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# Filling Terrorism Gaps: VEOs, Evaluating Databases, and Applying Risk Terrain Modeling to Terrorism

RH Hagan

**August 2016**

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Pacific Northwest National Laboratory  
Richland, Washington 99352



## **Abstract**

This paper aims to address three issues: the lack of literature differentiating terrorism and violent extremist organizations (VEOs), terrorism incident databases, and the applicability of Risk Terrain Modeling (RTM) to terrorism. Current open source literature and publicly available government sources do not differentiate between terrorism and VEOs; furthermore, they fail to define them. Addressing the lack of a comprehensive comparison of existing terrorism data sources, a matrix comparing a dozen terrorism databases is constructed, providing insight toward the array of data available. RTM, a method for spatial risk analysis at a micro level, has some applicability to terrorism research, particularly for studies looking at risk indicators of terrorism. Leveraging attack data from multiple databases, combined with RTM, offers one avenue for closing existing research gaps in terrorism literature.

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## Acronyms and Abbreviations

CPOST-SAD	Chicago Project on Security and Terrorism Suicide Attack Database
CVE	Countering Violent Extremism
FARC	Revolutionary Armed Forces of Colombia
FBI	Federal Bureau of Investigation
GTD	Global Terrorism Database
ISIL	Islamic State of Iraq and the Levant
ITERATE	International Terrorism: Attributes of Terrorist Events
IVEO	Influencing Violent Extremist Organizations
JCS	Joint Chiefs of Staff
LeT	Lashkar-e-Taiba
MAR	Minorities at Risk
MAROB	Minorities at Risk Organizational Behavior
MIIS	Monterey Institute for International Studies
PTS	Political Terror Scale
RDWTI	RAND Database of Worldwide Terrorism Incidents
RTM	Risk Terrain Modeling
RTV	Right-wing Terrorism and Violence
RDWTI	RAND Database of Worldwide Terrorism Incidents
SATP	South Asia Terrorism Portal
START	Study of Terrorism and Responses to Terrorism
TWEED	Terrorism in Western Europe: Events Data
UCDP	Uppsala Conflict Data Program
USAID	U.S. Agency for International Development
VEO	Violent Extremist Organization
WMD	Weapons of Mass Destruction



# 1.0 Introduction

Terrorist attacks continue to occur as multiple groups thrive in certain regions across the world. The prevalence of terrorism, coupled with the serious attention it demands from governments, creates an incentive for academics and researchers to study terrorism. Despite this proliferation of studies, there are significant gaps in research that need to be addressed. Both government policies and extant literature attempt to address violent extremism and terrorism in the same frame. Official definitions of violent extremism are scarce. Differentiation between terrorism and violent extremism is examined, along with the difference between counterterrorism and countering violent extremism.

This paper contributed to complementary work focused on how geographic features influence terror targets and how their spatiotemporal changes could help forecast the growth or emergence of new terror activity (see Chatterjee and Fortin 2016; Johansen 2016). The group selection section addresses the four countries and individual terror groups examined in that project; detailed profiles of each terror group are provided in Appendix A. Nearly all quantitative studies of terrorism rely on a database that covers terrorist events, yet there are major discrepancies between databases. These discrepancies, based on scope, geographic region, years covered, and the definition of terrorism used, greatly affect the results of associated studies. This paper attempts to address these inconsistencies by creating a matrix comparing the basic information of a dozen terrorism databases. A qualitative summary of each database is included to provide context to their discrepancies. Finally, an approach to spatial risk analysis, Risk Terrain Modeling (RTM), is evaluated on its applicability to terrorism. Originally designed for crime analysis, the approach has potential for determining higher risk areas for terrorism following the development of risk indicators that are proven to increase the likelihood of terrorism.

## 2.0 Background

### 2.1 Terrorism and Violent Extremist Organizations

Numerous definitions of terrorism exist, with little consensus on what constitutes a terrorist attack or organization. Definitions differ between academic, international, and government communities for two reasons: (1) terrorism is a pejorative term with no universal definition and (2) each community tends to adopt a definition that reflects their particular priorities and interests (Hoffman 2006). These definitions can differ between departments within the same government, such as the Federal Bureau of Investigation (FBI) and the State Department. For the purposes of this paper, we will use the definition of terrorism provided by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) for the Global Terrorism Database (GTD). They define a terrorist attack as “the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social good through fear, coercion, or intimidation” (START 2016). This definition was selected due to the widespread use of the GTD throughout the project; it provides the coding basis for attacks and drives the inclusion criteria. Including the threatened use of force in the definition creates a broad range of attacks that are categorized as terrorism.

Defining violent extremism is a more complex task compared to defining terrorism. Little research exists differentiating the two, with violent extremism and terrorism often used interchangeably. It is more helpful to compare definitions from similar federal agencies. The FBI defines terrorism as the “unlawful use of force or violence against persons or property to intimidate or coerce a government, a civilian population, or any segment thereof, in furtherance of political or social goal” (National Institute for Justice 2011). The FBI defines violent extremism as “encouraging, condoning, justifying, or supporting the commission of a violent act to achieve political, ideological, religious, social, or economic goals” (FBI n.d.). Furthermore, the FBI states, “more than 50 violent extremist groups around the world have been named terrorist organizations by the U.S. government,” and lists six examples: al-Qaeda, al-Shabaab, Hizballah, Islamic State of Iraq and the Levant (ISIL), Kahane Chai, and Revolutionary Armed Forces of Colombia (FARC) (FBI n.d.). Three of these examples, FARC, ISIL, and ISIL-Libya by extension, are terrorist organizations profiled in this report. It would be reasonable to assume that Lashkar-e-Taiba (LeT), which follows an extremist interpretation of Islam, would also fall into the FBI’s list of violent extremist organizations (VEOs).

While there is a significant lack of extant literature seeking to differentiate between terrorism and violent extremism, some authors have tackled the challenge. Nasser-Eddine et al. (2011) discovered through their examination of countering violent extremism (CVE) literature that definitions for both violent extremism and CVE are viewed as self-evident. Lake (2002) differentiated the purpose of violent extremism as provoking the target into “a disproportionate response, radicalize moderates and build support for its objectives in the long term, while the purpose of terrorism is to endogenize the capabilities of both the terrorists and the target.” Mroz (2009) explained violent extremism as “violence in the absence of reason, or rather, the belief that committing an act of violence will produce benefits that outweigh the cost of human life. Violent extremism is homicide, genocide, fratricide, and, yes, it can also be terrorism.”

Mroz (2009) also noted that while terrorism can be countered, violent extremism cannot, as most forms occur as lone wolf attacks. Nasser-Eddine et al. (2011) further addressed the issue of violent extremism being interchanged with not only terrorism, but also with political violence and extreme violence. Despite

some institutions, such as the FBI, defining both terrorism and violent extremism, they are still used interchangeably throughout policy papers and discussions. Thus no real distinction has fully evolved and they remain evolving concepts.

Examining the differences in counterterrorism and CVE provides another potential avenue for differentiation. The State Department's Bureau of Counterterrorism recently changed its name and mandate to the Bureau of Counterterrorism and Countering Violent Extremism. The State Department, in conjunction with the U.S. Agency for International Development (USAID), released a joint strategy on CVE in May 2016. The joint strategy defines CVE as "proactive actions to counter efforts by violent extremists to radicalize, recruit, and mobilize followers to violence and to address specific factors that facilitate violent extremist recruitment and radicalization to violence" (State Department and USAID 2016). The document acknowledges terrorist groups such as ISIL, Al-Qa'ida in the Arabian Peninsula, al-Shabaab, and Boko Haram as having propagated violent extremism within regional conflicts and state collapse (State Department and USAID 2016). The Joint Chiefs of Staff (JCS) official doctrine for military counterterrorism defines counterterrorism as "activities and operations taken to neutralize terrorists and their organizations and networks in order to render them incapable of using violence to instill fear and coerce governments or societies to achieve their goals" (Joint Publication 2014).

The difference between counter policies appears clear: CVE focuses on preventing radicalization and recruitment of potential followers, while counterterrorism focuses on eliminating terrorists and their organizations. Yet, the explanation for this difference is not nearly as apparent. One could simply attribute the differences to the distinct priorities of each contributor. Given its policy goals as a government institution, the State Department would naturally push forward a policy aimed at preventing radicalization. This falls in line with the FBI's online CVE campaign, called "Don't Be a Puppet." The campaign aims to educate how people become violent extremists, how they make contact, and how to avoid becoming radicalized (FBI n.d.). On the other hand, the JCS focuses more exclusively on military operations and policies. Therefore, a counterterrorism definition involving the neutralization of terrorists and their organizations fits their mission.

In the context of counterterrorism and CVE strategies, the two differing approaches by the JCS and FBI are distinguished as hard and soft power. Hard power mechanisms include military, financial incentives, economic sanctions, and legal options (Aly et al. 2015). The JCS' counterterrorism policy fits under hard power. Soft power encompasses a broader range of instruments that seek to improve relations between states or fuel desired social change. Aly et al. (2015) provides more nuance toward the relationship between counterterrorism and CVE. They associate CVE with the soft side of counterterrorism, and loosely define CVE as "measures that target the root cause of terrorism at the societal level". The conceptual shift from hard-focused counterterrorism to CVE is rooted in CVE strategies becoming more focused on prevention rather than responding to violent extremism (Aly et al. 2015; Nasser-Eddine 2011).

Harris-Hogan et al. (2015) confirms this view, noting that CVE has become a popular term used by governments and academics to refer to non-coercive attempts to reduce involvements in terrorism. They note CVE activities evolved from counter-radicalization policies, defined by the United Nations as "detering disaffected (and possibly already radicalized) individuals from crossing the line and becoming terrorists". This supports the ambiguity of CVE policies, with CVE evolving into a catchall category that lacks precision and focus (Harris-Hogan et al. 2015).

START provides a matrix called the Influencing Violent Extremist Organizations (IVEO) Knowledge Matrix that examines 183 different hypotheses on how VEOs may be negatively influenced. The matrix evaluates each hypothesis based on empirical support available in open literature, evidence applicability, Knopf's VEO influence typology, and the system level targeted (IVEO Knowledge Matrix n.d.). The empirical support for the top six hypotheses nearly all come from studies on interstate conflict, civil war, and terrorism. For example, one of the top hypotheses is "In a country/issue context with multiple VEOs, negotiating with one VEO may lead to increased bad behavior by VEOs left out of negotiations" (IVEO Knowledge Matrix n.d.). The matrix then offers several empirical studies supporting the hypothesis (Bloom 2005; Stedman 1997; Kydd and Walter 2002; Cunningham 2006; Nilsson 2008). It appears that most, if not all, of the hypotheses presented are rooted in previous terrorism literature.

## 2.2 Risk Terrain Modeling

RTM is an approach to spatial risk analysis that was invented by Les Kennedy and Joel Caplan, and has been developed in collaboration with Eric Piza (RTM n.d.). Initially, this approach was created to identify risk features of a landscape or geographic space and model how they co-locate to create unique behavior settings for crime. Since its inauguration, RTM has been adapted to many uses other than studying crime, including injury prevention, public health, epidemiology, border security, pollution, and maritime piracy. RTM provides a simple analogy to explain how it works:

*Consider a place where children repeatedly play. When we step back from our focus on the cluster of children, we might realize that located where they play exist swings, slides, and open fields. These features of the place (i.e., suggestive of a playground) attract children there instead of other locations that are absent such entertaining qualities. In a similar way, spatial factors can influence the seriousness and longevity of crime problems. (RTM n.d.)*

RTM assumes that all places are risky to some extent, but due to the spatial influences of some crimes, certain locations are much riskier than others (Caplan et al. 2013). Risky places are the product of vulnerability and exposure. They are defined as:

*... a function of the combined effect of (1) vulnerability, the spatial influences of features in the environment that contribute to attracting criminal behavior; (2) local exposure, near repeat crime events, that occur within a short period of time; and (3) global exposure, areas with a high concentration of criminal incidents. (Caplan and Kennedy 2016, p. 51)*

RTM uses a micro-level unit, called *place*, that provides smaller units of analysis for better precision and permits the modeling of a continuous surface, thereby reducing the need for worries about edge effects or the modifiable area unit problem (Caplan et al. 2013). This allows for analysis at the block or half-block level. Forecasting risky locations for crime must incorporate both spatial vulnerabilities and exposures at micro places to yield efficient and actionable spatial intelligence (Caplan and Kennedy 2016).

The RTM process begins by selecting factors of various weights that are geographically related to crime incidents. The final model displays places where criminal behavior is statistically most likely to occur (RTM n.d.). The changing of weights and indicators allows for dynamic analysis of unique locations, instead of trying to fit a set pattern of crime across jurisdictions. Caplan and Kennedy (2016) provide an

example of how the mapping process works by looking at robberies in Kansas City. They model the jurisdiction as a grid of 462-foot (the average block length in Kansas City) by 462-foot cells, with each cell representing a *place*. To determine the optimal spatial influence of each risky feature, they define 30 potential risk factors of the Kansas City landscape across several maps. For each risk factor, they measure whether each cell in the grid was within 462, 924, or 1386 feet of a feature point (approximately one block, two blocks, or three blocks), or in an area of high density of the feature points based on a kernel density bandwidth of 462, 924, or 1386 feet. They then empirically select risk factors for inclusion into the final model. Their results showed that 14 of the initial 30 risk factors were spatially related to robbery incidents in the city.

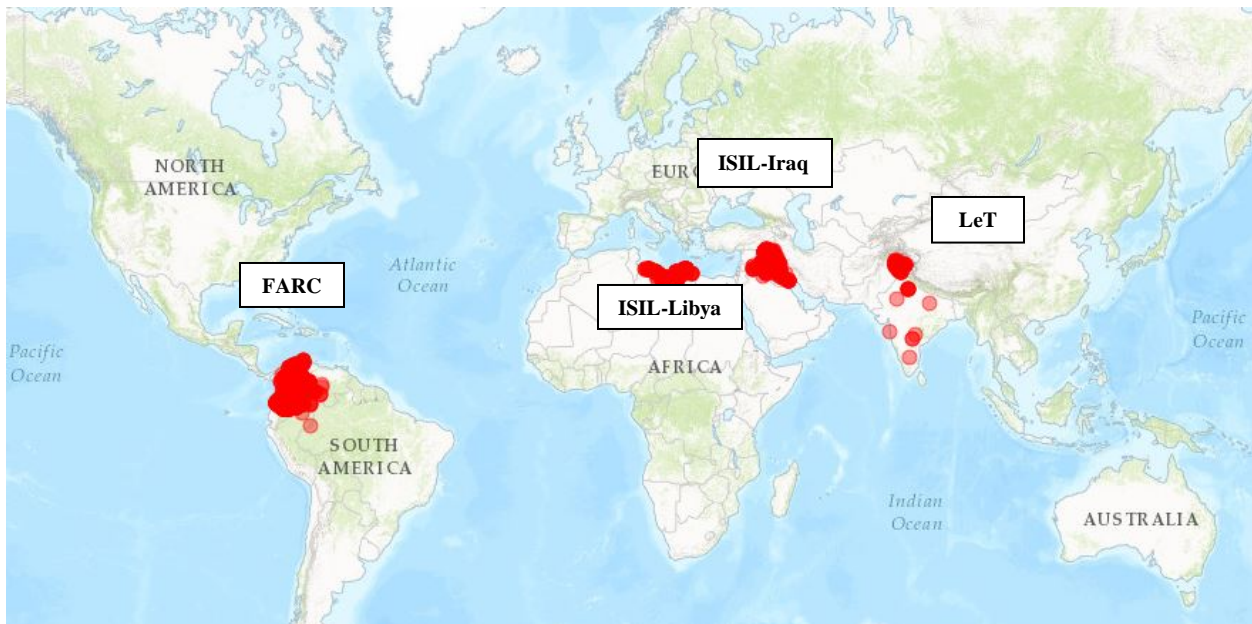
The RTM website ([www.riskterrainmodeling.com](http://www.riskterrainmodeling.com)), run by its founders Caplan and Kennedy, contains a number of resources for learning and conducting RTM. Multiple free publications are available, along with a number of other publications that require paid access. These include books, book chapters, journal articles, downloadable PDFs, working papers, reports, research briefs, literature reviews, conjunctive analysis, conferences and abstracts, and other selected recommended readings. Caplan and Kennedy offer their own software for conducting RTM, called RTMDx. They offer three versions of the software: Educational, geared toward students and educators, is free but does not output maps; Professional, which requires purchase of a single-end user license and outputs GeoTiff maps; and Project Partners, a professional version that can be customized with speaking, training, presentation, or research engagements. They provide a free user manual, available on their website, which provides detailed explanations on operating the software.

### 3.0 Country and Terror Group Selection

This section supports a complementary project with goals to use statistical methods for estimating terrorist risks (see Chatterjee and Fortin 2016; Johansen 2016). Selection of the countries and terrorist organizations to examine for the project included the following factors:

- Geographic diversity
- Terrorist organization
  - Ideology
  - Group longevity
  - Area(s) of operation

The selection process needed to focus on a diverse range of countries, leading us to select countries from four distinct regions: South America, the Middle East, Africa, and Asia. The process then diverged within each region, based on unique factors of the countries and terrorist organizations within those countries. Attacks within the selected country needed to cluster in small, distinct areas. Tight clustering holds a two-fold benefit: the necessary amount of data on infrastructure would be smaller than a broader range of attacks and allows the geospatial analysis to observe attacks from a higher resolution. Furthermore, there needed to be some diversity among selected groups. This pertains not just to ideology, but also the group’s longevity; a mature group and an emerging group needed to be included. Creating diversity in both the regions and groups examined allows for trends of attacks and risks to be compared. After evaluating the necessary criteria, four terrorist organizations were selected: FARC in Colombia, ISIL in Iraq, LeT in India, and ISIL in Libya. Detailed profiles of each group are provided in Appendix A.



**Figure 1.** The respective attacks by each group within the country they operate from 1970 to 2015, culminating in over 4,500 attacks (Source: GTD)

### **3.1 South America: Colombia – Revolutionary Armed Force of Colombia**

Colombia is home to the one of the only active terrorist organizations in South America. FARC is a mature terrorist organization that has been conducting attacks since 1964 (START PVC 2015a). Furthermore, their Leftist ideology differentiates them from the majority of high-profile terrorist organizations, which tend to be Salafi Jihadists. Despite recently coming to terms on a ceasefire and peace agreement with the Colombian government, it is likely that spoilers will factionalize from the main group to continue attacks. One FARC guerilla unit, the First Front, announced it would refuse any eventual order to lay down arms (InSight Crime 2016).

### **3.2 Middle East: Iraq – Islamic State of Iraq and the Levant**

Currently, ISIL is the most dangerous terrorist organization in the world, conducting thousands of attacks in Iraq and Syria since 2014. A Salafist Jihadist group, ISIL first formed in 2004 as al-Qaeda in Iraq and eventually splintered off in February 2014 with the mission of establishing an Islamic State (START PVC 2015b). As of December 2015, 43 terrorist groups have sworn allegiance to ISIL (IntelCenter 2015). Their status alone dictates their inclusion into the study. The regional selection was limited to Iraq for two key reasons. First, their attacks in Syria are dispersed, while they are clustered much closer together within Iraq. The attacks in Iraq cluster around Baghdad and move upward along the main highway through Tikrit and Mosul. The clustering helps aid the geospatial analysis, which is aiming to examine risk at the micro level. Second, the current civil war in Syria between President al-Assad and the Syrian rebels creates a high level of uncertainty for proper attack attribution. The high amount of armed conflict obscures accurate reporting of terrorist attacks.

### **3.3 Africa: Libya – Islamic State of Iraq in Libya**

Africa contains several countries where major terrorist organizations operate. While the top two terrorist groups, Boko Haram and al-Shabaab, would be attractive choices, more diversity among group selection is necessary. An emerging terrorist organization would provide us with a broader sample of attacks to compare against more established groups. The ISIL branch in Libya (known as ISIL-Libya) formed in November 2014, with at least three distinct groups having declared their affiliation with ISIL: Barqa in the east, Tripolitania in the west, and Fezzan in the south desert. The Barqa Province and Tripoli Province have committed nearly all their attacks in 2015, conducting a combined 199 attacks versus just nine in 2014 (GTD 2015). The Fezzan Province committed only three attacks during that period, so it will not be included during the analysis. The attacks by the Barqa Province primarily cluster in the eastern coastal cities of Benghazi, Derna, and Ajdabiya. The attacks by the Tripoli Province cluster around Surt (ISIL-Libya's headquarters) and Tripoli, the capital (GTD 2015).

### **3.4 Asia: India – Lashkar-e-Taiba**

Within the Asian continent, Pakistan and India are subject to a high number of terrorist attacks. While Pakistan experiences a higher number of attacks, the attacks in India tend to be more focused, especially on a group basis (GTD 2015). After examining group attack clusters, LeT was selected. LeT has been active since 1993, and their attacks focus almost exclusively in the Kashmir region, a hotly contested

geographic region between India and Pakistan. The group's stated mission is the integration of Jammu and Kashmir with Pakistan, removing India's sovereignty over the region (Council on Foreign Relations 2010). LeT will strike major cities outside the Kashmir region, which tend to have a larger impact. LeT was responsible for the Mumbai attacks in 2008, where 10 gunmen stormed public buildings throughout Mumbai, killing 164 people (CNN 2015).



## 4.0 Database Matrix

Databases containing detailed records of terrorist attacks provide a valuable resource for conducting terrorism research. However, variations in databases can significantly influence terrorism studies, creating potential for incorrect results. Using a database as a count measure for attacks can also lead to varying numbers, based on collection methodologies and definitions of terrorism. A comparison of any open source, publically available databases is necessary to ensure researchers and policymakers alike know the differences between databases. The selection criteria compare a number of factors: total number of incidents, years covered, geography, access availability, and unit of analysis. Outside of the matrix, each database will be evaluated qualitatively. Schmid (2011) reviewed several of these databases. This work updates the information on several of those databases, and adds new contributions while eliminating defunct databases. The matrix is organized by geographic region, and then by total number of incidents within those regions.

### 4.1 Matrix

**Table 1.** Matrix of databases organized by geographic region and then by total number of incidents within those regions

Database Name	Years Covered	Total Number of Incidents	Geographic Regions	Access	Unit of Analysis
Global Terrorism Database	1970-2015	156,733	Global	Free	Terrorist incident
RAND Database	1968-2009	40,130	Global	Limited	Terrorist incident
International Terrorism: Attributes of Terrorist Events (ITERATE)	1968-2007	13,087	Global	Restricted	Terrorist incident
Chicago Project on Security and Terrorism Suicide Attack Database (CPOST-SAD)	1982-2015	4,933	Global	Free	Suicide attack
Uppsala Conflict Data Program	1946-2014	2,168	Global	Free	Armed conflict
Monterey Weapons of Mass Destruction (WMD) Terrorism Database	1900-2012	1,742	Global	Limited	Incidents involving chemical, biological, radiological, and nuclear materials
Political Terror Scale	1976-2014	N/A	Global	Free	Political violence
Minorities at Risk Project	1945-2006	287 groups	Global	Free	Communal group conflict
Minorities at Risk Organizational Behavior	1980-2004	118 groups	Middle East and N. Africa	Free	Communal group conflict
South Asia Terrorism Portal	1987-2016	Unknown	South Asia	Free	Terrorist incident
Terrorism in Western Europe (TWEED)	1950-2004	11,026	W. Europe	Free	Terrorist incident
Right-wing Terrorism and Violence	1990-2015	578	W. Europe	Free	Terrorist incident

While a number of relevant databases were identified in the course of this research, only 12 are included in this report. The individual databases examined met our required characteristics of being open sourced and actively available. Databases such as the Worldwide Incidents Tracking System and the National Memorial Institute for the Prevention of Terrorism's Terrorism Knowledge Base are not included as they are no longer active. The Worldwide Incidents Tracking System was the U.S. government's database on acts of terrorism created by the National Counterterrorism Center. It was folded into the GTD in April 2012 (Empirical Studies of Conflict 2016). The Terrorism Knowledge Base became defunct in 2008 and the terrorist group profiles are now hosted by START. Databases that provide no access, whether free or paid, are also not included, such as the International Policy Institute for Counter-Terrorism's Terrorist Incident Database, the Institute for the Study of Violent Groups database, and the International Atomic Energy Agency's Illicit Trafficking Database.

## 4.2 Database Summaries

While the matrix provides a quantitative comparison of the databases, a brief qualitative look at each can provide greater insight to their differences. Arguably, the most important is the definition of terrorism. That definition becomes the foundation that drives the coding of attacks and is the primary reason for the widespread differences in reported incidents. These descriptions also provide other useful information: the parent host, URL, and principal sources used.

### 4.2.1 Global Terrorism Database

<b>Name:</b>	Global Terrorism Database (GTD)
<b>Host:</b>	National Consortium for the Study of Terrorism and Responses to Terrorism (START), University of Maryland
<b>URL:</b>	<a href="https://www.start.umd.edu/gtd/">https://www.start.umd.edu/gtd/</a>
<b>Years Covered:</b>	1970-2015 and ongoing
<b>Access:</b>	Free
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Terrorism incident
<b>Principal Sources:</b>	Publicly available open source material

The GTD is one of the most comprehensive databases of terrorist attacks available online. It was created in 2007 and began by computerizing data from the Pinkerton Global Intelligence Service, which spanned from 1970 to 1990 (Lafree and Dugan 2007). Because the goal of the Pinkerton database was to provide risk assessment to corporate customers, the database was designed to err toward inclusiveness (Lafree and Dugan 2007). The GTD contains 156,773 attacks globally, spanning from 1970 to 2015, and covers both domestic and international terror attacks. Noted earlier, the GTD defines terrorism as “the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social good through fear, coercion, or intimidation” (START 2016). This definition lends itself toward inclusiveness as well, given that the “threatened use” of violence is coded as an attack. The GTD also contains the most descriptive data regarding the attacks, with over 137 different variables. Attacks logged in the GTD were used as the basis for this project.

#### 4.2.2 RAND Database of Worldwide Terrorism Incidents

<b>Name:</b>	RAND Database of Worldwide Terrorism Incidents (RDWTI)
<b>Host:</b>	RAND Corporation
<b>URL:</b>	<a href="http://www.rand.org/nsrd/projects/terrorism-incidents.html">http://www.rand.org/nsrd/projects/terrorism-incidents.html</a>
<b>Years Covered:</b>	1968-2009
<b>Access:</b>	Limited
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Terrorism incident
<b>Principal sources:</b>	Open source material

The RDWTI covers domestic and international terrorist attacks from 1968 to 2009, and is managed by the RAND Corporation (RAND Corporation 2016). RAND has a goal to improve policy and decision making through research and analysis and works closely with the U.S. defense establishment (Schmid 2011). For the purposes of the RDWTI, terrorism is defined as:

*... violence calculated to create an atmosphere of fear and alarm to coerce others into actions they would not otherwise undertake, or refrain from actions they desired to take. Acts of terrorism are generally directed against civilian targets. The motives of all terrorists are political and terrorist actions are generally carried out in a way that will achieve maximum publicity. (RDWTI n.d.)*

RDWTI access is listed as “limited” due to the downloadable version of the database not containing the full spectrum of variables available. The downloadable database only contains basic variables, such as date, location, perpetrator, weapon, and casualties. The searchable database provided online contains additional variables, such as domestic/international incident, suicide mission, state sponsored, and coordinated attack, among others.

#### 4.2.3 Chicago Project on Security and Terrorism Suicide Attack Database

<b>Name:</b>	Chicago Project on Security and Terrorism Suicide Attack Database (CPOST-SAD)
<b>Host:</b>	Chicago Project on Security and Terrorism, University of Chicago
<b>URL:</b>	<a href="http://cpostdata.uchicago.edu/">http://cpostdata.uchicago.edu/</a>
<b>Years Covered:</b>	1982-2015
<b>Access:</b>	Free
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Suicide attack

The CPOST-SAD contains data on suicide attacks from 1982 through 2015, a total of 4,933 attacks in over 40 countries. The database includes information about the location of attacks, target type, weapon used, and systematic information on the demographic and general biographical characteristics of suicide attackers. CPOST-SAD defines a suicide attack as “an attack in which an attacker kills himself or herself

in a deliberate attempt to kill others.” Furthermore, CPOST-SAD intentionally does not consider whether a suicide attack is terrorism or not, due to the difficulty of defining terrorism. Instead, all suicide attacks must be committed by a non-state actor; attacks authorized by national governments are not included. CPOST-SAD does not include failed suicide attacks where explosives do not detonate or are detonated by someone other than the attacker, or “suicide missions” where the attacker expects to be killed but does not take their own life (CPOST 2016).

#### **4.2.4 Right-wing Terrorism and Violence Database**

<b>Name:</b>	Right-wing Terrorism and Violence (RTV) Database
<b>Host:</b>	University of Oslo, Center for Research on Extremism
<b>URL:</b>	<a href="http://www.sv.uio.no/c-rex/english/rtv-dataset/rtv-dataset.html">http://www.sv.uio.no/c-rex/english/rtv-dataset/rtv-dataset.html</a>
<b>Years Covered:</b>	1990-2015
<b>Access:</b>	Free
<b>Scope:</b>	Western Europe
<b>Unit of Analysis:</b>	Terrorist incident

The RTV dataset covers incidents of right-wing terrorism and violence in Western Europe from 1990 to 2015. The dataset was created by Jacob Ravndal, a doctoral candidate with the Center for Extremism Research at the University of Oslo. That dataset contains 578 incidents, of which 190 are considered deadly incidents, resulting in 303 deaths. As the number of violent incidents motivated by right-wing beliefs is too large to be dealt with effectively, the RTV contains only the most severe types of attacks; such incidents are fewer in number and less likely to go unnoticed. The database lacks a definition of both terrorism and right-wing terrorism. Instead, it includes only violent incidents whose target selection—minority groups, political adversaries, or the government—is based on right-wing beliefs. It intentionally avoids distinguishing terror incidents from other types of incidents because of the inherently blurred nature of such attacks (Ravndal 2016).

#### **4.2.5 International Terrorism: Attributes of Terrorist Events**

<b>Name:</b>	International Terrorism: Attributes of Terrorist Events (ITERATE)
<b>Host:</b>	Vinyard Software Inc.
<b>URL:</b>	<a href="http://www.vinyardsoftware.com/">http://www.vinyardsoftware.com/</a>
<b>Years Covered:</b>	1968-2007 and ongoing
<b>Access:</b>	Restricted
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Terrorist incident
<b>Principal Sources:</b>	Open source material

The ITERATE dataset provides both quantitative and qualitative data and information on international and transnational terrorism. ITERATE is the only database listed as “restricted” as it requires purchasing

to access. The dataset is hosted by Vinyard Software and is available from their website for \$50 per year of data (i.e., the year 2000 would be \$50, 2000-2001 would be \$100). The ITERATE project defines international/transnational terrorism as:

*... the use, or threat of use, of anxiety-inducing, extra-normal violence for political purposes by any individual or group, whether acting for or in opposition to established governmental authority, when such action is intended to influence the attitudes and behavior or a target group wider than the immediate victims and when, through the nationality or foreign ties of its perpetrators, its location, the nature of its institutional or human victims, or the mechanics of its resolution, its ramifications transcend national boundaries.* (Schmid 2011).

According to Schmid (2011) the numerical datasets are coded into four related but separate files: Common, Fate, Hostage, and Skyjack. The Common file contains the vast majority of international terrorism incidents; key variables include fatalities, victims wounded, nationalities of terrorists and terrorist groups, and nationalities of victims. The Fate file details the post-incident fate of perpetrators, which include death, arrest, escape, prison term, extradition, or asylum. The Hostage file includes incidents such as hostage taking, kidnappings, and the seizure of land-based transportation. The Skyjack file contains incidents and variables related to terrorist and non-terrorist hijackings; these data are also contained within the Common file. The source data used to compile all files draws from government agencies, scholars, news media, information services, and individuals.

#### **4.2.6 Terrorism in Western Europe: Events Data**

<b>Name:</b>	Terrorism in Western Europe: Events Data (TWEED)
<b>Host:</b>	Department of Comparative Politics, University of Bergen, Norway
<b>URL:</b>	<a href="http://folk.uib.no/sspje/tweed.htm">http://folk.uib.no/sspje/tweed.htm</a>
<b>Years Covered:</b>	1950-2004
<b>Access:</b>	Free
<b>Scope:</b>	Western Europe
<b>Unit of Analysis:</b>	Terrorist incident
<b>Principal Sources:</b>	<i>Kessing's Record of World Events</i>

The TWEED dataset contains information on incidents related to domestic terrorism in 18 Western European countries from 1950 to 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom of Great Britain and Northern Ireland (Engene 2007). The dataset was assembled by Dr. Jan Okar Engene of the Department of Comparative Politics at the University of Bergen in Norway (Schmid 2011). For the purposes of the TWEED dataset, “terrorism is understood theoretically as a form of violence that uses targets of violence in an indirect way in order to influence third parties, audiences” (Engene 2007). Given their abstract definition of terrorism, the criteria for an act of terrorism includes concrete events such as bombings, shootings, sieges, explosions, kidnappings, and other armed attacks (Schmid 2011). Attacks are codified as occurring domestically, though cases where a terrorist from one Western European country carries out attacks in another Western European country are also included

(Engene 2007). While the dataset features 9,542 incidents initiated by terrorist groups or non-state actors (86.5%), the remaining attacks are accredited to government actions primarily directed against terrorists (Engene 2007). Most researchers do not regard attacks by states as terrorism so it is exceedingly rare and controversial to include these in a terrorist attack database (Hoffman 2006).

#### 4.2.7 South Asia Terrorism Portal

<b>Name:</b>	South Asia Terrorism Portal (SATP)
<b>Host:</b>	Institute for Conflict Management, New Delhi
<b>URL:</b>	<a href="http://www.satp.org/">http://www.satp.org/</a>
<b>Years Covered:</b>	1987-2016 and ongoing; varies by country
<b>Access:</b>	Free
<b>Scope:</b>	South Asia
<b>Unit of Analysis:</b>	Terrorist incident
<b>Principal Sources:</b>	Open source material

The SATP is a web-exclusive mixture of detailed narrative, chronological listings, statistical data, graphs, maps, and documentation on terrorist incidents and events in South Asia (Schmid 2011). SATP is operated by the Institute of Conflict Management in New Delhi (Schmid 2011) and covers Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka (SATP 2016). Additionally, the Select States of India are included: Assam, Jammu and Kashmir, Manipur, Mizoram, Nagaland, Punjab, and Tripura (Schmid 2011). The SATP provides varying years and types of attack data per country. Each country and region contains unique data regarding terrorism. Countries that experience higher levels of terrorism, such as India and Pakistan, contain further data. Since SATP is web-exclusive, it holds limited utility for quantitative studies and models compared to those with downloadable databases; however, the specificity and uniqueness of the data provided makes up for it.

#### 4.2.8 Political Terror Scale

<b>Name:</b>	Political Terror Scale (PTS)
<b>Host:</b>	University of North Carolina at Asheville
<b>URL:</b>	<a href="http://www.politicalterror scale.org/">http://www.politicalterror scale.org/</a>
<b>Years Covered:</b>	1976-2014
<b>Access:</b>	Free
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Political violence and terror
<b>Principal Sources:</b>	U.S. State Department Country Reports on Human Rights Practices and Amnesty International's yearly reports

PTS departs from previous databases, which are focused on terrorist attack incidents, and instead measures levels of political violence and terror that a country experiences in a particular year, based on a five-level "terror scale" (Gibney et al. 2015). Mark Gibney, currently based at the University of North

Carolina at Asheville, has managed the PTS since 1984 (Schmid 2011). The data used in compiling the index primarily comes from Amnesty International and the State Department, though recent years have also included Human Rights Watch. The scale, originally developed by Freedom House, features five levels. Level 1 countries feature a secure rule of law, while Level 5 countries experience terror that has expanded to the whole population (Gibney et al. 2015). Although the title implies a focus on political terrorism, it is more accurate to consider the database as a ranking of human rights violations in a state (Schmid 2011). The term “terror” as used by the PTS, “refers to state-sanctioned killings, torture, disappearances, and political imprisonment” (Gibney et al. 2015). This further differentiates it from the previous definitions and databases that all focus on non-state actors.

#### **4.2.9 Monterey WMD Terrorism Database**

<b>Name:</b>	Monterey WMD Terrorism Database
<b>Host:</b>	Monterey Institute of International Studies (MIIS)
<b>URL:</b>	<a href="http://wmddb.miis.edu/">http://wmddb.miis.edu/</a>
<b>Years Covered:</b>	1990-2012 and ongoing
<b>Access:</b>	Limited
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Incidents involving sub-state actors attempting to acquire or use WMDs
<b>Principal Sources:</b>	Open source material

The Monterey WMD Terrorism Database (MIIS 2016) is an open source catalog of worldwide incidents involving the acquisition, possession, threat, and use of WMDs by sub-state actors. The database is hosted by the Center for Nonproliferation Studies through MIIS. The database focuses on incidents related to the use of chemical, biological, radiological, and nuclear materials as potential weapons. Sources used to compile the database include government documentation, media news services, unpublished material, academic journals, and non-English material, including documentation in German, Arabic, Russian, Chinese, and Korean (Schmid 2011). Despite free access to the database, it is restricted to federal, state, and local government employees (MIIS 2016). This restriction hinders its use for academic research, though it still has utility for use by policymakers.

#### **4.2.10 Uppsala Conflict Data Program**

<b>Name:</b>	Uppsala Conflict Data Program (UCDP) Armed Conflict Dataset
<b>Host:</b>	Department of Peace and Conflict Research, Uppsala University, Sweden
<b>URL:</b>	<a href="http://www.pcr.uu.se/research/ucdp/datasets/">http://www.pcr.uu.se/research/ucdp/datasets/</a>
<b>Years Covered:</b>	1946-2014 and ongoing
<b>Access:</b>	Free
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Armed conflict
<b>Principal Sources:</b>	Open source material

The UCDP collects information on many aspects of armed violence since 1946, containing both quantitative and qualitative data sets (Gleditsch 2002). The program allows researchers to access relevant data sets to conduct analysis on the origins of conflict, its dynamics, and resolutions (Schmid 2011). Armed conflict, different from terrorism, is defined by the UCDP: “An armed conflict is a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in one calendar year” (Gleditsch 2002).

Armed conflict is considered a level of violence above terrorism due to the actors involved. Terrorism occurs between a non-state actor and a variety of actors, including civilians, infrastructure, government, and the military. Armed conflict requires government involvement against an actor, whether non-state or another government. Therefore, codification of terrorism as armed conflict occurs depending on target selection. The UCDP Armed Conflict data set confirms this; groups such as al-Qaeda, al-Shabaab, FARC, and ISIL are included. Key variables include location, year, incompatibility, side A (government in conflict), and side B (non-state actor or other government) (Schmid 2011). Outside of the armed conflict data set, UCDP also offers data sets on actors, peace agreements, non-state conflict, battle-related deaths, and more.

#### **4.2.11 Minorities at Risk Project**

<b>Name:</b>	Minorities at Risk Project (MAR)
<b>Host:</b>	University of Maryland
<b>URL:</b>	<a href="http://www.mar.umd.edu/">http://www.mar.umd.edu/</a>
<b>Years Covered:</b>	1945-2006
<b>Access:</b>	Free
<b>Scope:</b>	Global
<b>Unit of Analysis:</b>	Conflict between politically active communal groups
<b>Principal Sources:</b>	Open-source Material

The MAR project tracks conflicts of 284 politically active ethnic groups worldwide whose current population is at least 500,000 (MAR 2009; Schmid 2011). MAR focuses specifically on ethnopolitical groups, non-state communal groups that have “political significance” in the contemporary world because of their status and political actions. MAR determines political significance through two criteria: “(1) the group collectively suffers, or benefits from, systematic discriminatory treatment vis-à-vis other groups in society; (2) the group is the basis for political mobilization and collective action in defense or promotion of its self-defined interests.” MAR groups are categorized as one of six types: ethnonationalist, indigenous, ethnoclass, communal contender, religious sect, and national minority (MAR 2009). A key aim of the MAR project is to provide researchers with standardized data, allowing for comparative studies and quantitative research across various conflicts (Schmid 2011).



#### 4.2.12 Minorities at Risk Organizational Behavior

<b>Name:</b>	Minorities at Risk Organizational Behavior (MAROB)
<b>Host:</b>	University of Maryland
<b>URL:</b>	<a href="http://www.mar.umd.edu/mar_data.asp#marob">http://www.mar.umd.edu/mar_data.asp#marob</a>
<b>Years Covered:</b>	1980-2004
<b>Access:</b>	Free
<b>Scope:</b>	Middle East and North Africa
<b>Unit of Analysis:</b>	Conflict between politically active communal groups
<b>Principal Sources:</b>	Open source material

The MAROB dataset is a subsidiary of the MAR project and focused initially on the Middle East and North Africa. The purpose of MAROB is to answer fundamental questions on the identification of factors that motivate members of ethnic minorities to radicalize, form activist organizations, and move from conventional means of politics and protest into violence and terrorism. MAROB details the characteristics of 118 ethnopolitical organizations likely to employ violence and terrorism in the pursuit of perceived grievances with state and international authority structures. The 118 organizations represent the interests of all 22 ethnopolitical groups in 16 countries of the Middle East and North Africa from 1980 to 2004 (Asal et al. 2008).

### 4.3 Challenges and Shortcomings

Schmid (2011) identifies seven major shortcomings with current open source terrorism databases: (1) one-sidedness, (2) under-reporting of failed and foiled attacks and threats, (3) under-reporting of political violence other than terrorism, (4) non-reporting of non- and not-violent activities of terrorists, (5) absence of monitoring of non-political, criminal intimidation, (6) absence of parallel systematic monitoring of terrorist communications, and (7) inadequate coverage of state or regime terrorism. While these are all valid concerns, some do not hold high relevancy toward terrorism research. Finding open source information on many of these shortcomings, such as non-violent activities, terrorist communications, and failed/foiled attacks, is nearly impossible. Furthermore, this information might misrepresent a terrorist group's activity levels by oversaturating databases with unnecessary events. As noted earlier, the last point is questionable due to the wide consensus that state terrorism does not exist (Hoffman 2006). One valid concern is the difficulty of differentiating terrorism in interstate and intrastate war from acts of war and war crimes. This is evident by reporting difficulties in Afghanistan, Iraq, and Syria. Ross (2004) notes further drawbacks of databases: (1) there is no guarantee that the same stringent collection standards were used to develop each database, (2) there is no assurance that all the same variables were coded, (3) rarely is the reliability of the source material questioned or verified, and (4) there is no guarantee that data sets exist for all of the countries under investigation.

Despite these criticisms, Ross (2004) also notes the utility and succinct advantages these databases provide for terrorism research. Databases can help researchers determine trends, give us a better idea of who is committing terrorist acts, compile the types of terrorism that occur, and analyze how terrorism changes over time. Databases also allow researchers to test hypotheses in a quantitative manner and have

primarily been used to aid descriptive research and recommendations for policy changes. Despite the drawbacks listed above, these datasets are necessary for the field of terrorism studies to move forward. In the future, better collection of open source data and coding methods will be developed, which will improve the study and modeling of terrorism and terrorism-related events.

## 5.0 Risk Terrain Modeling

### 5.1 Application to Terrorism

While RTM is being considered for topics other than crime, such as urban planning, border security, and maritime piracy, there is little current literature focused on the application of RTM to modeling terrorism. The RTM website provides a list of risk factors for crime analysis and global threat topics, including murder, shootings, fragile states, and natural resources security, among others. The closest risk indicators they offer involve armed conflict. As noted earlier, armed conflict has some similarities to terrorism. Analyzing the geography of conflict zones uses two methodologies: the use of national-level data to proxy for individual social-economic and political characteristics, and the use of subnational-level data to directly reflect the local differences. National risk factors include economic growth, per capita income, country size, institutional consistency, governance, neighbor conflict, and environmental conditions. Subnational risk factors include distances to capital, borders, and valuable resources; density of population; minority language; rough terrain; and road infrastructure (Gaziarifoglu 2012).

The national risk factors listed are common variables used to study both armed conflict and terrorism. Collier and Hoeffler (2004) conclude that slow economic growth is a robust predictor of conflict, while Fearon and Laitin (2003) suggest that per capita income is a significant indicator of civil wars (Gaziarifoglu 2012). Both sources also conclude that in a country-level analysis among all correlates, country size is the most robust indicator of civil war (Gaziarifoglu 2012). Numerous authors have confirmed that the degree of political stability is higher if there is a high degree of either democracy or autocracy, and states with a small degree of democracy and autocracy experience more armed conflict (Beetham 1991; Gaziarifoglu 2012; Goldstone et al. 2010). Goldstone et al. (2010) also found that having four or more bordering states experiencing armed conflict increases the risk of political instability. Finally, a study by Hegre (2003) finds that mountainous countries have a higher risk of war than other countries.

Gaziarifoglu (2012) does not elaborate nearly as much on the subnational-level risk factors, instead just providing sources and a quick explanatory sentence. The subnational-level risk factors hold greater weight for RTM, featuring applicability to smaller scale analysis. The weight increases for observing terrorism, as terrorists tend to operate at a subnational level. Buhaug and Rød (2006) find support for a number of subnational risk factors looking at armed conflict in Africa from 1970-2001. They find territorial conflict is more likely in sparsely populated regions near the state border, at a distance from the capital, and without significant rough terrain, while conflict over state governance is more likely in regions that are densely populated and near the capital city (Buhaug and Rød 2006).

In Ross (2004) terrorism research methodologies are divided between qualitative and quantitative approaches. The bulk of research on terrorism uses qualitative methods and primarily consists of descriptive accounts of terrorists, their actions, and measures to combat these actions. Qualitative research helps to understand the psychology of terrorists and their social settings, while contextualizing material that is developed in quantitative studies. Case studies are the most robust qualitative methodology and can focus on terrorist groups, different types of terrorism, particular terrorist incidents, and terrorism in selected regions and countries. Case studies typically follow one of two methodologies: most similar or most different. Most similar case studies select cases that hold high levels of similarity, to observe whether the topic of terrorism studied occurs for similar reasons. Most different case studies select cases

that are different in numerous ways and seek to examine if the same causal mechanisms result in the phenomenon studied (i.e., emergence of groups, proliferation of attacks). Most different case studies are seen as the more robust of the two, as their results are more generalizable across varying factors. The most frequent criticism of qualitative methods involves the analysis of the source material. Each person who looks at the information can draw different conclusions, meaning results are not reproducible.

The amount of quantitative research on terrorism pales in comparison to the number of qualitative studies, largely due to a lack of hard data (Ross 2004). Statistical information specific to terrorism research is generally unavailable, inaccurate, dated, or limited to international or transnational events. The proliferation of terrorism databases, particularly the GTD, has provided some manner of codified data for use in quantitative studies; the most prevalent quantitative data being events data. The primary change in terrorist research over the last few decades has been an increase in attempts to use more sophisticated modeling, aided by the development of faster and cheaper computers and statistical programs. The strongest studies tend to use both methodologies, feature multiple empirical analyses, and include at least one qualitative and one quantitative study supporting the hypothesis.

RTM may provide an avenue for analyzing terrorism at the micro level, something that is difficult to accomplish in a quantitative manner. Micro-level studies typically use qualitative methods due to the unavailability of data. By using a database with geocoded attacks, like the GTD, combined with the development of terrorism-specific risk indicators, entirely original research on the spatial dynamics of terrorism becomes possible. This would provide insight into the spatial attributes of terrorist hotspots, like Baghdad or Benghazi, to help understand what makes these areas opportunistic for terrorists. Furthermore, RTM does not assume that one pattern of terrorism would hold across multiple environments. Instead, RTM shows that each location has a unique combination of spatial and situational contexts that influence the risks of terrorism. In terms of methodology, a mixed quantitative and qualitative approach would be the most effective. A set of three to four most different case studies would provide the basis for regions studied, such as the Kashmir region of India, the Philippines, Chechnya, and Baghdad as an example set of locations. The next step would involve leveraging attack data from the GTD to identify areas that feature high levels of terrorist activity at the city level, and then at a block level. RTM could then provide insight toward the specific risk indicators in each city examined, which could then be compared to see how different regions experience risks in similar or different ways.

## **5.2 Recommendations for Future RTM and Terrorism**

Future application of RTM to terrorism will require significant work. The development of a set of risk indicators unique to terrorism is necessary. The subnational risk indicators for armed conflict provide a foundation to build from; however, the supporting literature needs further development. Nearly all of the subnational risk indicators for armed conflict are based on studies limited to Africa (Buhaug and Rød 2006). Gassebner and Luechinger (2011) assess the robustness of previous findings on the determinants of terrorism, reassessing the effect of 65 proposed correlates. This study could provide a starting point for selection of risk indicators for terrorism (e.g., logged gross domestic product per capita, secondary school enrollment, government consumption, fuel exports). Data from the World Bank can be used for national risk factors. In addition, attack data from multiple databases will need cross-referencing to develop a clearer picture of areas that suffer from high levels of terrorism. For example, cross-referencing attacks in the GTD with a regional specific database, such as the SATP, can provide a more accurate picture of high attack regions. One issue to address will be precise locations for attacks. The GTD is one of the only

databases that geocodes attacks; however, these geocodes are not always exact, making precise RTM at the block level unreliable. One method to counter imprecise geocodes is to cross-reference attacks with available police reports, which has been proven to provide more accurate information (Behlendorf et al. 2016). These steps will all need to be accomplished before testing RTM for terrorism.

## 6.0 Conclusion

This paper addressed existing gaps in current terrorism research while providing support for another project. The current literature on VEOs is insufficient to differentiate between violent extremism and terrorism. The selection of regions and terrorist groups to study contribute to a larger project, focused on using statistical methods to estimate terrorism risks. The selection follows a most different system by location and group, resulting in unique locations and groups selected: FARC in Colombia, ISIL in Iraq, ISIL in Libya, and LeT in India (see Appendix A). Terrorism databases, which are a major part of quantitative studies, provide insight toward attack trends and patterns. Comparing existing, open source databases provide a resource to help guide users toward the database that best suits their research needs. RTM, originally developed for crime analysis, could become a new methodology for conducting original research on terrorism at the micro level; however, current literature is still far behind providing robust information for RTM to effectively use.

Terrorism-specific risk indicators need development, with empirical support that is generalizable at a global scale. Accurately geocoded attacks are also needed to pinpoint attack locations for diagnosing how the geographic features of locations influence those attacks. Given the growth of violent extremism in policy circles, the academic field should catch up over the next five to ten years, creating new research on violent extremism and CVE.

## 7.0 References

- Aly A, AM Balbi, and C Jacques. 2015. "Rethinking Countering Violent Extremism: Implementing the Role of Civil Society." *Journal of Policing, Intelligence and Counter Terrorism*. 10(1): 3-13. Accessed on July 18, 2016 at <http://www.tandfonline.com/doi/full/10.1080/18335330.2015.1028772>
- Asal V, A Pate, and J Wilkenfeld. 2008. "Minorities at Risk Project Organizational Behavior and Codebook Version 9/2008." *College Park, MD: Center for International Development and Conflict Management*. Retrieved from: <http://www.mar.umd.edu/data.asp>
- Beetham D. 1991. *The Legitimation of Power*. Palgrave Macmillan, London, United Kingdom.
- Behlendorf, B, J Belur, and S Kumar. 2016. "Peering through the Kaleidoscope: Variation and Validity in Data Collection on Terrorist Attacks." *Studies in Conflict and Terrorism*, 39(7-8): 641-667.
- Bloom MM. 2005. *Dying to Kill: The Allure of Suicide Terror*. Columbia University Press, New York City, New York.
- Buhaug H and JK Rød. 2006. "Local Determinants of African Civil Wars, 1970-2001. *Political Geography*. 25(3): 315-335. Accessed August 1, 2016 at <http://isites.harvard.edu/fs/docs/icb.topic198768.files/Discussion%20%20Readings/Local%20Determinants%20of%20African%20Civil%20Wars.pdf>
- Caplan JM, LW Kennedy, and EL Piza. 2013. *Risk Terrain Modeling Diagnostics Utility User Manual (Version 1.0)*. Rutgers Center on Public Security, Newark, New Jersey.
- Caplan JM and LW Kennedy. 2016. *Risk Terrain Modeling*. University of California Press, Oakland, California.
- Chatterjee S and D Fortin. 2016. In press.
- Collier P and A Hoeffler. 2004. "Greed and Grievance in Civil Wars." *Oxford Economic Papers*. 56: 563-595. Accessed July 25, 2016 at <http://www.econ.nyu.edu/user/debraj/Courses/Readings/CollierHoeffler.pdf>
- Council on Foreign Relations. 2010. *Lashkar-e-Taiba (Army of the Pure) (aka Lashkar e-Tayyiba, Lashkar e-Toiba; Lashkari-i-Taiba)*. Accessed July 28, 2016 at <http://www.cfr.org/pakistan/lashkar-e-taiba-army-pure-aka-lashkar-e-tayyiba-lashkar-e-toiba-lashkar--taiba/p17882>
- CNN – Cable News Network. 2015. *Mumbai Terror Attacks Fast Facts*. Accessed July 27, 2016 at <http://edition.cnn.com/2013/09/18/world/asia/mumbai-terror-attacks/>
- CPOST – Chicago Project on Security and Terrorism. 2016. "Suicide Attack Database." Retrieved from <http://cpostdata.uchicago.edu/>
- Cunningham D. 2006. "Veto Players and Civil War Duration." *American Journal of Political Science*. 50(4): 875-892. Accessed July 24, 2016 at <http://onlinelibrary.wiley.com/doi/10.1111/j.1540-5907.2006.00221.x/abstract>
- Engene JO. 2007. "Five Decades of Terrorism in Europe: the TWEED Dataset." *Journal of Peace Research*. 44(1): 109-121. Retrieved from [www.folk.uib.no/sspje/tweed.htm](http://www.folk.uib.no/sspje/tweed.htm)

- Empirical Studies of Conflict. 2016. *Global Terrorism Database (Worldwide Incident Tracking System)*. Accessed August 3, 2016 at <https://esoc.princeton.edu/files/global-terrorism-database-worldwide-incident-tracking-system>
- FBI – Federal Bureau of Investigation. n.d. *Don't Be a Puppet: Pull Back the Curtain on Violent Extremism*. Accessed on July 18, 2016 at <https://cve.fbi.gov/home.html>
- Fearon J and D Laitin. 2003. "Ethnicity, Insurgency, and Civil War." *American Political Science Review*. 97(1): 75-90. Accessed July 24, 2016 at [http://fsi.stanford.edu/publications/ethnicity\\_insurgency\\_and\\_civil\\_war/](http://fsi.stanford.edu/publications/ethnicity_insurgency_and_civil_war/)
- Gassebner M and S Luechinger. 2011. "Lock, Stock, and Barrel: A Comprehensive Assessment of the Determinants of Terror." *Public Choice*. 149:235-261. Accessed on August 9, 2016 at <http://link.springer.com/article/10.1007%2Fs11127-011-9873-0#enumeration>
- Gaziarifoglu Y. 2012. "Risk Factors of Armed Conflict." *RTM Insights*. 19: 1-3. Accessed on July 17, 2016 at [http://www.rutgerscps.org/uploads/2/7/3/7/27370595/riskfactorsofarmedconflict\\_rtminsights19.pdf](http://www.rutgerscps.org/uploads/2/7/3/7/27370595/riskfactorsofarmedconflict_rtminsights19.pdf)
- Gibney M, L Cornett, R Wood, P Haschke, and D Arnon. 2015. "The Political Terror Scale 1976-2015." Retrieved from <http://www.politicalterrorsscale.org>
- Gleditsch NP, P Wallensteen, M Eriksson, M Sollenberg, and H Strand. 2002. "Armed Conflict 1946-2001: A New Dataset." *Journal of Peace Research*. 39(5). Retrieved from [www.pcr.uu.se/research/ucdp/datasets/ucdp\\_prio\\_armed\\_conflict\\_dataset/](http://www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_dataset/)
- Goldstone JA, RH Bates, DL Epstein, TR Gurr, MB Lustik, MG Marshall, J Ulfelder, and M Woodward. 2010. "A Global Model for Forecasting Political Instability." *American Journal of Political Science*. 54(1): 190-208. Accessed August 2, 2016 at <https://sites.duke.edu/niou/files/2011/06/goldstone-bates-et-al.pdf>
- GTD – Global Terrorism Database. 2015. "Global Terrorism Database." National Consortium for the Study of Terrorism and Responses to Terrorism, University of Maryland. Accessed August 2, 2016 at <https://www.start.umd.edu/gtd/>
- Harris-Hogan S, K Barrelle, and A Zammit. 2015. "What is Countering Violent Extremism? Exploring CVE Policy and Practice in Australia." *Behavioral Sciences of Terrorism and Political Aggression*. 8(1) 6-24. Accessed July 28, 2016 at <http://www.tandfonline.com/doi/full/10.1080/19434472.2015.1104710>
- Hegre H. 2003. "Disentangling Democracy and Development as Determinants of Armed Conflict." *Paper Presented at the 44<sup>th</sup> Annual Convention of the International Studies Association*, Portland, Oregon. Accessed July 28, 2016 at <https://havardhegre.files.wordpress.com/2013/09/democracydevelopmentconflict.pdf>
- Hoffman B. 2006. *Inside Terrorism*. Columbia University Press, New York, New York.
- InSight Crime. 2016. 'We Will Not Demobilize': First FARC Dissidents Won't be the Last. Accessed on July 19, 2016 at <http://www.insightcrime.org/news-analysis/we-will-not-demobilize-first-farc-dissidents-wont-be-the-last>
- IntelCenter. 2016. *Islamic State's 43 Global Affiliates Interactive World Map*. Accessed on July 21, 2016 at <http://intelcenter.com/maps/is-affiliates-map.html#gs.QNR=B3M>



- IVEO Knowledge Matrix. n.d. *Influencing Violent Extremist Organizations: Planning Influence Activities While Accounting for Unintended Side Effects*. Accessed on July 7, 2016 at <http://start.foxtrotdev.com/>
- Johansen T. 2016. "Interactive Visualization of Spatiotemporal Patterns in Terrorist Attacks." In Press.
- Joint Publication. 2014. *Counterterrorism*. DTIC. Accessed on July 18, 2016 at [http://dtic.mil/doctrine/new\\_pubs/jp3\\_26.pdf](http://dtic.mil/doctrine/new_pubs/jp3_26.pdf)
- Kydd A and B Walter. 2002. "Sabotaging the Peace: The Politics of Extremist Violence." *International Organization*. 56(2): 263-296. Accessed July 28, 2016 at <http://www86.homepage.villanova.edu/maghan.keita/readingsterrorism/terrorism/Andrew%20Kydd,%20Sabotaging%20the%20Peace.pdf>
- Lafree G and L Dugan. 2007. "Introducing the Global Terrorism Database." *Terrorism and Political Violence*. 19: 181-204. Accessed June 15, 2016 at [http://ccjs.umd.edu/sites/ccjs.umd.edu/files/pubs/FTPV\\_A\\_224594.pdf](http://ccjs.umd.edu/sites/ccjs.umd.edu/files/pubs/FTPV_A_224594.pdf)
- Lake DA. 2002. "Rational Extremism: Understanding Terrorism in the Twenty-first Century." *Dialogue-IO*. (Spring): 15-29. Accessed July 28, 2016 at <https://quote.ucsd.edu/lake/files/2014/06/Rational-Extremism.pdf>
- MAR – Minorities at Risk Project. 2009. "Minorities at Risk Dataset." *College Park, MD: Center for International Development and Conflict Management*. Retrieved from <http://www.mar.umd.edu/>
- MIIIS – Monterey Institute of International Studies. 2016. "Monterey WMD Terrorism Database." Retrieved from <http://wmddb.miiis.edu/>
- Mroz J. 2009. "Lone Wolf Attacks and the Difference Between Violent Extremism and Terrorism." *EastWest Institute*.
- Nasser-Eddine M, B Garnham, K Agostino, and G Caluya. 2011. "Countering Violent Extremism (CVE) Literature Review." *Counter Terrorism and Security Technology Centre, Defense Science and Technology Organisation*. DSTO-TR-2522. Accessed on July 28, 2016 at <http://dSPACE.dsto.defence.gov.au/dSPACE/bitstream/1947/10150/1/DSTO-TR-2522%20PR.pdf>
- National Institute of Justice. 2011. *Terrorism*. Accessed on July 15, 2016 at <http://www.nij.gov/topics/crime/terrorism/Pages/welcome.aspx>
- Nilsson D. 2008. "Partial Peace: Rebel Groups Inside and Outside of Civil War Settlements." *Journal of Peace Research*. 45(4): 479-495. Accessed on July 28, 2016 at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1149075](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1149075)
- RAND Corporation. 2016. "RAND Database of Worldwide Terrorism Incidents." Retrieved from: <http://www.rand.org/nsrd/projects/terrorism-incidents/download.html>
- Ravndal JA. 2016. "Right-wing Terrorism and Violence in Western Europe: Introducing the RTV dataset." *Perspectives on Terrorism*. 10(3): 1-15. Accessed on June 30, 2016 at <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/508>
- Ross JI. 2004. "Taking Stock of Research Methods and Analysis on Oppositional Political Terrorism." *American Sociologist*. Summer: 26-37. Accessed on August 6, 2016 at [http://www.jeffreyianross.com/uploads/Ross\\_-\\_Taking\\_Stock\\_of\\_Research\\_Methods.pdf](http://www.jeffreyianross.com/uploads/Ross_-_Taking_Stock_of_Research_Methods.pdf)

- RTM – Risk Terrain Modeling. n.d. *Risk Terrain Modeling*. Accessed on June 30, 2016 at <http://www.riskterrainmodeling.com/>
- Schmid AP. 2011. *Routledge Handbook of Terrorism Research*. Routledge, Abingdon, United Kingdom.
- SATP – South Asia Terrorism Portal. 2016. “South Asia Terrorism Portal Datasets.” *Institute for Conflict Management*. Retrieved from <http://www.satp.org>
- START – National Consortium for the Study of Terrorism and Responses to Terrorism. 2016. “Global Terrorism Database.” Retrieved from <https://www.start.umd.edu/gtd>
- START PVC. 2015a. *FARC Terrorist Profile*. Accessed on July 11, 2016 at <https://www.start.umd.edu/baad/database/revolutionary-armed-forces-colombia-farc-2012>
- START PVC. 2015b. *ISIS Terrorist Profile*. Accessed on July 11, 2016 at [https://www.start.umd.edu/baad/narratives/islamic-state-iraq-and-al-sham-isis#\\_edn58](https://www.start.umd.edu/baad/narratives/islamic-state-iraq-and-al-sham-isis#_edn58)
- State Department and USAID. 2016. *Joint Strategy on Countering Violent Extremism*. Accessed on July 29, 2016 at <https://www.state.gov/documents/organization/257913.pdf>
- Stedman SJ. 1997. “Spoiler Problems in Peace Processes.” *International Security*. 22(2): 5-53. Accessed on July 28, 2016 at [http://fsi.stanford.edu/publications/spoiler\\_problems\\_in\\_peace\\_processes/](http://fsi.stanford.edu/publications/spoiler_problems_in_peace_processes/)

## **Appendix A**

### **Selected Terrorist Groups**



## FARC - Revolutionary Armed Forces of Colombia—People's Army

### SUMMARY

**Active:** 1964 to Present

**Location:** Colombia

**Ideology:** Marxist-Leninist

**Leader:** Timoleón Jiménez

**Members:** 7,000 - 10,000

**Attacks:** 2,500 - 3,000



### OVERVIEW

**Organizational Setup:** Government  
Military

**Attack Weapons:** Biological  
Firearms  
Radiological

**Most Active Areas:** Colombia

**World Spread:** Local Region

**Allies:** National Liberation Army, BACRIM

**Adversaries:** Colombian Government  
National Police of Colombia  
Military Forces of Colombia

**Victims Affected:** Injured/Deaths 10,000+  
Displaced 7 - 8 Million

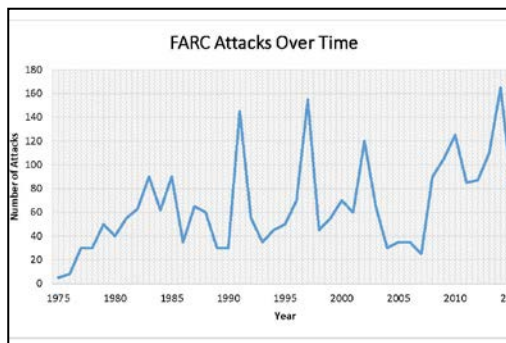
**Landmark Targets:** Private Citizens, Military, Police

**Attack Tactics:** Bombings/Explosions  
Armed Assault  
Kidnapping/Hostage

**Financing:** Drug Trafficking  
Kidnapping

### 1.1 MAP OF ATTACKS

Global Terrorism Database identified attacks since 1975, with 10 or more deaths



### 1.2 TARGET EVOLUTION

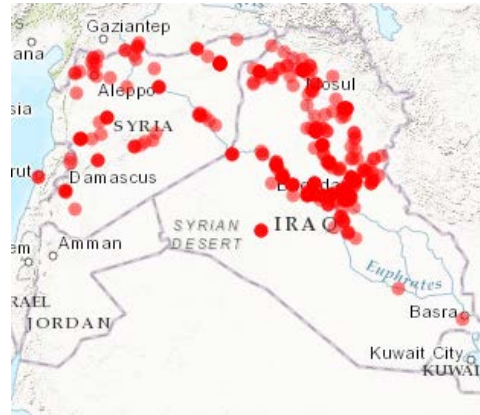
Attacks have spiked greatly since the group's creation

Target focus has shifted from private citizens and military to private citizens, police, and businesses

## ISIL - IRAQ

### SUMMARY

Active: 2004 to Present
Location: Iraq
Ideology: Religious - Sunni Salafist Jihadist
Leaders: Abu Bakr al-Baghdadi
Members: 30,000 - 35,000
Attacks: 2,000 - 2,500
Financing: \$2 Billion in 2014

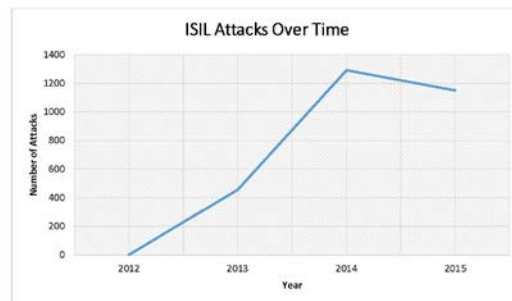


### OVERVIEW

<b>Organizational Setup:</b>	Military
<b>Attack Weapons:</b>	Explosives/Bombs/Dynamite Firearms Incendiary
<b>Most Active Areas:</b>	Syria/Iraq
<b>World Spread:</b>	Worldwide - Western
<b>Allies:</b>	Boko Haram, Abu Sayyaf
<b>Adversaries:</b>	Al-Qaeda Al-Nusra US and Iraqi Governments
<b>Victims Affected:</b>	Injury/Deaths Displaced
<b>Landmark Targets:</b>	Populated Areas Utilities
<b>Attack Tactics:</b>	Bombing/Explosion Armed Assault Lone Wolf
<b>Target Evolution:</b>	Private Citizens to Military
<b>Financing:</b>	Oil Sales Bank Looting and Extortion

### 1.1 MAP OF ATTACKS

Global Terrorism Database identified attacks since 2012 involving 10 or more deaths



### 1.2 TARGET EVOLUTION

Attacks have spiked since group's inception in 2013

Attacks typically focus on private citizens and property, though attacks against military and police have increased

## ISIL - LIBYA

### SUMMARY

Active: 2014 to Present

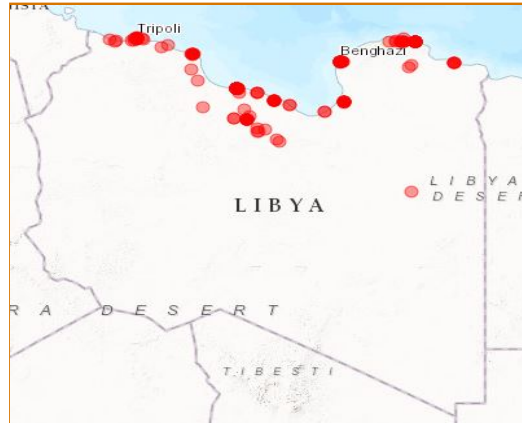
Location: Libya

Ideology: Religious — Sunni Salafi Jihadist

Leadership: Abdul Qadr al-Najdi

Membership: 4,000 - 6,000

Attacks: 150 - 250

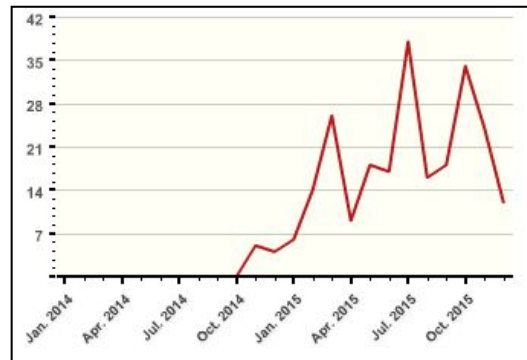


### OVERVIEW

Organizational Setup:	Military
Attack Weapons:	Explosives/Bombs/Dynamite Firearms
Most Active Areas:	Tripoli Benghazi Sirte
World Spread:	North Africa
Allies:	ISIL in Iraq
Adversaries:	Libya Dawn Libya National Army
Victims Affected:	100 - 800 Injured/killed
Landmark Targets:	Private Citizens and Property Military
Attack Tactics:	Bombing/Explosives
Financing:	Oil Sales Kidnapping

### 1.1 MAP OF ATTACKS

Global Terrorism Database identified attacks since 2014, all deaths



### 1.2 TARGET EVOLUTION

Attacks have spiked since the group's emergence in late 2014

Attacks focused on private citizens and property, military, and government

## LeT - INDIA

### SUMMARY

**Active:** 1990 to Present

**Location:** India

**Ideology:** Ahle-Hadith, Salafi, Sunni

**Leader:** Hafiz Muhammad Saeed

**Members:** 3,000+

**Attacks:** 100 - 200



### OVERVIEW

**Organizational Setup:** Militant  
Public Social Services

**Attack Weapons:** Firearms  
Biological  
Melee

**Most Active Areas:** Jammu and Kashmir

**World Spread:** Local Region

**Allies:** Al Qaeda  
Pakistani State

**Adversaries:** Indian Security Forces  
United States

**Victims Affected:** Injury/Death  
Displaced

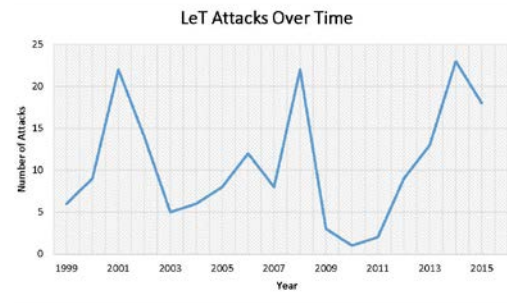
**Landmark Targets:** Military, Police, Businesses

**Attack Tactics:** Armed Assault  
Bombing/Explosion  
Assassination

**Financing:** State Sponsorship  
Legitimate Business  
Drug Trade

### 1.1 MAP OF ATTACKS

Global Terrorism Database identified attacks since 1999 involving 10 or more deaths



### 1.2 TARGET EVOLUTION

Attacks spiked in late 1990s, mid 2000s, and late 2000s

Attacks originally focused on military and police, now more on private citizens and property







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