelligence, police and security officials, and passengers are alert. In some instances, devices were also poorly designed.

Bombs and Bombers (cont.)

Bombs appear to detonate on target and on time more frequently against buses (87.27%) than against all targets (76.81%) and against trains (72.31%)

Outcomes	#	% of Total
Detonated or released on target	432	87.27%
EOD successful - rendered safe	40	8.08%
Detonated early or away from target or malfunctioned	23	4.65%
Total	495	100.00%

Figure 64

Distribution and Lethality by Device

Figure 65 shows the distribution and lethality of devices used against bus targets. Unspecified IEDs are used most commonly, but Claymore mines, land mines, and VBIEDs are the most lethal, followed by unspecified IEDs, which have slightly above-average lethality. All other devices have below-average lethality.

Bomb Attacks: Distribution and Lethality by Device

Distribution: Unspecified IEDs predominate, followed by grenades, IIDs, mines and VBIEDs.

Lethality: Claymores (unique to Sri Lanka) most lethal, followed by mines on roads, and then VBIEDS, and finally unspecified IEDs – all others below average lethality

Weapon	#	% of Total	FPD	IPD
IED - unspecified	378	76.36%	3.2	12.6
IED - grenade	37	7.47%	1.9	10.6
IID	31	6.26%	0.5	1.6
IED - mine	23	4.64%	7.1	15.5
VBIED	16	3.23%	5.3	20.2
IED - dynamite	5	1.01%	0.6	1.4
IED – Claymore mine	5	1.01%	20.8	36.2
IED - other	0	0	0.0	0.0
Total	495	100%	3.1	11.6

Figure 65

Distribution and Lethality by Target

The distribution and lethality for bomb attacks against bus targets were shown in Figure 62. Attacks on scheduled buses (including minivans) had the highest lethality. Attacks on tourist and school buses, which have been attacked less often, follow at around 2.4 FPD. Attacks on bus stops achieved 1.8 FPD and were more lethal than attacks on bus stations (1.0 FPD).

Distribution and Lethality by Delivery and Concealment Method

Figure 66 shows the distribution and lethality of various methods of delivery and concealment.

Distribution and Lethality by Concealment and Delivery

Method	#	% of Total	FPD	IPD
Concealed/left in pax compartments	173	34.9%	3.2	10.8
Physically thrown	71	14.3%	1.0	5.3
Concealed/left in stations	64	12.9%	0.2	1.6
Carried on person	61	12.3%	6.8	32.5
Placed on vehicle road	35	7.1%	6.2	14.7
Placed near the bus or other target	28	5.7%	7.2	20.6
Concealed in parcel or bags	24	4.8%	4.3	7.8
Concealed/left at bus stop	23	4.6%	0.8	8.8
Concealed/placed outside of stations	10	2.0%	0.2	1.6
Unknown (not described)	4	0.8%	1.0	5.0
Concealed/placed in non-pax areas	2	0.4%	5.0	0
Total/average	495	100.0%	3.1	11.6

Figure 66

Placing a bomb in the passenger compartment is the most common method, followed by throwing grenades, hiding bombs in stations, and delivery via a suicide bomber. Other techniques include parcel bombs, land mines, and attacks at bus stops. As shown in Figure 67, Claymore mines have the greatest lethality, but unlike the case of trains, suicide bombers are the most lethal means of attack on buses that occurred more than 50 times—twice as deadly as placing bombs in passenger compartments.

Distribution and Lethality: Delivery and Concealment

Distribution

- Concealing in passenger compartment dominates means
- Physically throwing grenades, concealing bombs in stations, and carrying them in person (suicide) follow
- Placing on vehicle road (usually mines), concealing in parcels or bags or at bus stops follow

Lethality

- Bombs (Claymores) placed on bus most lethal: 7.2 FPD
- Suicide bombs next more lethal (6.8 FPD), **and most lethal method when there are more than 50 attacks and twice as lethal as concealment in pax areas (3.2 FPD)**
- Concealment in parcels and bags (4.3 FPD) is also above average lethality (3.1 FPD)
- All other methods below average (except non-pax placement (5.0 FPD), which is from one bomb in one bus gas tank)

Figure 67

The Twelve Most Lethal Combinations

Figure 68 presents the 12 most lethal combinations of target, device, and concealment method for bus attacks. Again, some of these combinations reflect very few attacks and therefore show what terrorists have achieved in particular instances, not what they normally achieve.

For bus attacks, the combinations used in small numbers of attacks that provided greater average lethality than the most common methods include the following:

1. A 1996 attack in Pakistan (40 fatalities), in which a bomb was placed near the gasoline tank of a bus.
2. Two attacks involving Claymore mines in Sri Lanka (21 and 20 fatalities), one against a scheduled bus and the other against a government bus.
3. One 2007 suicide operation against a bus carrying police in Pakistan (18 fatalities).
4. Two instances in which flammable devices ignited in passenger buses (perhaps accidentally) in China in 1994 (an average of 14 fatalities).
5. A motorcycle bomb in Sri Lanka used against a government bus (13 fatalities).
6. Mines used once in Russia and twice in India against government buses (an average of 12 fatalities).

The most lethal attacks with more commonly used combinations on scheduled buses

involve IEDs carried in parcels or bags in 13 attacks, yielding an average of 9 FPD. The next most lethal were 46 attacks in which suicide bombers detonated inside of passenger buses, and 21 attacks in which mines were placed on vehicle roads. Seven attacks in

12 Most Lethal Combinations

FPA	#	Target	Device	Delivery/Concealment
40	1	Scheduled bus	IED - unspecified	Concealed in non-pax areas
30	1	Truck (ersatz minibus)	IED - unspecified	Carried on person
21	5	Scheduled bus	IED – Claymore	Placed near the target
16	2	Co. or gov't bus	IED- Claymore	Placed near the target
18	1	Co. or gov't bus	IED - unspecified	Carried on person
13	1	Co. or gov't bus	IED - unspecified	Concealed in or on vehicle (motorcycle)
12	3	Co. or gov't bus	IED - mine	Placed on vehicle road
9	13	Scheduled bus	IED - unspecified	Concealed in parcel or bags
8	46	Scheduled bus	IED - unspecified	Carried on person
8	21	Scheduled bus	IED - mine	Placed on vehicle road
7	6	Scheduled bus	VBIED	Placed near the bus
7	7	Bus stop	IED - unspecified	Carried on person

Figure 68

which suicide bombers detonated at bus stops—not stations—achieved an average FPD of 7, and 6 attacks in which VBIEDS were used against buses yielded an average FPD of six (once again, VBIEDs can be used in suicide operations).

Suicide bombers play a more important role in bus attacks than in train attacks. When we consider the 12 most lethal combinations of target, device, and method of concealment and delivery, the most commonly used is suicide bombing on board a bus (the data are clearly influenced by campaigns in Israel and Sri Lanka). However, the same lethality has been achieved using land mines, and bombs hidden in parcels and bags are more lethal than suicide bombs carried on the person.

The most common combination—concealment of an IED in a passenger compartment of a bus, of which there were more than 120 instances—yielded an average FPD of 4, only half that of suicide bombers carrying IEDs and less than half that of IEDs left in parcels or bags.

The final report will explore the lethality rates of various delivery and concealment methods when only bombs that detonated on target are considered. This may affect the relative lethality of suicide bombers and other commonly used methods of concealment and delivery.

Attacks, Fatalities, and Injuries Over Time

Figures 69 and 70 show patterns of attacks and fatalities and patterns of attacks and injuries, respectively. The patterns in bus attacks track more closely than those in train attacks.

Bus Bomb Attacks: Attacks and Fatalities Over Time

Spikes in fatalities coincide with attacks

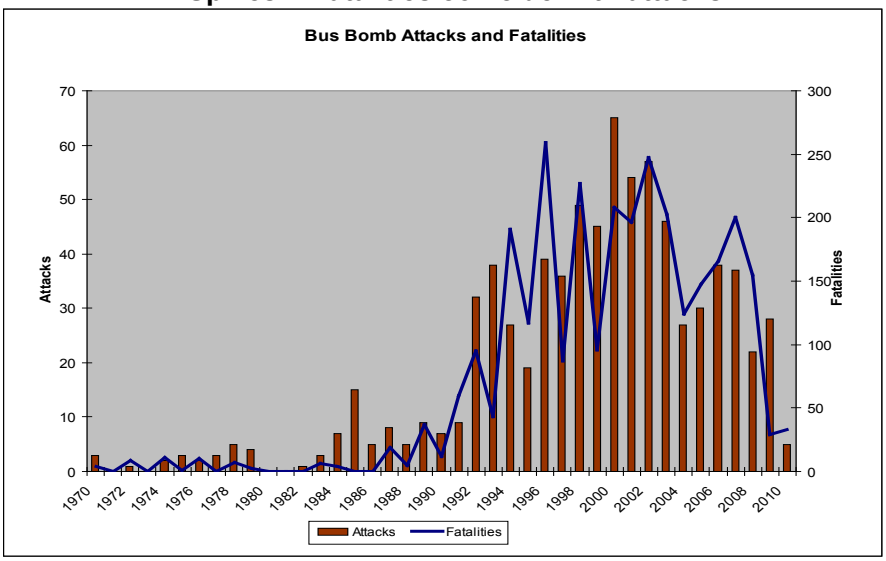

Figure 69

Bus Bomb Attacks: Attacks and Injuries Over Time

Injuries also generally coincide with attacks

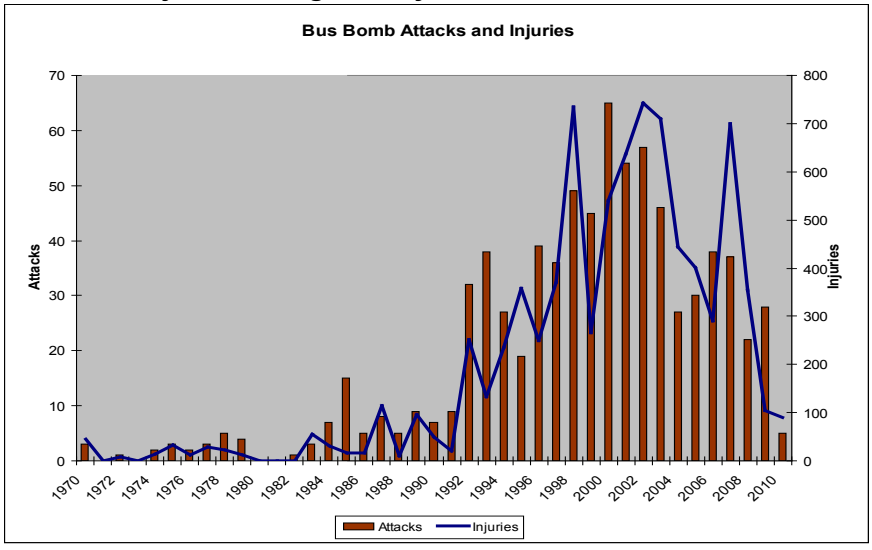

Figure 70

APPENDIX

NOVEMBER 12, 2009, BRIEFING FOR DHS COUNTER-IED WORKING GROUP

Explosives Used Against Public Surface Transport: Preliminary Observations

Brian Michael Jenkins
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Mineta Transportation Institute
National Transportation Security Center

Briefing for DHS
Counter-IED Working Group
November 12, 2009
Washington DC

Agenda

- Overview of MTI interim data base
- All attacks against all public surface transport targets
- Bomb attacks against all public surface transport targets
- All Attacks against passenger train targets
- Bomb attacks against passenger train targets
- All Attacks against bus targets
- Bomb attacks against bus targets

MTI Interim Data base

Overview

Current Data

- New attacks captured since 9/01/09, mostly for buses and some for train stations:
  - 1,384 (1206) attacks on all *public* surface transport
  - 438 (416) attacks against passenger trains/stations
  - 354 (338) explosive attacks against passenger trains
  - 684 (540) attacks against all buses
  - 439 (336) explosives attacks against all buses
- Time:
  - All Attacks: January 1970 (July 1974) to Present
  - Attempted Derailments – 1920 to Present (11 out of 91 occurred between 1920 and 1970)
- Sources:
  - 1920-2009: Published MTI Chronologies and Updated Open Sources
  - 1998-2007 UMSTART accounts with narratives

Recent and Planned Enhancements

- Recent:
  - Added under 200 new attacks from terrorist campaigns against buses in Russia, Israel, Sri Lanka, India, Pakistan, Turkey, Colombia, Thailand, the Philippines and Indonesia, and some train station and road attacks
  - Focused road attacks on those clearly aimed at bridge and tunnel destruction or road system disruption.
- Underway:
  - Information from explosives communities on recent explosives attacks.
  - Additional data fields (see next two slides) on 50 bus attacks (for bus operator project) train attacks; 50 train attacks will then be added.
  - Moving to more stable and robust platform.
  - More powerful system will enable multiple median calculations which will give a truer picture.
- WE ARE SEEKING YOUR SUGGESTIONS

Some Current Fields

Targets (37 types):

- Bus (scheduled, school, tourist, government)
- Train (inter-city and commuter passenger, subway, Trolley, elevated, government, tourist)
- Train infrastructure: Track, Bridge, Tunnel, Communications
- Stations (enclosed, open air) and bus stops
- Vehicle highway, road, bridge, tunnel

Weapon and Attack (26 types:

- IED & IID
- VBIED
- Assault automatic weapons
- Assault with RPG
- Arson
- Sabotage by derailing, or other sabotage
- Robbery, Armed Hijacking and Kidnapping

Some Current Fields for Explosives

Explosives

- **IED Unspecified**
- **Mines & Claymore Mines**
- **Dynamite**
- **Grenades**
- **VBIEDS**
- **IIDs**
- **Other**

Location:

- **Above or under Ground**
- **In enclosed or open area**

Outcome:

- **Detonated or released on target**
- **Malfunctioned, detonated, released early or away from target**
- **Failed to detonate or release**
- **Detonated during unsuccessful EOD**
- **Rendered Safe**

Delivery and Concealment (16 types)

- **On Person (Suicide)**
- **Left in bag or parcel in train or bus**
- **Left in station or bus stop**
- **Left outside station or bus stop**
- **Left in passenger compartment of train or bus**
- **Left in non-passenger compartment of train or bus**
- **Placed on tracks or near trains**
- **Placed near buses**
- **Physically thrown**
- **Other**

Some Future Data Fields

- **When attacks take place (peak versus off-peak)**
- **Size of cities in which attacks take place**
- **Type of train or bus, and type of service, and any other data on environment in which bombs detonate**
- **IED details: Type and size of charge, type of detonator and timer**
- **Success in detecting attack/device:**
  - **Intelligence**
  - **Security personnel**
  - **Employees**
  - **Passengers**
  - **Canines**
  - **Technology**
- **Security measures before and after attack**

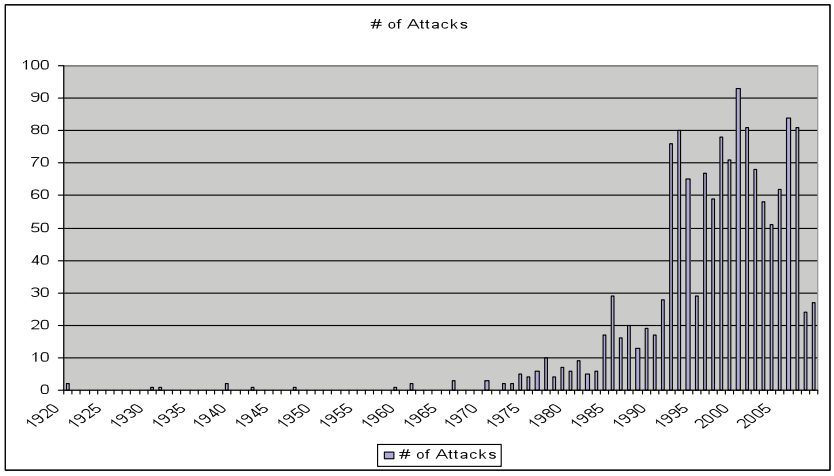
- **NOTE: Because accurate information is difficult to get, focus will be on more recent attacks, and attacks in countries with more reliable public reporting.**

All Attacks Against Public Surface Transport Targets

Body Counts "Count"

- **Terrorists seek slaughter; attacks with body counts of 50 to 100 considered good returns on investment**
- **Substantial percentage of *all* attacks against surface transport designed to kill, not to cause economic harm:**
  - **39% of attacks resulted in at least 1 death**
  - **18% of attacks resulted in at least 5 deaths**
  - **10% of attacks resulted in at least 10 deaths**
    - **Majority of recent attacks appear intended to kill**
  - **Most of remaining 61% of attacks**
    - **failed or were stopped, or**
    - **Aimed at disruption (often in areas of insurgency), especially against road targets (e.g., FARC and also IRA campaigns against tracks and roads)**

Surface Transportation Attacks: A Relatively Recent Problem



What About Suicide Bombers?

Train attacks: Small % of attacks and also proportional % of fatalities;
Different Story for Bus attacks: Higher Percentage and more lethal attacks

Category	#	Suicide %	Fatalities	Suicide %	Injuries	Suicide %
All attacks						
# suicides	71		530		2624	
# of all attacks	1384	5.13%	5460	9.71%	16385	16.01%
# of bomb attacks	1191	5.96%	3915	13.54%	14319	18.33%
Train Attacks						
# of Suicides	14		69		720	
# of Train Attacks	439	*3.19%*	2527	*2.73%*	8784	*8.20%*
# of Train Bomb attacks	354	*3.95%*	1951	*3.54%*	7769	*9.27%*
Bus Attacks						
# of Suicides	55		413		1884	
# of Bus Attacks	685	*8.03%*	2653	*15.57%*	7081	*26.61%*
# of Bus Bomb Attacks	441	*12.47%*	1734	*23.82%*	6102	*30.88%*

All Attacks - Distribution by Region

Region	#	%
South Asia	403	29.12%
Middle East and North Africa	283	20.45%
Southeast Asia	149	10.77%
Western Europe	189	13.66%
Russia and the NIS	110	7.95%
South America	98	7.08%
Sub-Saharan Africa	56	4.05%
East Asia	31	2.24%
Eastern Europe	28	2.02%
Central America & Caribbean	16	1.16%
North America	14	1.01%
Australasia & Oceania	4	0.29%
Central Asia	3	0.22%
Total	1384	100.00%

All Bomb Attacks

Bombings dominate: No differences in distribution

Region	#	%
South Asia	332	32.6%
Middle East and North Africa	203	20.0%
Southeast Asia	101	9.9%
Western Europe	153	15.0%
Russia and the NIS	91	8.9%
South America	56	5.5%
Sub-Saharan Africa	23	2.3%
East Asia	25	2.5%
Eastern Europe	12	1.2%
Central America & Caribbean	5	0.5%
North America	9	0.9%
Australasia & Oceania	4	0.4%
Central Asia	3	0.3%
Total	1017	100.0%

All Attacks: Leading Countries

With exception of Israel, developing countries suffer more

Rank	Developing	#	% of total	Rank	Developed	#	% of total
1	India	202	14.60%	1	Israel	140	10.12%
2	Pakistan	126	9.10%	2	Russian Federation	94	6.79%
3	Philippines	72	5.20%	3	United Kingdom	67	4.84%
4	Turkey	51	3.68%	4	Spain	43	3.11%
5	Colombia	60	4.34%	5	France	26	1.88%
6	Sri Lanka	55	3.97%	6	Germany	20	1.45%
7	Thailand	42	3.03%	7	Greece	10	0.72%
8	Egypt	34	2.46%	8	Italy	9	0.65%
9	Algeria	37	2.67%	9	United States	7	0.51%
10	China	19	1.37%	10	Japan	8	0.58%

Bomb attacks: Leading Countries

Bombs Dominate: No significant differences

Rank	Developing	#	% of total	Rank	Developed	#	% of total
1	India	162	15.96%	1	Israel	113	11.13%
2	Pakistan	109	10.74%	2	Russian Federation	81	7.98%
3	Philippines	53	5.22%	3	United Kingdom	64	6.31%
4	Turkey	38	3.74%	4	Spain	32	3.15%
5	Colombia	33	3.25%	5	France	19	1.87%
6	Sri Lanka	49	4.83%	6	Germany	11	1.08%
7	Thailand	25	2.46%	7	Greece	8	0.79%
8	Egypt	16	1.58%	8	Italy	8	0.79%
9	Algeria	23	2.27%	9	United States	6	0.59%
10	China	17	1.67%	10	Japan	5	0.49%

All Attacks: Distribution by Target Groups

Target	# Attacks	% of Total
Buses	543	39.23%
Passenger Trains	286	20.66%
Train Stations	152	10.98%
Bus stations/stops	141	10.19%
Railway Tracks	85	6.14%
Vehicle Bridge	56	4.05%
Highway or Road	28	2.02%
Freight Train	21	1.52%

1. **Buses targets dominate: 49.42%**
2. **Passenger train targets (including track) follow: 37.41%**
3. **Road targets are last major group: 6.06% (mostly bridge attacks)**

All Bomb Attacks: Distribution by Target Group

Target	# Attacks	% of Total
Buses	307	30.19%
Passenger Trains	217	21.34%
Train Stations	137	13.47%
Bus stations/stops	133	13.08%
Railway Tracks	74	7.28%
Vehicle Bridge	55	5.41%
Highway or Road	21	2.06%
Freight Train	0	0.00%

1. Rankings do not change and buses still dominate over trains, but
2. Bus stations and stops are roughly same as train stations and there are no attacks on freight trains

Target Distribution for 1384 Attacks

TARGET	#	%
Bus, Scheduled	447	32.30%
Train, Passenger	261	18.86%
Train Station, Unspecified	106	7.66%
Bus Station – Unspecified	101	7.30%
Railway Tracks	85	6.14%
Vehicle Bridge	56	4.05%
Bus, Tourist	56	4.05%
Bus Stop	40	2.89%
Bus, Company or Gov't	33	2.38%
Highway or Road	28	2.02%
Minibus or Minivan	26	1.88%
Enclosed Train Station	15	1.08%
Train, Freight	15	1.08%
Subway station, unspecified	18	1.30%
Train, Subway	21	1.52%
Railway Bridge	14	1.01%

TARGET	#	%
Truck	10	0.72%
Train, Trolley	5	0.36%
Other	5	0.36%
Train, Tourist	7	0.51%
Station -- Train and Bus	9	0.65%
Enclosed Subway Station	4	0.29%
Railway Signals/ Comm System	3	0.22%
Vehicle Tunnel	2	0.14%
Enclosed Bus Station	1	0.07%
Railway Tunnel	1	0.07%
Train, Troop	1	0.07%
Railway-Unspecified	1	0.07%
Transport Office Multiple targets, Open Air Bus, Subway, Train Stations, Elevated trains, Overpasses	0	0.00%

Target Distribution for 1017 Bomb Attacks

Few Significant Differences: See below when rank is off by more than one place

Target	#	%
Bus, Scheduled	260	25.6%
Passenger Trains	197	19.4%
train station, unspecified	100	9.8%
Bus Station – Unspecified	96	9.4%
Railway Tracks	74	7.3%
Vehicle Bridge	55	5.4%
Bus Stop	37	3.6%
Bus, Company or Gov't	23	2.3%
Bus, Tourist *(9th - was 7th)*	21	2.1%
Highway or Road	21	2.1%
Train, Freight	20	2.0%
Minivan or Minibus	18	1.8%
train, subway	15	1.5%

Target	#	%
Enclosed Train Station *(14th was 12th)*	13	1.3%
Railway Bridge	13	1.3%
Subway station, unspecified	13	1.3%
Bus, School	8	0.8%
Station -- Train and Bus	7	0.7%
Truck	5	0.5%
Enclosed Subway Station	4	0.4%
Train, Trolley	4	0.4%
Other	4	0.4%
Railway Signals/Comm System	2	0.2%
Transport Company Office	2	0.2%
Multiple Targets, Tourist Train *(had 7)*, Troop Train, Vehicle Tunnel, Unspecified Railway:	1	0.1%
Enclosed and Open Bus station	0	0.1%

All Attacks: Lethality by Target Group:

More attacks against bus targets, but train attacks more Lethal

Target Group	Average Fatalities	Average Injuries
Trains and Train Stations	6	20
Bus, Bus Stops and Bus stations	4	10
Track	1	1
Road Targets	0	0
Overall Average	4	10

Bomb Attacks: Lethality By Target Group

1. **Bombs Equalize: Differences between train and bus targets decrease**
2. **Road Attacks increase in lethality (developing country campaigns).**
3. **Track attacks: Lack of mechanical derailments decrease lethality.**

Target Group	Average Fatalities per Explosion	Average Injuries per Explosion
Train	5	19
Bus	4	13
Road	1	0
Track	0	1
Overall Average	4	12

All Attacks: Lethality By Target

Trains, stations and *then* buses most lethal targets

Target	Average Deaths	Average Injuries
Passenger train	7	20
Enclosed Train Station	6	64
Subway station, unspecified	5	44
train station, unspecified	5	30
Co & Gov't bus	5	12
train, subway	5	11
Bus, Scheduled	5	3
Bus, School	4	10
Train, Freight	3	5
Enclosed Subway Station	3	1
Bus Stop	2	14
Bus, Tourist	2	11
Minivan or Minibus	2	10
Other	2	7
Highway or Road	2	4
Train, Tourist	2	0
Truck	1	9
Bus Station - Unspecified	1	3
Vehicle Bridge	1	1
Railway Tracks, Enclosed & Open Air Bus Stations, Train and Bus Stations, Multiple Targets, Railway Bridges and Tunnels, Trolley, Troop Trains, Transport Company Office, Railway Signals/Comm System	0	0
Overall Average	4	10

Bomb Attacks: Lethality By Target (per explosion):

Bombs equalize: Buses, trains and train stations become equally lethal targets

Target	Average Fatalities	Average Injuries
Tourist Train (Very Few)	8	40
Subway station, unspecified	6	38
Bus, Scheduled	5	16
Enclosed Train Station	5	54
Bus, Company or Gov't	5	12
Passenger Train	5	18
train, subway	5	39
train station, unspecified	4	11
Truck (often ersatz bus)	3	1
Bus, School	3	15
Minivan or Minibus	2	6

Target	Average Fatalities	Average Injuries
Enclosed Subway Station	2	0
Other	2	0
Bus Stop	2	14
Train, Freight	1	3
Bus Station unspecified	1	8
Highway or Road	1	1
Station -- Train and Bus	1	5
Bus, Tourist	1	2
Train, Trolley	0	11
Overall Average	4	12

Distribution By Attack and Weapon

(1) Explosives and incendiaries (73% of total) & automatic weapons (10.77%) dominate; (2) Hijacking and Robbery still important; (3) Mechanical derailments are effective

Attack and Weapon	#	%
IED - unspecified	846	61.17%
Assault with Automatic Weapons	149	10.77%
Arson	54	3.90%
IID (Improvised Incendiary Device)	42	3.04%
IED - Mine	38	2.75%
Armed Hijacking	31	2.24%
Robbery	28	2.02%
Assault- Other or Unspecified	19	1.37%
IED - Dynamite	20	1.45%
IED - Grenade	36	2.60%
VBIED	27	1.95%
Sabotage through Derailing	20	1.45%

Distribution by Attack and Weapon (con't)

Attack and Weapon	#	%
Sabotage, Other	13	0.94%
Assault with RPG	13	0.94%
Multiple Weapons	13	0.94%
Kidnapping	10	0.72%
IED - Claymore Mine	6	0.43%
Other	8	0.58%
Unknown	3	0.22%
IED - Other	1	0.07%
Mortar	2	0.14%
Unconventional weapons	1	0.07%
Sniper or other stand-off attacks	0	0.00%
Threat, Bomb	3	0.22%
TOTAL	1383	100.00%

All Attacks: Lethality by Attack and Weapon

(1) Some weapons are local (claymores) or few (Other assault); (2) Suicide bombers cause 7.07 deaths and 34.99 injuries -- overall deaths are closed to automatic weapons assaults; (3) Mechanical derailments can be deadly

Attack and Weapon	Average Fatalities	Average Injuries
IED - Claymore Mine	23	24
Sabotage through Derailing	8	16
Assault with Automatic Weapons	7	9
Assault- Other or Unspecified	6	5
Multiple Weapons	6	8
VBIED	5	11
IED - Mine	5	10
IED - unspecified	4	15
IID (Improvised Incendiary Device)	4	3
Sabotage, Other	3	1

Attack and Weapon	Average Fatalities	Average Injuries
IED - Grenade	2	12
Assault with RPG	2	9
Mortar	1	5
Other	1	4
Kidnapping	1	1
IED - Dynamite	1	1
Armed Hijacking	1	1
Robbery	1	1
Arson	0	1
IED - Other	0	0
Overall Average	4	12

Bomb Attacks Against All Public Surface Transport Targets

Single or Multiple Bombs

86% are single bomb attacks; No trends over time

Number of Bombs	#	%
Single Bomb Attacks	877	86.2%
Multiple Bomb Attacks	140	13.8%
Total Attacks	1017	100.0%

Outcome of All Bomb Attacks

77% On Target, 14.5% Detected and rendered safe, 7% didn't work as planned

Bomb Results	#	%
Detonated or released on Target	921	77.33%
EOD successful - rendered safe	173	14.53%
Detonated Early or Away from Target, or Malfunctioned	62	5.21%
Failed to Detonate or Release	21	1.76%
Unknown	10	0.84%
Detonated during unsuccessful EOD	4	0.34%
Total	1191	100.00%

Lethality by Target per Explosion

Trains, Subways, Buses and Enclosed *Train* and *Subway* Stations Dominate

Target	Deaths	Injuries
Passenger Train	7	20
Enclosed Train Station	6	64
Subway Train	5	44
Bus, Scheduled	5	11
Subway station, unspecified	5	30
Truck (ersatz bus)	5	3
train station, unspecified	5	12
Bus, Company or Gov't	4	10
Minivan or Minibus	3	5
Other	3	1
Bus Stop	2	14

Target	Deaths	Injuries
Train, Tourist	2	11
Bus, School	2	10
Station -- Train and Bus	2	7
Bus, Tourist	2	4
Enclosed Subway Station -	2	0
Bus Station - Unspecified	1	9
Train, Freight	1	3
Highway or Road	1	1
Overall Average	3	12

Lethality Per Device by Explosion:

VBIEDs, Mines and IIDs More Lethal than Average

Device	Average # Fatalities per Explosion	Average # of Injuries per Explosion
VBIED	5	10
IED - Mine	4	8
IID (Improvised Incendiary Device)	4	3
IED - unspecified	3	13
IED - Grenade	2	10
IED - Dynamite	1	1
IED - Other	0	0
Overall Average	3	12

Lethality Per Explosion by Delivery/Concealment

Suicide attacks account for only 5.13% of bomb attacks and 9.71% of all deaths and are lethal…. But not *the* most lethal method of delivering a bomb

Delivery/Concealment	Average Fatalities	Average Injuries
Concealed/placed in non-passenger areas	10.50	0.00
Carried on Person	7.07	34.99
Concealed/Left in Passenger Compartments	4.98	16.63
Placed near the bus or other target - unspecified	4.87	12.26
Concealed in Parcel or Bags	4.84	31.35
Concealed/left in Stations (Trash bins, Under benches, near trains or buses)	3.45	7.29
Placed on Vehicle Road, Bridge or in Tunnel	2.83	4.56
Unknown	2.14	10.00
Concealed in or on Vehicle	1.70	10.70
Placed on Railroad track or bridge, or near a train	1.06	4.45
Concealed/left at Bus Stop	0.90	10.65
Physical Thrown	0.67	6.60
Concealed/placed outside of Stations	0.51	2.78
Overall Average	3.34	12.21

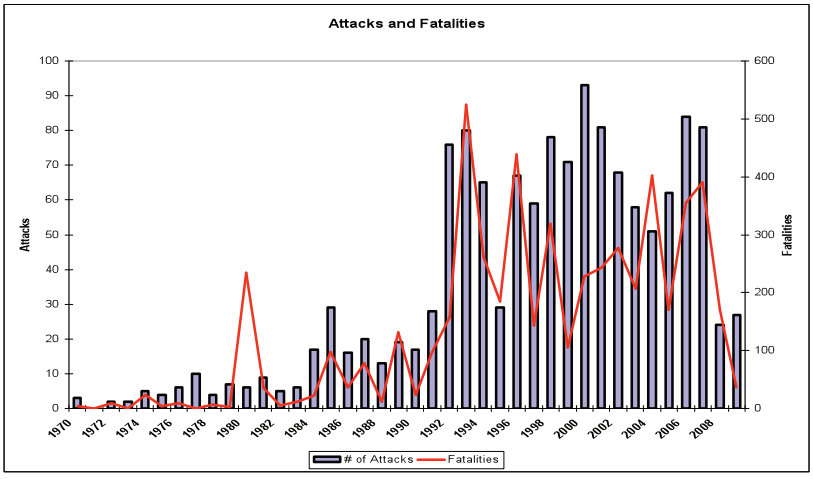
All Bomb Attacks: Most Lethal Combinations

(1) Buses, Trains and enclosed stations dominate (2) VBIEDS and IIDs can be lethal; (3) Suicides not most deadly.

Avg. Fatalities	Target	Device	Delivery/Concealment
40	Bus, Scheduled	IED Unspecified	Placed in non-Passenger area
35	Subway Station	IED - Unspecified	Concealed in Parcel or Bag
34	Passenger Train	IID	Left in Passenger Compartment
31	Enclosed Train Station	IED unspecified	Concealed in Parcel or Bag
30	Truck (ersatz Minivan)	IED unspecified	Carried on Person
30	Bus, Scheduled	IED Grenade	Physically Thrown
20	Passenger Train	IED Dynamite	Left in Passenger compartment
18	Co or Gov't Bus	IED unspecified	Carried on Person
17	Bus, Scheduled	VBIED	Placed Near Bus or Target
14	Bus, Scheduled	IID	Concealed in Parcel or Bag

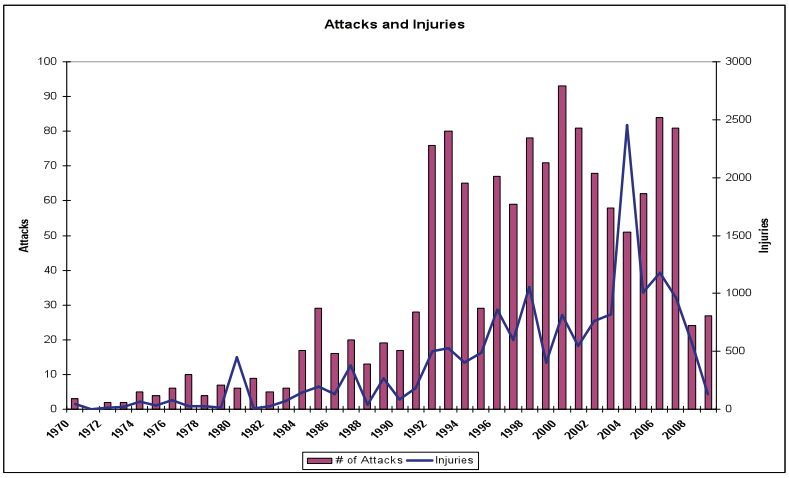
Attacks and Fatalities Over Time

Notice Spikes in fatalities; normally but not always coincide with spikes in attacks



Attacks and Injuries over time

Injuries fluctuate less, with one major spike in 2005 (Reporting on Injuries is probably less accurate)



All Attacks Against Passenger Train Targets

Body Counts Count

- **True also for passenger trains; but % of attacks with highest death rates is greater:**
  - **35% (vice 29%) of attacks resulted in at least 1 death**
  - **20% (vice 21%) of attacks resulted in at least 5 death**
  - **12% (vice 10%) of attacks resulted in at least 10 deaths**
  - **Most of the remaining 65% failed or were stopped**
  - **Some railway bridge or track bombings in South Asia, Southeast Asia, and some (IRA) in UK appear designed to disrupt rail systems**
- **Average deaths and injuries per bomb against passenger rail targets are 5.5 and 21.9; however, 66% of bomb attacks failed and resulted in no casualties**
- **Some of the most deadly bomb attacks have yielded an average body count of 24 per bomb**

Where: Train Attacks By Region

- **Trains a major target but not yet in North America**
- **Top 5 Regions & North America:**
  - **South Asia: 135 (30.75%)**
  - **Western Europe: 114 (25.97%)**
  - **Middle East & North Africa: 49 (11.16%)**
  - **Russia and the NIS 47 (10.71%)**
  - **Southeast Asia: 31 (7.06%)**
  - **North America: (9th) 7 (1.59%)**
- **Regional distribution was somewhat different for all attacks**
  - **Middle East and North Africa was 2nd region (20.45%)**
  - **Southeast Asia was 3rd region (10.77%)**
  - **Western Europe was 4th region (13.66%)**
  - **North America was in 11th position for all attacks**

How: All Attacks and Train Attacks

- **All Attacks: Explosives and incendiaries dominate. Automatic weapons, and fire are used next. Top 5**
  - **IEDs, IIDs & 17 VBIEDS: 73.00%**
  - **Automatic Weapons: 10.77%**
  - **Arson: 3.90%**
  - **Armed Hijacking 2.24%**
  - **Robbery 2.02%**
- **Passenger Train Attacks: Explosives *really* dominate; followed by automatic weapons, mechanical derailing, and then fire. Top Five**:
  - **IEDs & 4 VBIEDS: 78.50%**
  - **Automatic Weapons: 6.38%**
  - **Mechanical derailing: 3.42%**
  - **IIDs: 2.51%**
  - **Arson: 1.82%**

What: Passenger Trains

- Top targets for attacks against passenger trains:
  - Train (Intercity or Commuter): 261 (59.51%)
  - Train Stations: 130 (29.68%)
  - Subway Stations: 19 (5.02%)
  - Subway Trains: 15 (3.42%)
  - Tourist Trains: 5 (1.14%)
  - Trolleys: 5 (1.14%)

Most Lethal Train Targets

• **NOTE: Enclosed locations most lethal: Trains and some stations**

Train Sub-Target	Average Fatalities	Average Injuries
Train, Passenger (Intercity or Commuter)	6.7	20.0
Train Station, Enclosed Building	6.4	64.3
train, subway	5.3	44.3
Subway station, unspecified	4.9	29.7
train station, unspecified	4.7	11.7
Train, Tourist	2.0	11.4
Subway Station - Enclosed Building	2.0	0.0
Station -- Train and Bus	1.6	6.8
Train, Trolley	0.0	9.1
Total Overall Average	5.8	20.0

Bomb Attacks Against Passenger Train Targets

Passenger Train Attacks using Explosives: The Bombs and Bombers

- **Suicide bombers may not be our biggest problem: Suicides constitute a small percentage of attacks, even fewer than for all attacks against surface transport**
  - **5.13% of all attacks**
  - **3.19% of all attacks on trains**
  - **3.95% of all explosive attacks on trains**
- **For all attacks, they cause a disproportionate percentage of casualties; but for attacks on trains, and explosives attacks on trains, fatalities are roughly proportional to attacks.**
  - **9.71% of all fatalities and 16.01% of all injuries for all attacks**
  - **2.73% of all fatalities and 8.20% of all injuries for all attacks on trains**
  - **3.54% of all fatalities and 9.27% of all injuries for train attacks using explosives**

The Bombs and Bombers (con't)

- **In train attacks, suicide not as lethal as other methods of delivery, yielding 3 fewer fatalities on average than next most lethal methods (see slide 48)**
- **Number of bombs used:**
  - **Only 12.7% of attacks used more than 1 device**
  - **No discernable trends over time**
- **Successful Bombs:**
  - **74.08% of bombs successful**
  - **14.93% percent found – EOD successful**
  - **6.48% detonated early, or away from primary target**
  - **1.97% failed to detonate**

What: Train Targets

Sub-target	#	%
Train, Passenger (Intercity or Commuter)	197	55.65%
Train station, unspecified	100	28.25%
Train, subway	15	4.24%
Subway station, unspecified	13	3.67%
Train Station, Enclosed Building	13	3.67%
Station -- Train and Bus	7	1.98%
Subway Station - Enclosed Building	4	1.13%
Train, Trolley	4	1.13%
Train, Tourist	1	0.28%
Total	354	100.00%

All Attacks: Lethality Per Explosion by Delivery/Concealment

Suicide attacks constitute only 5.96% of train bomb attacks, are lethal, but not THE most lethal method of delivering a bomb

Delivery/Concealment	Average Fatalities	Average Injuries
Concealed/placed in non-passenger areas	10.50	0.00
Carried on Person	7.07	34.99
Concealed/Left in Passenger Compartments	4.98	16.63
Placed near the bus or other target - unspecified	4.87	12.26
Concealed in Parcel or Bags	4.84	31.35
Concealed/left in Stations (Trash bins, Under benches, near trains or buses)	3.45	7.29
Placed on Vehicle Road, Bridge or in Tunnel	2.83	4.56
Unknown	2.14	10.00
Concealed in or on Vehicle	1.70	10.70
Placed on Railroad track or bridge, or near a train	1.06	4.45
Concealed/left at Bus Stop	0.90	10.65
Physical Thrown	0.67	6.60
Concealed/placed outside of Stations	0.51	2.78
Overall Average	3.34	12.21

Delivery/Concealment – Significant differences

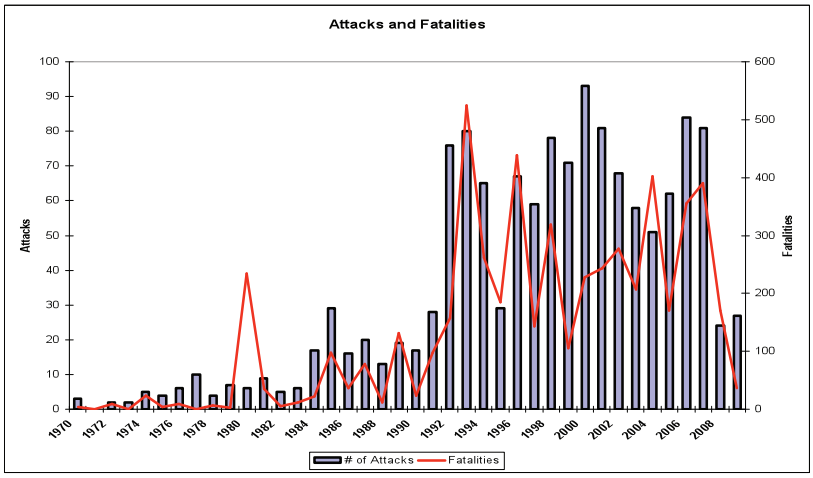
Suicides relatively less lethal in trains

Delivery and Concealment	Average Fatalities	Average Injuries
Concealed/Left in Passenger Compartments *(was 3rd, now 1st)*	8	27
Concealed in Parcel or Bags (*was 5th, now 2nd*)	8	70
Concealed/left in Stations (*now 3rd,was 6th*)	6	7
Carried on Person *(was 2nd, now 4th)*	5	51
Placed on Railroad track or bridge, or near a train	3	13
Placed in non-passenger areas	1	0
Placed outside of Stations	1	5
Placed near the bus or other target - unspecified	1	10
Physical Thrown	0	5
Concealed in or on Vehicle	0	3
Overall Average		

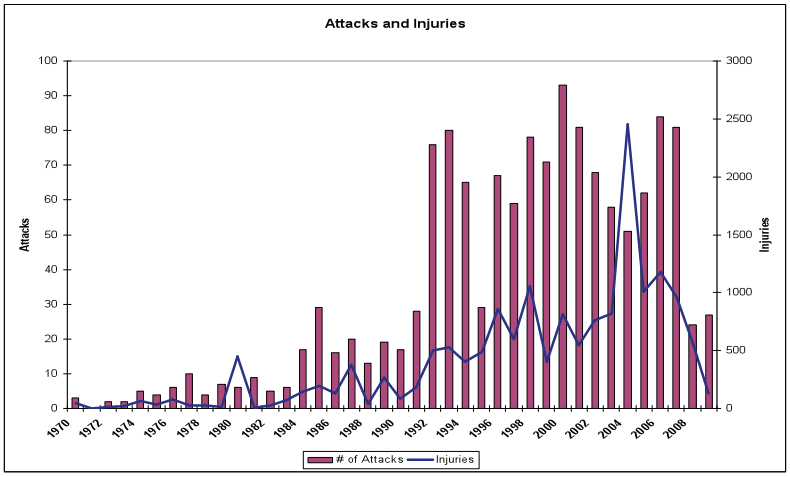
Most Lethal Combinations: Trains

Average Fatalities	Target	Device	Delivery/Concealment
35	Subway Station	IED unspecified	Concealed in Parcel or Bags
34	Passenger Train	IID	Concealed/left in Passenger Compartment
31	Enclosed Train Station	IED unspecified	Concealed in Parcel or Bags
20	Passenger Train	IED - Dynamite	Concealed in Parcel or Bags
13	Subway Train	IED unspecified	Carried on Person
11	Subway Station	IED unspecified	Carried on Person
8	Train Station	IED unspecified	Left in Station
8	Passenger Train	IED unspecified	Left in Passenger Compartment
8	Tourist Train	IED unspecified	Placed on Track or Bridge
7	Passenger Train	IED - Mine	Placed on Track or Bridge

Explosives Train Attacks & Fatalities Over Time



Explosives Train Attacks & Injuries Over Time



All Attacks Against Buses

685 Bus Attacks: By Region

Region	#	% of total
Middle East and North Africa	204	29.78%
South Asia	196	28.61%
Southeast Asia	85	12.41%
South America	46	6.72%
Russia and the NIS	46	6.72%
Sub-Saharan Africa	30	4.38%
Western Europe	25	3.65%
East Asia	21	3.07%
Eastern Europe	14	2.04%
Central America & Caribbean	13	1.90%
North America	3	0.44%
Central Asia	1	0.15%
Australasia & Oceania	1	0.15%
Total	685	100.00%

441 Bus Bomb Attacks: Regions Shift

Region	#	% of total
South Asia *(Was 2nd)*	156	35.37%
Middle East and North Africa *(was 1st)*	140	31.75%
Southeast Asia	56	12.70%
Western Europe *(was 7th)*	17	3.85%
East Asia *(was 8th)*	16	3.63%
Russia and the NIS *(was 5th)*	30	6.80%
South America *(was 4th)*	16	3.63%
Sub-Saharan Africa *(was 6th)*	5	1.13%
Central America & Caribbean	2	0.45%
Central Asia	1	0.23%
Eastern Europe	1	0.23%
Australasia & Oceania	1	0.23%
North America *was 11th with 3 attacks)*(	0	0.00%
Total	441	100.00%

All Bus Attacks: Leading Countries

Developing countries suffer more; Major campaigns in developed countries are Israel (current) and UK (mostly past - IRA)

Rank	Developing Country	#	% of total	Rank	Developed Country	#	% of total
1	India	81	11.82%	1	Israel	129	18.83%
2	Pakistan	66	9.64%	2	Russian Federation	36	5.26%
3	Philippines	59	8.61%	4	United Kingdom	8	1.17%
4	Colombia	34	4.96%	3	Greece	7	1.02%
5	Sri Lanka	34	4.96%	5	France	4	0.58%
6	Turkey	22	3.21%	6	Spain	3	0.44%
7	Algeria	22	3.21%	7	Japan	2	0.29%
8	Egypt	20	2.92%	8	Poland	2	0.29%
9	China	17	2.48%	9	Bosnia/Herzegovina	1	0.15%
10	Indonesia	13	1.90%	10	Canada	1	0.15%

Bus Bomb Attacks – Leading Countries

Some changes in developing countries; no significant changes in developed countries

Rank	Developing Country	#	% of total	Rank	Developed Country	#	% of total
1	India	60	13.61%	1	Israel	102	23.13%
2	Pakistan	57	12.93%	2	Russian Federation	25	5.67%
3	Philippines	42	9.52%	3	United Kingdom	6	1.36%
4	Sri Lanka	31	7.03%	4	Greece	5	1.13%
5 (9)	China	15	3.40%	5	France	3	0.68%
6	Turkey	13	2.95%	6	Estonia	1	0.23%
7 (4)	Colombia	13	2.95%	7	Italy	1	0.23%
8	Algeria	10	2.27%	8	Sweden	1	0.23%
9	Egypt	8	1.81%	9			
10	Indonesia	8	1.81%	10			

All Bus Attacks: How?

Bombs Predominate (60.23%) -- followed by automatic weapons (16%) Fire - Arson and IIDs - (10%); Hijacking (3.95%) -- but bombs dominate less so than for all Attacks (73%) and trains (78.5%)

Attack and Weapon	#	%
IED - unspecified	343	50.15%
Assault with Automatic Weapons	109	15.94%
Arson	39	5.70%
Armed Hijacking	27	3.95%
IID (Improvised Incendiary Device)	28	4.09%
Robbery	23	3.36%
IED - Grenade	29	4.24%
Assault- Other or Unspecified	13	1.90%
IED - Mine	16	2.34%
VBIED	14	2.05%

Attack and Weapon	#	%
Assault with RPG	9	1.32%
Kidnapping	9	1.32%
IED - Dynamite	5	0.73%
IED - Claymore Mine	5	0.73%
Multiple Weapons	5	0.73%
Mortar	2	0.29%
Other	4	0.58%
Sabotage, Other	2	0.29%
Unknown	2	0.29%
Total	684	100.00%

All Bus Attacks: Targets

Scheduled buses and bus stations predominate, followed by tourist buses and bus stops

Sub-Target	#	%
Bus, Scheduled	447	65.35%
Bus Station - Unspecified	101	14.77%
Bus, Tourist	56	8.19%
Bus Stop	40	5.85%
Minivan or Minibus	26	3.80%
Bus, School	14	2.05%
Bus Station - Enclosed Building	0	0.00%
Bus Station - Open Air	0	0.00%
Total	684	100.00%

Bus Bomb Attacks: Targets

Note: Somewhat smaller % of attacks against scheduled buses (65.35%) and tourist buses (8.19%) than for all bus attacks; and higher % against stations and stops (14.11% and 5.85%)

Sub Target	#	% of total
Bus, Scheduled	261	59.18%
Bus Station - Unspecified	96	21.77%
Bus Stop	37	8.39%
Bus, Tourist	21	4.76%
Minivan or Minibus	18	4.08%
Bus, School	8	1.81%
Enclosed Bus Station	0	0.00%
Bus Station - Open Air	0	0.00%
Total	441	100.00%

Bomb Attacks Against Buses

The Bombs and Bombers

The % of single bombs are about the same as for all bomb attacks and all train bomb attacks

Single or Multiple	#	% of total
Single	389	88.21%
Multiple	50	11.34%
Total	441	100.00%

The % of suicides is considerably higher than in all bomb attacks (5.96%) and much higher than in bomb attacks against trains (3.95%): Most likely attributed to suicide campaigns in Israel, Sri Lanka and Russia

Type	#	% of total
Non-Suicide	386	87.53%
Suicide	55	12.47%
Total	441	100%

Bombs and Bombers (con't)

Bombs appear to detonated on target and on time more frequently against buses (88.21%) than against all targets (77.33%) and against trains (74.08%)

Outcomes	#	% of Total
Detonated or released on Target	389	88.21%
EOD successful - rendered safe	38	8.62%
Detonated Early or Away from Target, or Malfunctioned	14	3.17%
Total	441	100.00%

Bus Bomb Attacks: Lethality by Target

Lethality increases for some targets over all bus attacks, especially scheduled and school buses; it remains about the same for the rest, and the overall average also remains about the same

Target	Average Fatalities	Average Injuries
Bus, Scheduled	6 (5)	17 (11)
Minivan or Minibus	3 (3)	7 (5)
Bus, School	3 (2)	15 (10)
Bus Stop (same)	2 (2)	14 (14)
Bus Station – Unspecified	1 (1)	9 (9)
Bus, Tourist	1 (2)	3 (4)
Total Overall Average	4 (4)	14 (10)

All Bus Attacks: Lethality by Attack & Weapon

Claymores (Sri Lanka) and Other Sabotage and Assault - (a few events) are unique. VBIEDS, Automatic Weapons, Mines, and IEDs give average or better lethality

Attack Type	Average Fatalities	Average Injuries
IED - Claymore Mine	24	29
Sabotage, Other	18	4
VBIED	9	18
Assault- Other or Unspecified	9	3
Automatic Weapons	6	6
IED - Mine	4	14
IED - unspecified	4	15
Multiple Weapons	3	10
Other	3	8
IED - Grenade	3	13

Attack Type	Average Fatalities	Average Injuries
IID (Improvised Incendiary Device)	2	2
Kidnapping	1	1
Mortar	1	5
Assault with RPG	1	10
Armed Hijacking	1	1
IED - Dynamite	1	2
Robbery	1	1
Arson	0	1
Overall Average	4	10

Bomb Attacks: Lethality by Device

Claymores unique to Sri Lanka; but VBIEDs and mines used in many countries and quite lethal, along with IEDs

Attack Type	Average Fatalities	Average Injuries
IED - Claymore Mine	24	29
VBIED	9	18
IED - unspecified	4	15
IED - Mine	4	14
IED - Grenade	3	13
IID (Improvised Incendiary Device)	2	2
IED - Dynamite	1	2
Overall Average	4	14

Lethality by Concealment and Delivery

Suicide is lethal but the same as method used for VBIEDs and Claymores, and lower than placing in the non-passenger compartment

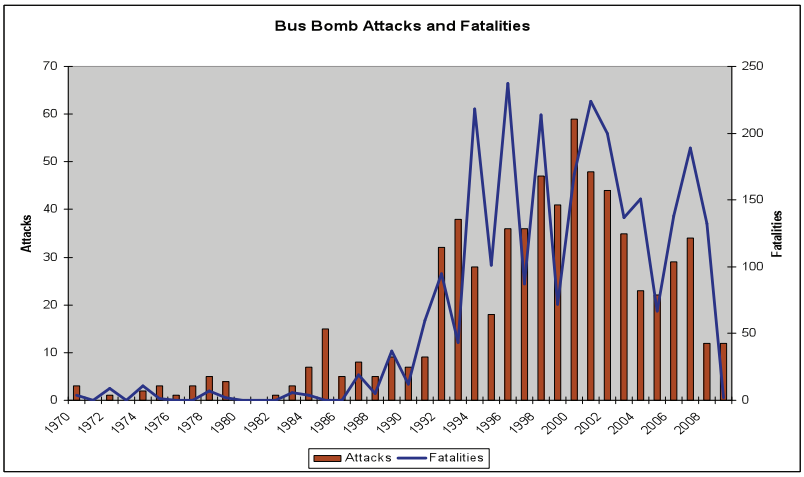
Delivery and Concealment	Average Fatalities	Average Injuries
Concealed/placed in non-passenger areas	20	0
Carried on Person	8	34
Placed near the bus or other target - unspecified	8	18
Concealed in Parcel or Bags	6	9
Concealed/Left in Passenger Compartments	4	13
Concealed/left in Stations (Trash bins, Under benches, near trains or buses)	1	9
Physical Thrown	1	7
Concealed/placed outside of Stations	0	3
Total	4	14

Most Lethal Combinations

Average Fatalities	Target	Device	Delivery/Concealment
40	Bus, Scheduled	IED Unspecified	Concealed/Placed in Non-Passenger Areas
30	Bus, Scheduled	IED-Grenade	Physically Thrown
18	Bus, Co or Gov't	IED - Unspecified	Carried on Person
17	Bus, Scheduled	VBIED	Placed near the bus
14	Bus, Scheduled	IID	Concealed in Parcel or Bags
13	Bus, Co or Gov't	IED - Unspecified	Concealed in or on Vehicle
10	Bus, Scheduled	IED - Unspecified	Concealed in Parcel or Bags
9	Bus, Scheduled	IED - Unspecified	Carried on Person
9	Bus Station - Unspecified	VBIED	Placed near the bus
8	Bus, Scheduled	IED - Grenade	Placed near the bus

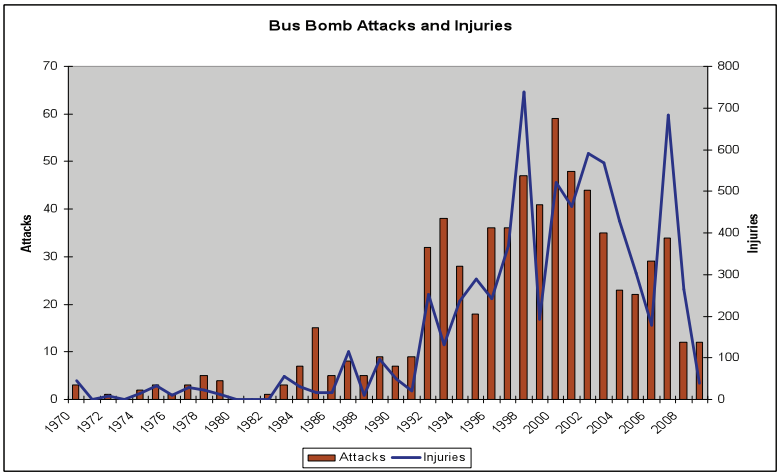
Bus Bomb Attacks: Attacks and Fatalities Over Time

Spikes in fatalities coincide with attacks



Bus Bomb Attacks: Attacks and Injuries Over Time

Injuries also generally coincide with attacks



ENDNOTES

1. Brian Michael Jenkins, MTI Report #97-04: *Protecting Surface Transportation Systems and Patrons from Terrorist Activities: Case Studies of Best Security Practices and a Chronology of Attacks*, San Jose, CA: Mineta Transportation Institute, December 1997.

2. Brian Michael Jenkins and Larry N. Gerston, MTI Report # 01-07: *Protecting Public Surface Transportation Against Terrorism and Serious Crime: Continuing Research on Best Security Practices*, San Jose, CA: Mineta Transportation Institute, September 2001.

3. See Brian Michael Jenkins, Bruce R. Butterworth, and Jean-François Clair, MTI Report # 09-12: *Off the Rails: The 1995 Attempted Derailing of the French TGV (High-Speed Train) and a Quantitative Analysis of 181 Rail Sabotage Attempts*, San Jose, CA: Mineta Transportation Institute, March 2010.

4. Attacks against ferries are also not included, as MTI's current mandate extends only to surface or land transportation and does not include maritime transport.

5. Although the results should not be pre-judged, a quick review of the data suggests that a number of attacks that resulted in no fatalities or injuries will be entered; these entries may decrease the average lethality of many kinds of attacks.

6. Twice in December 1994, a disgruntled individual detonated incendiary devices on subway trains in New York; he was not connected to any terrorist organization.

7. Brian Michael Jenkins and Bruce R. Butterworth, MTI Report #09-03: *Potential Terrorist Uses of Highway-Borne Hazardous Materials*, San Jose, CA: Mineta Transportation Institute, January 2010.

8. Ibid.

9. It is important to put these cases in context in terms of actual plots. Of these 44 cases, 24 involved actual plots. In 19 of these 24 plots, potential targets were identified and operational plans discussed. In 10, the plotters actually conducted reconnaissance, and in 11, they possessed, acquired, or tried to acquire explosives or other weapons, often without taking much care to avoid detection.

10. To reduce counting, the database interprets "dozens" to mean literally 24.

11. The categorization of *developed* and *developing* countries may not fit all regions of all countries. Major cities of Turkey and South America are quite developed, yet the two countries are categorized as developing. MTI will seek a more updated approach to this problem in line with current economic classifications from the United States.

12. Unique among fatality calculations for bomb attacks, these fatalities and injuries are calculated per attack (FPA and IPA), and not per device (FPD and IPD), in order compare general target lethality. The final database should enable calculation of fatality by device, by attack, and by device that explodes on target.

13. References to *other* and *unknown* methods indicate methods not yet categorized in the database and those for which the description of the attack did not include the method, respectively.

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Brian Michael Jenkins is the Director of the Mineta Transportation Institute National Transportation Security Center of Excellence and since 1997 has directed the Institute's continuing research on protecting surface transportation against terrorist attacks. He received a Bachelor of Arts degree in fine arts and a Masters degree in history, both from UCLA. He also studied at the University of Guanajuato, Mexico, and in the Department of Humanities at the University of San Carlos, Guatemala, where he was a Fulbright Fellow and received a second fellowship from the Organization of American States.

Commissioned in the infantry at the age of 19, Mr. Jenkins became a paratrooper and ultimately a captain in the Green Berets. He is a decorated combat veteran, having served in the Seventh Special Forces Group in the Dominican Republic during the American intervention and later as a member of the Fifth Special Forces Group in Vietnam (1966–1967). He returned to Vietnam on a special assignment in 1968 to serve as a member of the Long Range Planning Task Group; he remained with the Group until the end of 1969, receiving the Department of the Army's highest award for his service. Mr. Jenkins returned to Vietnam on an additional special assignment in 1971.

In 1983, Mr. Jenkins served as an advisor to the Long Commission, convened to examine the circumstances and response to the bombing of the U.S. Marine Barracks in Lebanon. In 1984, he assisted the Inman Panel in examining the security of American diplomatic facilities abroad. In 1985–1986, he served as a member of the Committee of the Embassy of the Future, which established new guidelines for the construction of U.S. diplomatic posts. In 1989, Mr. Jenkins served as an advisor to the national commission established to review terrorist threats following the bombing of Pan Am 103. In 1993, he served as a member of the team contracted by the New Jersey–New York Port Authority to review threats and develop new security measures for the World Trade Center following the bombing in February of that year.

In 1996, President Clinton appointed Mr. Jenkins to the White House Commission on Aviation Safety and Security. From 1999 to 2000, he served as an advisor to the National Commission on Terrorism, and since 2000, he has been a member of the U.S. Comptroller General's Advisory Board. Mr. Jenkins is a Special Advisor to the International Chamber of Commerce (ICC) and a member of the advisory board of the ICC's investigative arm, the Commercial Crime Services. Over the years, he has served as a consultant to or carried out assignments for a number of government agencies, including the Department of Homeland Security (DHS). As part of its international project to create a global strategy to combat terrorism, the Club of Madrid in 2004 appointed Mr. Jenkins to lead an international working group on the role of intelligence.

Mr. Jenkins is the author of *International Terrorism: A New Mode of Conflict*; the editor and co-author of *Terrorism and Personal Protection*; the co-editor and co-author of *Aviation Terrorism and Security*; and a co-author of *The Fall of South Vietnam*. His latest books are *Unconquerable Nation: Knowing Our Enemy, Strengthening Ourselves* and *Will Terrorists*

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BRUCE ROBERT BUTTERWORTH

Bruce Butterworth is a Mineta Transportation Institute National Transportation Security Center of Excellence Research Associate. He has had a distinguished government career working at congressional, senior policy, and operational levels. Between 1975 and 1980, as a professional staff member for the House Government Operations Committee, he ran investigations and hearings on many transportation safety issues, particularly in aviation. He spent 11 years in the Department of Transportation, eight of them in the Office of the Secretary. He managed negotiations on air and maritime services in the General Agreement on Tariffs and Trade (GATT) (now the World Trade Organization (WTO)), chaired U.S. delegations to United Nations committees, dealt with transport issues related to border inspections, and was part of the U.S. response to the Lockerbie bombing.

Mr. Butterworth has held two executive posts in aviation security and in both worked closely with Congress as the informal but primary liaison. He was Director of Policy and Planning (l991–1995), establishing strategic, long-term, and contingency plans and federal rules. As Director of Operations (l995–2000), he was responsible for federal air marshals, hijacking response, and 900 field agents; he worked to improve security and the performance of security measures by U.S. airports in this country and by U.S. airlines worldwide. He ran the Federal Air Administration's (FAA's) Aviation Command Center, successfully managing the resolution of hijackings and security emergencies. He launched a successful program of regulation of dangerous goods and cargo security after the 1995 ValuJet crash, oversaw the conversion of the air marshal program to a full-time program with high standards, was a key player in the response to the ValuJet and TWA 800 accidents, and was a frequent media spokesperson. He has worked closely with Congress, the National Security Council staff, the intelligence community, law enforcement agencies, and authorities of other nations.

He was an Associate Director at the U.S. Holocaust Memorial Museum (2000–2003), responsible for security and building operations. He designed and implemented a "best practice" procedure to deal with mail possibly containing anthrax powder and developed and conducted comprehensive emergency planning and exercises. Between January 2003 and September 2007, he was one of two deputy directors in a 1,300-person Engineering Directorate at NASA's Goddard Space Flight Center, managing workforce planning, budgeting, and human-capital management for complex robotics space missions, substantially reducing overhead and improving workplace safety there. In addition to having helped the Department of Homeland Security (DHS) in information sharing, he is a research associate at the Mineta Transportation Institute. He has written a peer-reviewed report on security risks created by highway-borne hazardous materials for the State of California, is updating prior work on selective screening in the rail environment, and is constructing an IED-focused database of surface transport attacks, along with Brian Michael Jenkins.

He co-authored with Mr. Jenkins the following reports published by the Mineta Transportation Institute: *Selective Screening of Rail Passengers* (MTI Report 06-07), February 2007; a

supplement to that report, published in January 2010; *Potential Terrorist Uses of Highway Borne Hazardous Materials* (MTI Report 09-03), January 2010; and *Implementation and Development of Vehicle Tracking and Immobilization Technologies* (MTI Report 09-04). He also co-authored a study with P. J. Crowley, Senior Fellow and Director of Homeland Security at the Center for American Progress, *Keeping Bombs Off Planes: Securing Air Cargo, Aviation's Soft Underbelly*, May 2007. In February 2009, he published with Mr. Jenkins an opinion piece on information sharing entitled "A Campaign the Secretary Must Win."

Mr. Butterworth received a Master of Science degree from the London School of Economics in 1974 and a Bachelor of Arts degree from the University of the Pacific in 1972 (Magna Cum Laude). He was a California State Scholar and a Rotary Foundation Fellow and has received numerous special achievement and performance awards.

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