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# Anatomizing Chemical and Biological Non-State Adversaries Identifying the Adversary, Final Report

Ackerman, Gary A.

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**START**

# **Anatomizing Chemical and Biological Non-State Adversaries**

*Identifying the Adversary*

January 5, 2014

FINAL REPORT

National Consortium for the Study of Terrorism and Responses to Terrorism  
A Department of Homeland Security Science and Technology Center of Excellence  
Based at the University of Maryland

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## About This Report

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## About START

The National Consortium for the Study of Terrorism and Responses to Terrorism (START) is supported in part by the Science and Technology Directorate of the U.S. Department of Homeland Security through a Center of Excellence program based at the University of Maryland. START uses state-of-the-art theories, methods and data from the social and behavioral sciences to improve understanding of the origins, dynamics and social and psychological impacts of terrorism. For more information, contact START at [infostart@start.umd.edu](mailto:infostart@start.umd.edu) or visit [www.start.umd.edu](http://www.start.umd.edu).

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## Chapter 1: Introduction<sup>1</sup>

The prospect of violent non-state actors (VNSAs), including terrorists and criminals, employing chemical or biological (CB) weapons has understandably attracted much attention in both policy and government circles, primarily as a result of credible evidence of terrorist interest in these weapons<sup>2</sup> and demonstrated terrorist willingness and capability, albeit thus far via conventional means, to inflict mass casualties. Much valuable research has been conducted in the areas of state possession of CB weapons, the vulnerability of industrial and commercial facilities to attack or infiltration, the technical capabilities required to construct CB weapons and preparations for dealing with the consequences of a large-scale chemical or biological attack. In contrast, the characteristics, decision-making and behaviors of the potential perpetrators themselves have thus far received far less attention. After all, as Jerrold Post has observed with respect to nuclear weapons – but which applies equally to the CB context – “absent a clear understanding of the adversary’s intentions, the strategies and tactics developed [to counter them] are based primarily on knowledge of terrorists [sic] technological capabilities and give insufficient weight to psychological motivations.”<sup>3</sup>

Therefore, the objectives of the Anatomizing CB Adversaries project are: to identify indicators of VNSAs’ potentially changing CB predilections and capabilities; to improve our understanding of potential non-state attackers by identifying salient characteristics of past CB adversaries, including the linkage between their strategic concerns and their targets and tactics; and to embed these findings into a Bayesian analytical tool. Most importantly, this study will enhance the capability of defense practitioners to protect the United States by including in risk assessment calculations more detailed specifications of the threat component, in addition to the already well-developed vulnerability and consequence elements. By enhancing the ability to rank and prioritize threats based on an adversary’s behavior, such as its targeting strategy, the likelihood increases that the nation’s limited resources can be focused on mitigating the most likely threats, effectively reducing risk. In sum, by identifying the potential CB perpetrators that pose the highest threat, as well as exploring the possible behaviors of these actors and developing a tool that can be used to update the analysis, the project will provide real benefit to analysts and decision-makers in efficiently addressing the threat of CBRN terrorism.

Recognizing that only a small subset of violent actors demonstrating antipathy toward the United States will ever embark upon a chemical or biological weapons route, the first phase of the project, which is

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<sup>1</sup> This chapter was written by Gary A. Ackerman.

<sup>2</sup> With respect to just one type of perpetrator, radical Islamists, there have been multiple expressions of interest in these weapons, from Osama bin Ladin’s description of the acquisition of these weapons as a “religious duty” to Sheik Nasir bin Hamd al-Fahd’s 2003 fatwa legitimating their use and Abu Hamza al-Muhajir’s 2006 call for qualified scientists to aid in the jihad. In terms of following through with these intentions, with respect to al-Qa`ida alone there have been over 50 reports of attempts to obtain, produce or use chemical and biological weapons (see Erin McNerney and Matthew Rhodes, “Al-Qa`ida’s WMD Activities” in Gary Ackerman and Jeremy Tamsett (eds.) *Jihadists and Weapons of Mass Destruction* (Boca Raton, FL: CRC Press, 2009)).

<sup>3</sup> Jerrold M. Post, “Prospects for Nuclear Terrorism: Psychological Motivations and Constraints,” in *Preventing Nuclear Terrorism*, ed. by Paul Leventhal and Yonah Alexander (Lexington, MA: D. C. Heath, 1987), p. 91.



represented by this report, seeks specifically to determine the most likely future CB perpetrators and to develop means of proactively identifying them. Specifically, the initial phase was aimed at a) identifying the most likely CB perpetrators, and b) by identifying salient characteristics of CB adversaries, to undertake the development of a set of indicators that can be applied to downstream actors who have not yet evidenced the capability or motivations for using CB weapons.

In approaching a topic as multi-faceted and dynamic as CB terrorism, or other similar asymmetric activities by VNSAs, it has been argued elsewhere that “researchers should be experimenting with every analytical tool in the scientific toolbox to wring new insights from existing data on CBRN terrorism.”<sup>4</sup> To accomplish this, the study therefore provides for the application of a multi-method analytical approach to the behavioral and organizational determinants of non-state adversaries’ pursuit and use of CB weapons, leveraging analytical techniques from a variety of disciplines. This includes, inter alia, the creation of the most extensive open-source database of known previous CB perpetrators and conducting both qualitative and quantitative analyses of these actors. In addition, given the relative rarity of CB attacks by VNSAs, retrospective analysis of the historical empirical record is augmented through a prospective structured elicitation workshop of relevant subject matter experts. The study (and indeed, much of this report) builds upon methodologies that have already been tested and applied in the context of the pursuit of radiological and nuclear weapons.<sup>5</sup> Taken together with these related studies, this project will fill a lacuna in current understanding of the full range of CBRN terrorism and how specific constellations of attributes are related to adversary threat.

## STUDY PARAMETERS

The research team, in conjunction with the funder, developed a set of parameters that would delimit the problem set. The following parameters apply to the overall project (including all tasks in the current phase):

1. **Time Period:** All analyses are to consider the current threat context, as well as the future threat context out to 2022.
2. **Nature of Adversaries:** The study will focus on CB end-users (i.e. actual perpetrators) in terms of threat actors.
3. **Specification of Adversaries:** Where possible, adversaries are to be explicitly identified (e.g. Hizballah). However, where it is not possible to describe a specific organization or individual, CB adversaries can be described generically.

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<sup>4</sup> G. A. Ackerman, “Defining Knowledge Gaps within CBRN Terrorism Research” in M. Ranstorp and M. Normark (eds.), *Unconventional Weapons and International Terrorism: Challenges and New Approaches* (New York: Routledge, 2009), p.18.

<sup>5</sup> Gary Ackerman, Charles Blair and Jeffrey Bale, *Anatomizing Radiological and Nuclear Non-State Adversaries*, College Park, MD: National Consortium for the Study of Terrorism and Responses to Terrorism (2010). Research project conducted for the Department of Homeland Security.

4. **Geographical Scope:** The study will focus on threats to the U.S. homeland and U.S. overseas territories (e.g. Puerto Rico; Guam); however it will also include threats to U.S. facilities abroad (e.g. U.S. embassies; military bases). U.S. commercial interests as targets are excluded.
5. **Type of Materials:** The study will consider the use of *ANY* harmful chemical or biological materials, as well as attacks on facilities that involve the immediate release of CB materials.
6. **Geopolitical Structure Assumptions:** While the analysis will take into account any relevant international developments within the given period, it will not consider major changes to the international system unless otherwise stated. So, for example, unless explicitly included, the study will not consider such structure-changing events as a possible major war between the United States and Iran or China, or a disease pandemic that destroys 25% of the global population.
7. **Attack Scope:** As an output variable, the study will focus on CB actors capable of perpetrating events that cause more than 50 non-psychogenic injuries or widespread (at least regional) and sustained social disruption. However, the study will consider events and actors of lower magnitude when necessary to inform understanding of such outcomes.

## METHODOLOGICAL APPROACH

This phase of the project involved the following broad methodological approach. Detailed explanations of individual methodologies are presented in the relevant sections of the report.

*Data Sources* – the research team built the analysis upon the following information and data resources:

1. A review of the pertinent secondary literature pertaining to chemical and biological non-state actor events, including identifying dominant theoretical paradigms and isolating indicators proposed by other scholars.
2. The development of brief profiles of all former non-state users and attempted users of CB weapons, recorded in a structured database format to constitute the Chemical and Biological Non-State Actors Database (CABNAD).
3. Existing START research datasets, primarily the Big Allied and Dangerous 2 (BAAD2) Dataset, which includes annually coded information on over 1,000 terrorist and insurgent organizations worldwide between 1998 and 2007. It also made extensive use of the Global Terrorism Database.
4. Various external quantitative databases, such as the Quality of Government Database.
5. Semi-structured and probabilistic elicitation of leading outside subject matter experts in the CB terrorism and related domains.

*Analysis* – the following analytical approaches were utilized, drawn from a number of different academic and analytical disciplines:

1. Qualitative analysis based on applying a series of literature-derived indicators to a set of extant VNSAs.
2. Qualitative analysis of past CB perpetrators, using the assembled CABNSAD data and comparison with the extant literature.
3. Quantitative analysis of prior chemical and biological adversaries to identify salient characteristics of past perpetrators through the development of a set of statistical models, utilizing CABNSAD, BAAD2 and several additional datasets. Owing to the relative rarity of past CB events, methods used included logistic and rare-event logit regression models and event history methods.
4. Controlled qualitative and quantitative analysis of the elicitation results, using a variety of ranking and other probabilistic risk assessment procedures.

The analysis was guided by an analytical framework based on the standard threat equation (**threat = motivation \* capability**). The reviews of the literature and qualitative analysis initially consider each of these elements separately, and they are integrated at the final stage of analysis. While chemical and biological weapons differ greatly in many respects, there are similarities in some aspects of the threat, particularly as these relate to motivation. The initial motivational review therefore discusses the two weapons types together and distinguishes between motivations only where relevant. The remainder of the analysis largely treats chemical and biological weapons separately.

With respect to the terminology used in this project, it is important at the outset to distinguish between the moniker “CB” as employed in this project, and the more commonly used (and misused) term of Weapons of Mass Destruction (WMD). The WMD term has proven to be problematic<sup>6</sup> and implies an unspecified, yet significant level of consequences. CB was selected as shorthand for the two weapon types that fall within the purview of the sponsor of this report and the term is used for convenience only. This use should not be taken to imply that these weapons are co-equal in terms of likelihood or severity. When the combined term “CB weapon” is used in this report, it should therefore not be taken to necessarily imply a WMD, unless explicitly stated. In addition, although much of the discussion in the report will focus on terrorist actors, as will be seen, the threat is not limited to these actors and a multitude of other non-state actors will be considered.

## STRUCTURE OF REPORT

The report covers all the activities of the research team pertaining to the first phase of the larger project. Following this introductory chapter, Chapter 2 contains a literature review that both introduces all of the core concepts and critically synthesizes the existing literature on non-state CB adversaries. This is followed by applying this review to the derivation of an initial set of indicators and in turn an application to a preliminary set of non-state actors in Chapter 3. Chapter 4 describes and presents an initial descriptive analysis of the CABNSAD database. The usage of existing quantitative datasets is presented in

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<sup>6</sup> For a discussion of some of these difficulties, see W. Seth Carus, “Defining “Weapons of Mass Destruction,” Occasional Paper, No. 4 (Washington, D.C.: Center for the Study of Weapons of Mass Destruction, January 2006).

Chapter 5, followed by the results of this analysis. Chapter 6 describes the conduct and results of the expert elicitation. The concluding section, Chapter 7, presents a set of final rankings derived from each of the analytical streams and carries out a comparison between them. Various appendices present several study outputs, including the final set of indicators, elicitation outputs and other associated documentation.

## Chapter 2: Review of the Literature

### INTRODUCTION

This literature review forms part of the first phase of the Anatomizing Chemical and Biological Non-State Adversaries Project. As such, it serves three different functions. First, the review provides context for the overall study by introducing and specifying many of the basic concepts involved and can serve as a primer for those less familiar with the issues surrounding chemical and biological (CB) terrorism. Second, it synthesizes the existing literature on chemical and biological non-state adversaries and identifies the major areas of agreement and disagreement amongst scholars in the field. Third, it engages with the scholarship in an attempt to form the basis for inferring a set of preliminary qualitative indicators of the most likely future non-state perpetrators of CB violence, which is a core objective of Phase I of the project.

The review was guided by the overall analytical framework adopted for the project, which was based on the standard threat equation ( $\text{THREAT} = \text{MOTIVATION} * \text{CAPABILITY}$ ) and is structured accordingly. After providing an overview of the primary themes in the literature in this section, the review explores in some detail the motivational aspects of CB adversaries. It then proceeds to describe a variety of factors linked to the capabilities that adversaries require to successfully carry out a CB attack, including a discussion of emerging technological and geopolitical issues that should be taken into account in any analysis. The review also includes two appendices, on chemical and biological weapons respectively, that provide certain technical information on the agents themselves, as well as presents some of the unique characteristics associated with CB attacks.

### THE LITERATURE ON MOTIVATIONS FOR CHEMICAL AND BIOLOGICAL TERRORISM<sup>7</sup>

During the past two or more decades, there has been a steadily growing concern in both policymaking and academic circles about the threat posed by terrorism involving chemical, biological, radiological, and nuclear (CBRN) weapons.<sup>8</sup> Not surprisingly, this concern became even more acute in the wake of the March 20, 1995 sarin nerve agent attack in the Tokyo subway system by an apocalyptic millenarian

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<sup>7</sup> This portion of this chapter was written by Jeffrey M. Bale.

<sup>8</sup> A good short survey and analysis of the scholarly CB terrorism literature can be found in Marie Isabelle Chevrier, "Why Do Conclusions from the Experts Vary?," in *Bioterrorism: Confronting a Complex Threat*, ed. Andreas Wenger and Rito Wollenmann (Boulder, CO: Lynne Rienner, 2007), 119-51. However, she focuses exclusively on the more serious, reputable, and high-profile academic literature produced by scientists and terrorism specialists, and intentionally excludes "the mind-boggling number of reports, studies, articles, and published testimonies emanating from institutions, governments, and the popular media." See Marie Isabelle Chevrier, "Why Do Conclusions from the Experts Vary?," in *Bioterrorism: Confronting a Complex Threat*, ed. Andreas Wenger and Rito Wollenmann (Boulder, CO: Lynne Rienner, 2007), 120-1. In doing so, of course, she ignores almost all of the overly alarmist, superficial, and poorly researched publications dealing with this controversial subject that have done so much to confuse the public and mislead policymakers.

religious group known as Aum Shinrikyō (Aum Supreme Truth), an event that has been described as the very “first major sub-state use” of such a weapon.<sup>9</sup> Many experts argued that Aum’s blatant and indeed traumatic violation of long-standing societal taboos against the use of chemical and biological agents by non-state actors represented a “qualitative leap” that would soon inspire other terrorist groups to employ them, whereas other specialists instead insisted that terrorists were likely to continue to rely on tried-and-true conventional weapons.<sup>10</sup> In the event, neither of these positions has turned out to be entirely warranted.<sup>11</sup> Although no significant spike in actual incidents of CBRN terrorism has yet occurred, there are increasing indications that certain types of terrorist groups have been planning to carry out attacks using chemical or biological agents, several apparent plots to launch these types of attacks have since been interdicted, and, perhaps most worrisome, some have actually carried out conventional bombing attacks in which the explosive materials were mixed with toxic chemicals.<sup>12</sup> Given the importance of devising sensible policies and allocating resources effectively in order to forestall or respond properly to such potentially harmful attacks, there is currently a crying need to try and separate fact from fiction by examining, synthesizing, and critically evaluating the existing scholarly and policy-oriented literature dealing with chemical and biological terrorism. The purpose of this section is to begin the process of expanding current understanding by assessing the value of this literature and providing the basis for extracting a comprehensive set of attributes to describe and characterize terrorist threats involving chemical and biological agents in a more systematic manner. As such it should be viewed as an initial, preliminary phase in this project’s more comprehensive effort to evaluate the nature and extent of the CB terrorist threat.

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<sup>9</sup> Gavin Cameron, *Nuclear Terrorism: A Threat Assessment for the 21<sup>st</sup> Century* (New York: Macmillan Palgrave, 1999), 1. Jean Pascal Zanders echoes this point but also makes an important clarification: the Aum incident was the first time that non-state actors employed an actual chemical warfare (CW) agent, but certainly not the first time they had made use of other types of potentially lethal toxic chemicals. See Jean Pascal Zanders, “Assessing the Risks of Chemical and Biological Weapons Proliferation to Terrorists,” *Nonproliferation Review* 6:4 (Fall 1999), 19.

<sup>10</sup> See, e.g., Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *Nonproliferation Review* 7:1 (Spring 2000), 164, 167, 169; and Bruce Hoffman’s segment in “America and the New Terrorism: An Exchange,” *Survival* 42:2 (Summer 2000), 163; and Brad Roberts, “Has the Taboo Been Broken?,” in *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses* (Alexandria, VA: Chemical and Biological Arms Control Institute, 1997), 121-40.

<sup>11</sup> Compare Brian M. Jenkins, “Understanding the Link between Motives and Methods,” in *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses* (Alexandria, VA: Chemical and Biological Arms Control Institute, 1997), 44.

<sup>12</sup> For example, there were several vehicle bomb attacks carried out in Iraq by jihadists in which the explosives were mixed together with chlorine. These crude chemical attacks generally failed for technical reasons, i.e., the explosion burned away most of the chlorine, but the residual chlorine still had a harmful impact on some wounded Iraqis. Moreover, they had a tremendous psychological impact on the Iraqi public, which turned even more against the jihadists. See, e.g., “Chlorine gas attacks hint at new enemy strategy,” Associated Press, February 22, 2007; “Concern over Iraqi chemical bombs,” BBC website, February 22, 2007, available at [http://news.bbc.co.uk/2/hi/middle\\_east/6385033.stm](http://news.bbc.co.uk/2/hi/middle_east/6385033.stm). Cf. William Robert Johnston, “Chemical Weapon Terrorism in Iraq and Afghanistan,” Johnston’s Archive website, September 3, 2012, available at <http://www.johnstonsarchive.net/terrorism/wmdterrorism-1.html>. For further analysis, see Fred Wehling, “A Toxic Cloud of Mystery: Lessons from Iraq for Detering CBRN Terrorism,” in *Detering Terrorism: Theory and Practice*, ed. Andreas Wenger and Alex Wilner (Stanford, CA: Stanford University, 2012), 273-98; Assaf Moghadam, “The Chlorine Gas Attacks in Iraq and the Specter of Suicide Attacks with CBRN Weapons,” Counterterrorism Blog website, March 19, 2007, available at [http://counterterrorismblog.org/2007/03/the\\_chlorine\\_gas\\_attacks\\_in\\_ir.php](http://counterterrorismblog.org/2007/03/the_chlorine_gas_attacks_in_ir.php); Richard Weitz, Ibrahim al-Marash, and Khalid Hilal, “Chlorine as a Terrorist Weapon in Iraq,” *WMD Insights*, May 2007; and, more generally, Benjamin Brodsky, “Industrial Chemicals as Weapons: Chlorine,” Nuclear Threat Initiative website, July 31, 2007, available at <http://www.nti.org/analysis/articles/industrial-chemicals-weapons-chlorine/>.

In the literature on chemical and biological terrorism, opinions about the severity, acuteness, and imminence of the threat run the proverbial gamut, and, as is so often the case in scholarly or policy debates, these positions, once adopted, have tended to become entrenched on all sides.<sup>13</sup> On one pole of the spectrum, there are those who believe that certain extremist groups already have both the motivations and the capabilities to carry out catastrophic or lower-impact acts of chemical or biological terrorism, and are simply awaiting the optimal moment to launch those attacks. At the other pole are those who believe that terrorists are in general unlikely to carry out mass casualty attacks with chemical or biological weapons in the near future, since they typically lack either the motives and/or the capabilities to do so. In this context, Gregory D. Koblentz has argued that a tripartite division can be discerned in the literature between what he refers to as “pessimists,” “optimists,” and “pragmatists.”<sup>14</sup> According to his formulation, the pessimists argue that CBRN terrorism is a “low (but growing) probability, high consequence threat”; the optimists that it is a “very low probability, very low consequence” threat; and the pragmatists that it is a “low probability, low consequence” threat.<sup>15</sup> Although many analysts might balk at being included definitively in the pessimistic or optimistic categories, since they all probably see themselves as pragmatic, others arguably straddle the boundaries of more than one category, and still others could be said to fall into a (non-clinical) “paranoid” category whereby CBRN terrorism is regarded as a “high probability, high consequence” threat, his three categories do serve to illustrate contrasting perceptions in the existing literature on CB terrorism. However, in order to avoid confusion and over-categorization, this review will divide the literature broadly into “alarmist” and “skeptical” camps or, to be more precise, to place individual authors closer to either the alarmist or skeptical poles along a broad spectrum of CB threat assessments.<sup>16</sup>

Not surprisingly, given its intrinsically dramatic nature and *potentially* catastrophic effects, there has been no shortage of alarmist or pessimistic interpretations concerning the threat of CB terrorism by policymakers, academic analysts, and journalists, as the following examples serve to illustrate. This is

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<sup>13</sup> Gregory D. Koblentz, “Predicting Peril or the Perils of Prediction? Assessing the Risk of CBRN Terrorism,” *Terrorism and Political Violence* 23:4 (2011), 509, 511. Cf. Brian Michael Jenkins, *The Potential for Nuclear Terrorism* (Santa Monica, CA: RAND, 1977), 7-8, who sardonically characterized the two sides [of the nuclear terrorism debate] as “[a]pocalypticists” and “disbelievers” given that both positions were adopted more on faith than on the basis of the paltry available evidence, a situation that has not changed much given the rarity of subsequent incidents of CBRN terrorism. In Gregory D. Koblentz, “Predicting Peril or the Perils of Prediction? Assessing the Risk of CBRN Terrorism,” *Terrorism and Political Violence* 23:4 (2011), 504-514, Koblentz also discusses the thorny problems of biases leading to overestimation and underestimation, and is justly critical of the “false promise” of quantitative risk assessments.

<sup>14</sup> Gregory D. Koblentz, “Predicting Peril or the Perils of Prediction? Assessing the Risk of CBRN Terrorism,” *Terrorism and Political Violence* 23:4 (2011), 502-4.

<sup>15</sup> Gregory D. Koblentz, “Predicting Peril or the Perils of Prediction? Assessing the Risk of CBRN Terrorism,” *Terrorism and Political Violence* 23:4 (2011), 503-4. According to his scheme (p. 516, notes 12-14), the CBRN terrorism “pessimists” include Richard Falkenrath, Ashton Carter, Richard Danzig, Tara O’Toole, and Graham Allison; the “optimists” include Brian Jenkins, Ehud Sprinzak, Milton Leitenberg, John Mueller (who I would call ridiculously sanguine), and Robin Frost; and the “pragmatists” include Jessica Stern, John Parachini, Jonathan Tucker, Jean Pascal Zanders, the Gillmore Commission, and Bruce Hoffman. I would include myself in this latter category.

<sup>16</sup> In using the term “alarmist” in this context, I generally seek to do so in a descriptive sense – i.e., to indicate that the individuals in question are trying to “sound the alarm” about a CB terrorism threat they regard, rightly or wrongly, as very serious – rather than in the pejorative sense. On those occasions when I use the term more pejoratively, it should be clear. Likewise with the use of the term “skeptical” herein, to which no value judgment is necessarily attached.

especially true in relation to bioterrorism, given that it is widely recognized that even military grade chemical weapons are unlikely to kill more than several thousand people per attack incident, even under optimal conditions. Some experts, however, have rightly emphasized the potential dangers of successful conventional terrorist attacks against vulnerable chemical plants or on vehicles transporting dangerous chemicals, which are not only easier to carry out but also far more likely to have higher body counts and other catastrophic health and economic consequences than simply launching an attack with a chemical weapon.<sup>17</sup> Even so, the majority of alarmist statements have thus far related to the potential use of biological weapons, whether by state or non-state actors.<sup>18</sup>

In the aforementioned alarmist category, as early as 1987 – and thus prior to both the failed Aum biological agent attacks and the group’s partially successful sarin attacks – Joseph D. Douglass, Jr. and Neil C. Livingstone wrote the following ominous words: “Welcome to the ‘brave new world’ of terrorist violence, a world where the click of a camera shutter releases a deadly virus into a room; of death-dealing envelopes and postage stamps with a lethal toxin in the glue; of terrorist groups armed with C/B weapons capable of inflicting thousands of casualties without warning.”<sup>19</sup> Similarly, Robert H. Kupperman and Jeff Kamen offered the following foreboding assessment in 1989 concerning the future CBRN terrorist threat:<sup>20</sup>

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<sup>17</sup> Lawrence M. Wein, “Preventing Catastrophic Chemical Attacks,” in *Issues in Science and Technology Online* [National Academy of Sciences], Fall 2006, available at [http://www.issues.org/23.1/p\\_wein.html](http://www.issues.org/23.1/p_wein.html); Margaret E. Kosal, “Terrorism Targeting Industrial Chemical Facilities: Strategic Motivations and the Implications for U.S. Security,” *Studies in Conflict and Terrorism* 29:7 (December 2006), 719-51. Kosal notes (719) that, according to both government and private sector estimates of worst-case terrorist attack scenarios on chemical plants, 2.4 million people could end up being killed or injured, figures she considers “staggering” given the relatively large number of vulnerable chemical plants within the U.S. She adds, quite rightly, that “the potential threat from attack on industrial–chemical facilities is not receiving comparable attention as the threat of terrorist use of biological and chemical warfare agents.” Such projected casualty figures, even if they are overstated, are far greater than the number that terrorists could possibly succeed in killing or injuring if they were to carry out a successful attack with even the most deadly military-grade chemical weapon. Yet oddly enough, almost none of the documented attacks on chemical facilities by terrorist groups have hitherto been designed to release lethal or dangerous chemicals into the atmosphere. See Margaret E. Kosal, “Terrorism Targeting Industrial Chemical Facilities: Strategic Motivations and the Implications for U.S. Security,” *Studies in Conflict and Terrorism* 29:7 (December 2006), 724-39. This fact may have broader implications, even in terms of evaluating the potential likelihood of large-scale attacks with CB agents or weapons.

<sup>18</sup> In this context, Gregory D. Koblentz has made a useful distinction between “first-generation” biological attacks using “materials naturally infected with a pathogen or toxin”, such as feces or blood contaminated with HIV; “second-generation” biological attacks requiring “the ability to produce small quantities of biological agents, although dissemination remains limited to the use of fomites, vectors, the contamination of food or water, or direct injection into the victim”, the most common example being ricin; and “third-generation” biological attacks “requiring the ability to disseminate pathogens or toxins in an aerosol of particles in the 1-10 micron range”, the only non-state example of which thus far were the Amerithrax letter mailings, which were seemingly designed as warnings rather than having been intended to kill. See Gregory D. Koblentz, *Living Weapons: Biological Warfare and International Security* (Ithaca and London: Cornell University, 2009), 203-5.

<sup>19</sup> Joseph D. Douglass, Jr. and Neil C. Livingstone, *America the Vulnerable: The Threat of Chemical and Biological Warfare* (Lexington, MA: Lexington Books, 1987), 11. They then added: “Although many observers have viewed the production of so-called fright weapons by terrorists as little more than science fiction, the chilling prospect of a terrorist group building or stealing C/B weapons is a very real threat.” In those days, Douglass, a security studies specialist, often adopted alarmist views concerning Soviet capabilities and intentions as well as other types of security threats.

<sup>20</sup> Robert Kupperman and Jeff Kamen, *Final Warning: Averting Disaster in the New Age of Terrorism* (New York: Doubleday, 1989), 92. In fact, a key aspect of this fearsome claim was then and still remains suspect, viz., that “the expertise required is actually within [the] grasp” of non-state terrorists. Nor, fortunately, are most terrorists intent on generating the degree of psychological “horror” that the use of CBRN weapons would invariably produce.



Speculation about whether terrorist groups would ever dare to use extreme weaponry such as nuclear explosives or biological, chemical or radiological agents that can inflict mass destruction is often dismissed as sensationalist. It is argued that the lack of availability of nuclear materials and the universal horror surrounding the use of chemical or biological weapons would deter their use. The unfortunate reality is that the materials for such weapons have proliferated widely, that the expertise required is actually within their grasp [sic], and that horror is the name of the terrorist game.

Since then, such statements have only proliferated, especially in the wake of the 1995 Aum sarin attacks. Indeed, many such statements have had not only alarmist but “doomsday overtones.”<sup>21</sup> In 2005, for example, Senator William Frist (R-TN), himself a medical doctor, insisted that the “greatest threat we have in the world today is biological...an inevitable bio-terror [sic] attack [is coming] at some time in the next ten years.”<sup>22</sup> That same year Tara O’Toole, then chief executive officer and director of the Center for Biosecurity at the University of Pittsburgh Medical Center, claimed that the bioterrorist threat “is not science fiction” and that the “age of Bioterror [sic] is now.”<sup>23</sup> A no less alarmist view was apparently held by 51% of the biologists surveyed in 2007, who believed that there would be a bioterrorist incident somewhere in the world within the next five years.<sup>24</sup> In 2008, Barry Kellman, a professor of international law and Director of the International Weapons Control Center at DePaul University, insisted that “no other problem facing humanity is so potentially cataclysmic and has been so inadequately addressed” as bioviolence.<sup>25</sup> Later in the year, the bipartisan [Graham-Talent] Commission on the Prevention of Weapons Destruction Proliferation and Terrorism predicted that “it is more likely than not that a weapon of mass destruction will be used in a terrorist attack somewhere in the world by the end of 2013.”<sup>26</sup>

As it happens, most of these frightening, worrisome statements have been based primarily on inflated assessments of terrorist group capabilities in the CB realm, as well as on the undeniable vulnerabilities of the U.S. and other modern Western democratic societies with respect to potential surprise CB attacks. For example, several of the major arguments that have been used to justify such exaggerated, worst-case conceptions of bioterrorism have been articulated by Richard Danzig, a former Secretary of the Navy, in his 2003 report entitled *Catastrophic Bioterrorism: What Is To Be Done?*:<sup>27</sup>

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<sup>21</sup> Amy Smithson and Leslie-Anne Levy, *Ataxia: The Chemical and Biological Terrorism Threat and the US Response* (Washington, DC: Stimson Center, [October] 2000), 11.

<sup>22</sup> “U.S. Senate Leader urges ‘Manhattan Project’ against Bio-Terror Threat,” Agence France Presse, January 27, 2007.

<sup>23</sup> Cited in Anne Applebaum, “Only a Game,” *Washington Post*, January 29, 2005. The “game” in question was a bioterrorism scenario known as “Dark Winter,” a collaborative exercise sponsored by several private groups and developed in part by O’Toole, who was until recently a senior official in the Department of Homeland Security.

<sup>24</sup> National Research Council, *A Survey of Attitudes and Actions on Dual Use Research in the Life Sciences* (Washington, DC: National Academies Press, 2009), 74.

<sup>25</sup> Barry Kellman, *Bioviolence: Preventing Biological Terror and Crime* (Cambridge: Cambridge University Press, 2007), 1. A few pages later (11), he further opined that the “threat of bioviolence is unique among perils facing humanity, and those who would perpetrate bioviolence are villains in a class of their own.”

<sup>26</sup> Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, *World at Risk* (New York: Vintage, 2008), xv.

<sup>27</sup> Richard Danzig, *Catastrophic Bioterrorism: What Is To Be Done?* (Washington, DC: Center for Technology and National Security Policy, National Defense University, [August] 2003), 1.

Many have observed that biological weapons are “a poor man’s atomic bomb.” A single biological attack can kill a great many people, while the technologies to develop and deliver these weapons are relatively inexpensive, accessible, and difficult to detect, much less interdict. However, an additional attribute of bioterrorism would, if commonly recognized, amplify these concerns. I call this phenomenon “reload” ....Attackers who use biological weapons probably can avoid prompt detection and stockpile or replenish resources that permit repeated attack. Making a gram of readily aerosolized anthrax spores in a weaponized 1-to-5 micron range is a technical challenge, but, once production is accomplished, it is a much lesser challenge to make 1 kilogram. And it is not a significant challenge for a terrorist organization that can make a kilogram to make 10 or 100 kilograms.

Some of Danzig’s claims may be problematic even for technical reasons, but more importantly, there is no mention whatsoever of terrorist motivations, in his analysis, only a concern with terrorist capabilities. The current project argues strenuously (and will continue to do so throughout) that a threat must be characterized by both the adversary’s motivation and its capabilities for conducting a CB attack, i.e.,  $\text{THREAT} = \text{MOTIVATION} * \text{CAPABILITY}$ .<sup>28</sup>

However, some of the alarmists have argued, not without considerable justification, that more and more terrorist organizations are nowadays motivated to carry out mass casualty attacks, with or without using CB weapons. Among the arguments adduced in support of this view that a “new [form of] terrorism” has arisen include: a) that the body count per terrorist attack incident has increased significantly in recent decades; b) that many “new” generation terrorist groups, especially those inspired by religious doctrines and/or apocalyptic worldviews, no longer feel as constrained morally by existing cultural or social taboos, or even by practical concerns, with respect to the employment of CB weapons; and c) that these actors are thus more likely to cross the “WMD” threshold than Cold War-era terrorist groups, many of which tended to target more selectively and, in some cases, to purposely avoid causing too much “collateral damage.”<sup>29</sup> These issues will be addressed at more length below.

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<sup>28</sup> This project is primarily oriented towards understanding the adversary (i.e., the threat component of CB non-state actor risk). The threat should always be placed in the context of the overall risk, one formulation of which is  $\text{RISK} = \text{THREAT} * \text{VULNERABILITY} * \text{CONSEQUENCE}$ . The other aspects of CB risk demand their own assessments, although one of the driving influences behind the current study is the belief that the threat aspect (especially the motivational component thereof) has been insufficiently explored in previous evaluations of CB risk.

<sup>29</sup> See, e.g., Bruce Hoffman, “Holy Terror”: The Implications of Terrorism Motivated by a Religious Imperative (Santa Monica, CA: RAND Corporation, 1993); Bruce Hoffman, “Viewpoint – Terrorism and WMD: Some Preliminary Hypotheses,” *Nonproliferation Review* 4:3 (Spring-Summer 1997), 45-53; Bruce Hoffman, *Inside Terrorism* (New York: Columbia University, 2006), chapter 4 and 239-40, 267-81; Walter Laqueur, *The New Terrorism: Fanaticism and the Arms of Mass Destruction* (New York: Oxford University, 2000); Amy Smithson and Leslie-Anne Levy, *Ataxia: The Chemical and Biological Terrorism Threat and the US Response* (Washington, DC: Stimson Center, [October] 2000), 13-19; Adam Dolnik, *Understanding Terrorist Innovation*, 1-2; Roberts, ed., *Hype or Reality?*; Audrey Kurth Cronin, *Terrorist Motivations for Chemical and Biological Weapons Use: Placing the Threat in Context* (Washington, DC: Congressional Research Service, [March] 2003), 2-5; Peter R. Neumann, *Old and New Terrorism* (Cambridge, UK and Malden, MA: Polity Press, 2009); Jeffrey Kaplan, *Terrorist Groups and the New Tribalism: The Fifth Wave* (New York: Routledge, 2010), 24-32. For a broader and more skeptical analysis, see Thomas Mockaitis, *The “New” Terrorism: Myths and Reality* (Stanford, CA: Stanford University, 2008); and Martha Crenshaw, “The Debate over ‘New’ vs. ‘Old’

Pessimists further argue that the technical barriers which previously restricted chemical and biological weapons to state-level programs have been so eroded that it is inevitable that terrorist organizations will eventually adopt these capabilities. Those who espouse this view highlight the rapid diffusion of dual-use technology, where “advances in seemingly innocuous fields have found potent military applications.”<sup>30</sup> These technologies have legitimate uses within both the civilian and military realms; however, international countermeasures to prevent their illicit use have been partial at best. Evans and Hays express concern that “non-Western states collectively have a poor track record of controlling the spread of non-conventional weapons...in relation to nonstate actors operating within their borders.”<sup>31</sup> Compounding this fear is the fact that as dual-use technologies such as chemical microreactors and DNA synthesis become increasingly sophisticated,<sup>32</sup> “the size of the weapon and the footprint of the facility in which it might be produced [by terrorists] has shrunk dramatically, making it an even more difficult intelligence target.”<sup>33</sup> The pessimist school of thought thus contends that it is not a matter of “if”, but of “when” terrorist groups will be able to achieve a chemical and/or biological weapons capability.

Those who fall into the optimist camp dismiss the notion that terrorists groups, who generally face significant financial and security/time constraints, will invest their limited resources pursuing unconventional capabilities such as biological or chemical weapons. As Forest and Salama note, “Jihadists are not stupid; they will not invest substantial money, personnel, and other resources toward the acquisition and use of weapons whose strategic benefit is questionable,”<sup>34</sup> especially when most terrorist objectives can be achieved via traditional, easily produced explosives. The widespread dissemination of online manuals that purportedly enable small groups or individuals to engage in “do-it-yourself jihadi bioterrorism”<sup>35</sup> are, optimists point out, often very basic, riddled with technical inaccuracies, and include faulty information that will not yield a product with the desired toxicity or lethality. Finally, and perhaps most saliently, Gurr and Cole observe that successful production of such agents involve “tricks of the trade”<sup>36</sup> that remain relatively unknown outside of specialized scientific communities, creating

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Terrorism,” paper prepared for the Annual 2007 Meeting of the American Political Science Association, available at [http://start.umd.edu/start/publications/New\\_vs\\_Old\\_Terrorism.pdf](http://start.umd.edu/start/publications/New_vs_Old_Terrorism.pdf).

<sup>30</sup> William M. Evans and Bret B. Hays, “Dual-Use Technology in the Context of the Non-Proliferation Regime.” *History and Technology* 22, no. 1 (March 2006): 105-113. Doi: 10.1080/07341510500517850.

<sup>31</sup> William M. Evans and Bret B. Hays, “Dual-Use Technology in the Context of the Non-Proliferation Regime.” *History and Technology* 22, no. 1 (March 2006): 105-113. Doi: 10.1080/07341510500517850.

<sup>32</sup> For microreactors, see Holger Lowe, Volker Hessel, and Andreas Mueller, “Microreactors. Prospects Already Achieved and Possible Misuse,” *Pure and Applied Chemistry* 74, no. 12 (2002): 2271-2276.

<http://pac.iupac.org/publications/pac/pdf/2002/pdf/7412x2271.pdf>. For DNA synthesis and its commercial applications, see Ali Nouri and Christopher Chyba, “Biotechnology and Biosecurity,” chap. 20 in *Global Catastrophic Risks* (New York: Oxford University Press: 2008); Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>33</sup> David Franz. “Bioterrorism Defense: Controlling the Unknown.” In *Weapons of Mass Destruction and Terrorism*, edited by Russell D. Howard and James J.F. Forest. 184–197. McGraw-Hill/Contemporary Learning Series, 2008.

<sup>34</sup> James J. F. Forest, and Sammy Salama, “Jihadist Tactics and Targeting,” chap. 3 in *Jihadists and Weapons of Mass Destruction* (Boca Raton: Taylor & Frances Group, LLC, 2009), 86.

<sup>35</sup> Gregory D. Koblentz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 224.

<sup>36</sup> Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (New York: I.B. Tauris, 2002), 43.

significant technical obstacles for even skilled terrorists.<sup>37</sup> Gurr and Cole classify the probability of a mass-casualty terrorist attack with such weapons as “the least likely threat to emerge.”<sup>38</sup> In other words, this camp emphasizes that there is “a significant gap between the theoretical possibility and operational reality.”<sup>39</sup>

Perhaps the most persistent skeptics concerning the likelihood of CB terrorism have been Milton Leitenberg, a Senior Fellow at the Center for International and Security Studies at the University of Maryland, who mainly focuses on the technical hurdles that VNSA’s would have to – but, *nota bene*, have yet to – overcome in order to carry out large-scale bioterrorist attacks,<sup>40</sup> and Brian Michael Jenkins, currently a Senior Advisor to the President of the RAND Corporation, who for decades has challenged the exaggerated claims of other scholars, policy analysts, journalists, and pundits concerning the imminence and likelihood of catastrophic CB terrorist attacks. Unlike Leitenberg, Jenkins is mainly concerned with terrorist motivations rather than capabilities. Among his many arguments over the years are that terrorists (at least in the past) used to “want a lot of people watching and listening, not a lot of people dead”,<sup>41</sup> that terrorists tend to be conservative with respect to their choice of weapons, that the overwhelming majority of terrorist incidents have employed a limited number of operational techniques and tactics, and that even though terrorism has since increased in lethality and spectacularness, at times dramatically, most terrorist groups still do not seem to be highly motivated to acquire and employ CB weapons.<sup>42</sup> These various opinions, and others like them, have since been embraced and elaborated upon by many other terrorism experts, as the discussion and source citations below will amply illustrate.

There are some commentators who try to balance their concern over the growing availability of dual-use technology with the reality of the resource constraints that even sophisticated terrorist groups contend with. This contingent takes a more sanguine view on the likelihood that terrorists will successfully

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<sup>37</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 49.

<sup>38</sup> Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (New York: I.B. Tauris, 2002), 74.

<sup>39</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 40. Also see Bernard Lewis, “License to Kill: Usama bin Ladin’s Declaration of Jihad,” *Foreign Affairs* 77, no. 6 (1998), 14-19. <http://www.foreignaffairs.com/articles/54594/bernard-lewis/license-to-kill-usama-bin-ladins-declaration-of-jihad> and Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *The Nonproliferation Review* (Spring 2000), 162-179. Doi: 10.1080/10736700008436803.

<sup>40</sup> For illustrative examples, see Milton Leitenberg, *Assessing the Biological Weapons and Bioterrorism Threat*; Milton Leitenberg, “Bioterrorism, Hyped,” *Los Angeles Times*, February 17, 2006; Milton Leitenberg, “Evolution of the Current Threat,” in *Bioterrorism: Confronting a Complex Threat*, ed. Andreas Wenger and Rito Wollenmann (Boulder, CO: Lynne Rienner, 2007), 39-76 [a shorter version of one of his SSI monograph chapters]; Milton Leitenberg, “Biological Weapons: Where Have We Come From over the Past 100 Years?,” Federation of American Scientists website, January 15, 2013, available at <http://www.fas.org/pubs/pir/article/bioweapons.html>.

<sup>41</sup> For this now famous quote, see Brian Michael Jenkins, “International Terrorism: A New Mode of Conflict,” in *International Terrorism and World Security*, ed. David Carlton and Carlo Schaerf (London: Croom Helm, 1975), 15.

<sup>42</sup> These arguments can be found in several of Jenkins’ publications that have appeared between his early report entitled *Will Terrorists Go Nuclear?* (Santa Monica, CA: RAND, 1975), 6-7, and his recent book with the same title, *Will Terrorists Go Nuclear?* (2008), esp. chapters 3-4, 10.

pursue an unconventional weapons capacity. They acknowledge that globalization and advances in technology have created increased opportunities for terrorist organizations that seek such weapons,<sup>43</sup> but express doubt in their ability to “overcome the significant hurdles involved in CBRN acquisition and weaponization.”<sup>44</sup> Falkenrath, Newman, and Thayer outline a number of factors, including the widespread rise in basic scientific competence in the general population and the role of the internet in facilitating the proliferation of information, that have eroded the traditional capability limitations of non-state actors<sup>45</sup>, though Falkenrath concludes in a later writing that “the likelihood of acts of NBC terrorism in the future is low, but it is not zero and it is rising”<sup>46</sup>. Koblentz, citing the 2001 *Bacillus anthracis* mailings, echoes this sentiment while specifically cautioning that the current surge in the biodefense field may have unintended consequences that a determined terrorist group could potential exploit.<sup>47</sup>

In any event, Jenkins is right to insist that CBRN terrorism forecasting still remains “hazardous,” just as it was several decades ago, inasmuch as “the resultant predictions must be viewed as highly conjectural, tentative, and quite possibly wrong.”<sup>48</sup> The reasons why have been further elaborated upon by David C. Rapoport, Professor Emeritus at UCLA:<sup>49</sup>

We are dealing with a frightening and very remote possibility, but one which, alas, can neither be demonstrated nor disproved. Just as there is no logical way to show religious believers that they are in error in thinking that the world will come to an end, so likewise no way exists to demonstrate [that] terrorists will never use apocalyptic weapons.

Even the so-called JASON group, an independent scientific advisory network that advises the U.S. government and normally displays inordinate faith in the value of applying natural science methodologies and quantification methods to understand and predict human behavior in the social sphere, concluded that “it is simply not possible to validate (evaluate) predictive models of rare events

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<sup>43</sup> Adam Dolnik, “13 Years Since Tokyo: Re-Visiting the ‘Superterrorism’ Debate,” *Perspectives on Terrorism* II, no. 2 (January 2008): 3-11. <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/25/html>.

<sup>44</sup> Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007), 1.

<sup>45</sup> Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles' Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack*, (Cambridge: Belfer Center Studies in International Security, 1998). The identified factors are:

- a) technical barriers to WMD are at most fixed and are probably declining.
- b) the latent ability of non-state actors to master NBC [Nuclear, Biological and Chemical] challenges is rising in all modern societies.
- c) the underlying scientific and technical competence of U.S. and other populations is rising with time, for example the rise of the biotechnology industry means that there are now more skilled workers, a greater number of labs, easier access to equipment etc.
- d) the Internet makes information acquisition and communication of breakthroughs easier.
- e) the general efficiency of non-state operations is outpacing the efficiency of state operations, at least in the U.S. and probably everywhere in the developed world.

<sup>46</sup> Richard Falkenrath, “Confronting Nuclear, Chemical and Biological Terrorism,” *Survival* 40, no. 3 (Autumn 1998): 43-65. Doi: 10.1093/survival/40.3.43.

<sup>47</sup> Gregory D. Koblentz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009).

<sup>48</sup> Brian Michael Jenkins, *Will Terrorists Go Nuclear?* (Santa Monica, CA: RAND, 1975), 3.

<sup>49</sup> David C. Rapoport, “Terrorism and Weapons of the Apocalypse,” *National Security Studies Quarterly* 5:3 (1999), 50.

that have not occurred, and unvalidated models cannot be relied upon.”<sup>50</sup> However, that hasn’t stopped self-styled experts from making predictions about one type of rare event, acts of CBRN terrorism, often in a confident tone that is arguably unwarranted.

## MOTIVATIONAL ASPECTS OF NON-STATE CHEMICAL AND BIOLOGICAL (CB) WEAPONS USE<sup>51</sup>

### Background

There is a large and ever-growing scholarly and popular literature on the subject of “chemical terrorism” and/or “biological terrorism.” Unfortunately, much of this CB terrorism literature is characterized by alarmism, superficiality, ignorance about technical issues and/or the motivations of terrorists, a failure to consult or analyze primary sources in a scholarly manner, and the problematic and often uncritical use of secondary sources.<sup>52</sup> Some of these problems have been highlighted in the context of bioterrorism by Daniel M. Gerstein:<sup>53</sup>

the nature of reporting on bioterror [sic] has made getting to the “truth” highly problematic. After the Amerithrax attacks, it seems as though the floodgates opened: the proliferation of articles about BW and, in particular terrorist BW, has occurred at a rampant pace. However, much of this information reflects circular reporting. In other words, when one goes to the literature from books to articles to blogs, the information generally comes from a handful of key sources. The effect has been volumes of information that lead to more reporting, all based on information from just a few sources. In some cases, the sources are unconfirmed assertions. Perhaps of even greater concern is that national policy is being set based on such information.

This highly critical view has been seconded by George Smith, a senior fellow at Global Security.org, who noted that “much of the literature on chemical and biological terrorism published in the United States is replete with errors, exaggeration, and scaremongering.”<sup>54</sup> Although such critiques of the existing CB literature are often accurate, the same problematic literature continues to be uncritically cited.

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<sup>50</sup> JASON, *Rare Events* (McLean, VA: MITRE Corporation, 2007), 7, cited by Gregory D. Koblenz, “Predicting Peril or the Perils of Prediction? Assessing the Risk of CBRN Terrorism,” *Terrorism and Political Violence* 23:4 (2011), 514. For a journalistic treatment of the JASON group, see Ann Finkbeiner, *The Jasons: The Secret History of Science’s Postwar Elite* (New York: Viking, 2006).

<sup>51</sup> This section was written by Jeffrey M. Bale. The author would like to thank Milton Leitenberg at the University of Maryland for providing useful source materials and comments on sources.

<sup>52</sup> Amy Smithson and Leslie-Anne Levy have rightly noted that “[t]he subject of unconventional [CB] terrorism was tailor-made for hyperbole, and unfortunately much of what has been said has made it difficult to ascertain the gravity of the unconventional terrorist threat.” See Amy Smithson and Leslie-Anne Levy, *Ataxia: The Chemical and Biological Terrorism Threat and the US Response* (Washington, DC: Stimson Center, [October] 2000), 282. If anything, this problem may have become even more acute since those words were written.

<sup>53</sup> Daniel M. Gerstein, *Bioterror in the 21<sup>st</sup> Century* (Annapolis, MD: Naval Institute Press, 2009), 150.

<sup>54</sup> George Smith, “Comments on the CRS Report ‘Small-Scale Terrorist Attacks Using Chemical or Biological Agents,’” GlobalSecurity.org, undated, available at [www.fas.org/irp/crs/RL32391](http://www.fas.org/irp/crs/RL32391).

Moreover, one of the peculiarities of this literature is the continuing disparity between, on the one hand, the relatively small amount of attention paid to terrorist motivations, and, on the other, the relatively large amount of attention paid both to a) preventing nefarious actors from getting their hands on dangerous chemical materials or biological agents, and b) the technical capabilities of terrorists for producing chemical and biological weapons.<sup>55</sup> Although this narrow focus on acquisition issues and terrorist capabilities has been subjected to pointed criticism for some time and has been both challenged and increasingly compensated for by a proper emphasis on the vital importance of terrorist motivations and intentions, these imbalances in the literature have not yet been sufficiently redressed.<sup>56</sup> Indeed, the

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<sup>55</sup> Emblematic of this ongoing neglect of terrorist motivations in the CB terrorism threat literature can be found in the report by Richard Danzig, *Catastrophic Bioterrorism: What Is To Be Done?* (Washington, DC: Center for Technology and National Security Policy, National Defense University, [August] 2003), wherein there is no discussion whatsoever of terrorist motivations; in the books by Daniel M. Gerstein, *Bioterror in the 21<sup>st</sup> Century: Emerging Threats in a New Global Environment* (Annapolis, MD: Naval Institute Press, 2009), 173-6; Barry Kellman, *Bioviolence: Preventing Biological Terror [sic] and Crime* (New York: Cambridge University, 2008), 71-83; William R. Clark, *Bracing for Armageddon: The Science and Politics of Bioterrorism in America* (New York: Oxford University, 2008), 26-39, 161-71, all of which devote at most only a few pages to examining terrorist motivations for using, or even prior terrorist uses of, CB agents; and in the anthology edited by Andreas Wenger and Reto Wollenmann, *Bioterrorism: Confronting a Complex Threat* (Boulder, CO: Lynne Rienner, 2007), which does not include a separate chapter focused primarily on terrorist motivations (although those motivations are briefly touched upon, in different contexts, in the chapters by Milton Leitenberg and Marie Isabelle Chevrier). Cf. also the articles by Lawrence M. Wein, "Preventing Catastrophic Chemical Attacks," in *Issues in Science and Technology Online* [National Academy of Sciences], Fall 2006, available at [http://www.issues.org/23.1/p\\_wein.html](http://www.issues.org/23.1/p_wein.html), and Ronald M. Atlas, "Securing Life Sciences Research in an Age of Terrorism," both of which appeared in *Issues in Science and Technology Online* [National Academy of Sciences], Fall 2006, available at <http://www.issues.org/23.1/atlas.html>. To be fair, neither article is about CB terrorism per se. Thus Wein's article notes the risks of attacks by terrorists on vulnerable chemical facilities or vehicles transporting dangerous chemicals, but focuses on how to prevent this as well as how to secure dangerous chemicals at storage sites. Atlas instead deals with how concerns about bioterrorism might affect scientific research, especially how governments, the international community, and scientists can help "prevent dangerous biological agents from being acquired by terrorists", as well as with how the diffusion of scientific knowledge might enable terrorists to carry out a biological attack. Even so, it is all too typical of the threat assessment literature on CB terrorism that so many authors focus entirely on vulnerabilities and/or terrorist capabilities, and that they often seem to assume a priori that "terrorists" in general are highly motivated to carry out such attacks instead of trying to determine which terrorists, or even whether most terrorists, are in fact interested in acquiring such agents.

<sup>56</sup> For examples of studies that do include a more extensive examination of terrorist motivations, see Jeffrey D. Simon, *Terrorists and the Potential Use of Biological Weapons: A Discussion of Possibilities* (Santa Monica, CA: RAND Corporation, [December] 1989); Bruce Hoffman, "Terrorism and WMD: Some Preliminary Hypotheses," *Nonproliferation Review* 4:3 (Spring-Summer 1997), 45-53; Ehud Sprinzak, "The Great Superterrorism Scare," *Foreign Policy* 112 (Fall 1998), 110-24; Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles' Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, MA: MIT, 1998), chapter 3; Dean A. Wilkening, "BCW Attack Scenarios," in *The New Terror [sic]: Facing the Threat of Biological and Chemical Weapons*, ed. Sidney D. Drell, Abraham D. Sofaer, and George D. Wilson (Stanford, CA: Hoover Institution, 1999), 101-7; Brad Roberts, ed., *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses* (Alexandria, VA: Chemical and Biological Arms Control Institute, 1999), esp. the chapter by Brian M. Jenkins, "Understanding the Link between Motives and Methods," 43-51; Brad Roberts, ed., *Hype or Reality?: The "New Terrorism" and Mass Casualty Attacks* (Alexandria, VA: Chemical and Biological Arms Control Institute, 2000); Amy Smithson and Leslie-Anne Levy, *Ataxia: The Chemical and Biological Terrorism Threat and the US Response* (Washington, DC: Stimson Center, [October] 2000), esp. 13-28; Jessica Stern, *The Ultimate Terrorists* (Cambridge, MA: Harvard University, 2001), esp. the chapter entitled "Who Are the Terrorists?"; Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), chapters 4-7; Jonathan B. Tucker, "Chemical/Biological Terrorism: Coping with a New Threat," *Politics and the Life Sciences* 15:2 (September 1996), 167-83; *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000); Daniel S. Gressang IV, "Audience and Message: Assessing Terrorist WMD Potential," *Terrorism and Political Violence* 13:3 (Autumn 2001), 83-106; John V. Parachini, "Comparing Motives and Outcomes of Mass-Casualty Terrorism involving Conventional and Unconventional Weapons," *Studies*

long-standing focus on the availability of dangerous materials and/or on terrorist capabilities rather than on terrorist intentions has arguably been seriously misplaced given that the threat of chemical and biological terrorism is first and foremost a “demand-side” problem rather than a “supply-side” problem.<sup>57</sup> After all, if violence-prone extremist groups had no interest in acquiring or employing such materials, it would not matter, insofar as terrorism is concerned, whether those materials were accessible or whether the groups in question had sufficient technical capabilities to be able to deploy them.

Hence a priority in assessing the present and future non-state threat of chemical and biological weapons use must be on the issue of the actor’s motivations for carrying out acts of violence using such materials. As David Franz has rightly emphasized, “intent is a critical dimension to understanding of the WMD terrorism threat,” and in fact is the “key” to such an understanding.<sup>58</sup> More generally, Bruce Hoffman has noted that “the need for a better understanding of the motivations, thought processes, mindsets and historical consciousness of terrorists...is essential if the [terrorism] field is to grow in new and beneficial directions, retain its relevance, and provide insightful and thoughtful analysis...”<sup>59</sup> This same observation is especially true with respect to the *ideological motivations* and *operational objectives* of different types and groups of violent non-state actors (VNSAs), as will soon become clearer. Nor can these organizations’ *internal decision-making processes and dynamics* be overlooked. As Christina Hellmich and Amanda J. Redig rightly emphasize, “[a]n evaluation of the means behind a terrorist threat without preceding analysis of the decision-making paradigm of the terrorists is dangerously misguided and must be considered invalid.”<sup>60</sup> The goal of this section is to highlight the range of opinions about how acute the threat of chemical and biological terrorism currently is, and then undertake an analysis of the historical record and specific extremist ideologies in order to help identify which types of extremist groups are most likely to be interested in carrying out acts of violence using chemical or biological materials. This will set the stage for subsequent sections dealing with terrorist capabilities and opportunities in this

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*in Conflict and Terrorism* 24:5 (September 2001), 389-406; John V. Parachini, “Putting WMD Terrorism into Perspective,” *Washington Quarterly* 26:4 (Autumn 2003), 37-50; Jeffrey M. Bale and Gary Ackerman, “How Serious is the ‘WMD Terrorism’ Threat?: Terrorist Motivations and Capabilities for Using Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons,” report prepared by the WMD Terrorism Research Program, Center for Nonproliferation Studies, 2005, Part II on motivations; Anne Stenersen, *Al-Qaida’s Quest for Weapons of Mass Destruction: The History behind the Hype* (Saarbrücken: VDM, 2008); Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York: Routledge, 2007), 46-7, chapters 3 and 8; Adam Dolnik, “13 Years since Tokyo: Re-Visiting the ‘Superterrorism’ Debate,” *Perspectives on Terrorism* 2:2 (January 2008), 3-11; Gary Ackerman and Jeremy Tamssett, eds., *Jihadists and Weapons of Mass Destruction* (Boca Raton, FL: CRC Press, 2009); Magnus Ranstorp and Magnus Normark, eds., *Unconventional Weapons and International Terrorism: Challenges and New Approaches* (New York: Routledge, 2009); and Brian Michael Jenkins, *Will Terrorists Go Nuclear?* (Amherst, NY: Prometheus Books, 2008), esp. chapters 3-5, 10, 14-15, albeit in the context of nuclear weapons rather than CB weapons. Perhaps not surprisingly, in the scholarly literature in which terrorist motivations are given sufficient attention, the gulf between alarmist and skeptical interpretations concerning the CB terrorist threat is not as wide as it is in the scientific literature focused narrowly on capabilities or in the journalistic literature.

<sup>57</sup> This is why certain specialists are now, albeit rather belatedly, paying somewhat more attention to the “demand” side, e.g., Charles B. Curtis, “Curbing the Demand for Mass Destruction,” in “Confronting the Specter of Nuclear Terrorism,” ed. Graham Allison special issue of *Annals of the American Academy of Political and Social Science* 607 (September 2006), 27-32.

<sup>58</sup> David Franz, “Bioterrorism Defense: Controlling the Unknown,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest (New York: McGraw-Hill, 2007), 1<sup>st</sup> edition, 190, 194.

<sup>59</sup> Bruce Hoffman, “Forward,” in *Research on Terrorism: Trends, Achievements and Failures*, ed. Andrew Silke (Portland, OR and London: Frank Cass, 2004), xviii.

<sup>60</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and the Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30 (2007), 384.



context.

## Distinguishing Terrorism from Other Forms of Non-State Violence

Before turning to the central topic, however, a few words need to be said about the nature of terrorism, the importance of ideological extremism in evaluating terrorist motivations, and the principal ideological categories of non-state terrorist groups. Perhaps the first desideratum should be to draw a clear analytical distinction between “terrorism” in the strict sense of the term and other types of non-state violence, a distinction that unfortunately needs to be made at the outset precisely because most definitions of terrorism are imprecise if not entirely misleading.<sup>61</sup> Without spending too much time on contentious definitional questions, it can be said that the best way to distinguish between terrorism and other forms of violence is to recognize that most acts of violence are dyadic, i.e., they involve only two parties or protagonists—the perpetrator(s) and the victim(s):

Perpetrator(s) → Victim(s)

In marked contrast, bona fide acts of terrorism are necessarily triadic, i.e., they involve three parties or protagonists—the perpetrator(s), the victim(s), and a wider target audience (or audiences):

Perpetrator(s) → Victim(s) → Wider Target Audience(s)

In short, terrorism is violence that is consciously carried out by the perpetrator(s) in order to influence the attitudes and behaviors of a wider target audience (or multiple target audiences). It is, as Brian Jenkins and others have aptly pointed out, violence for psychological effect.<sup>62</sup>

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<sup>61</sup> Note, e.g., the definition from Title 22 of the U.S. Code, Section 2656f(d): “Terrorism means premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience.” See [www.cia.gov/terrorism/faqs.html](http://www.cia.gov/terrorism/faqs.html). Here there is one unnecessary restriction (e.g., terrorism can be “religiously motivated” or even “economically motivated” as well as “politically motivated”) and two outright errors (terrorism is not always perpetrated against “noncombatant targets,” and it is not only carried out by “subnational groups” or “clandestine agents” – the worst perpetrators of terrorism, historically speaking, have been states, which often openly employ their own security forces instead of “clandestine agents”), and the quintessential feature of terrorism – the carrying out of violence in order to influence a wider target audience – is wrongly qualified with “usually.”

<sup>62</sup> The best collection and analysis of definitions of terrorism can be found in Alex P. Schmid and Albert J. Jongman, *Political Terrorism: A New Guide to Actors, Authors, Concepts, Data Bases, Theories and Literature* (Amsterdam: North-Holland, 1988), esp. 1- 38. Many of the better definitions highlighted therein emphasize the centrality of carrying out violent actions with the conscious intention of exerting a psychological impact on a wider target audience. This work has recently been updated by Schmid as *The Routledge Handbook of Terrorism Research* (New York: Routledge, 2011), wherein the discussion of terrorism definitions appears in chapter 2. The formal definition that the author has been using in his own classes on terrorism for three decades is as follows: “Terrorism is the use or threatened use of violence, directed against victims selected for their symbolic or representative value, as a means of instilling anxiety in, transmitting one or more messages to, and thereby manipulating the attitudes and behavior of a wider target audience or audiences.” Note also, in the interests of terminological precision, that the term “terror” refers to a psychological state marked by fear and anxiety, and must therefore be distinguished from terrorism, a violent technique of psychological manipulation. There is no such thing as a “terror network,” only a “terrorist network.”

Indeed, one of the many perverse ironies of terrorism is that, although the actual victims suffer its effects disproportionately and in the most direct and brutal manner, their importance is strictly secondary and derives principally from the fact that they have been specifically selected because they are viewed as symbolizing something larger or representing a broader category of persons. To put it another way, the most important nexus in any genuine act of terrorism is between the perpetrators and the target audience(s) they are trying to influence. It follows from this that targeted assassinations of particular individuals for purely instrumental reasons (e.g., murders of particularly effective or brutal policemen) or attacks that are solely designed to kill large numbers of people (e.g., massacres) are not, strictly speaking, acts of terrorism. They would only constitute acts of terrorism if their primary purpose was to traumatize and influence the behavior of wider target audiences. In many real-world cases, of course, attacks are carried out for both instrumental and psychological reasons, but *the latter would have to predominate in the eyes of the perpetrators* if such attacks are to be regarded, strictly speaking, as terrorism. Hence violent acts that inadvertently end up traumatizing people other than the actual victim, e.g., a series of rapes in a particular neighborhood, should not be characterized as acts of terrorism.

Thus, for the purposes of this study, terrorism is defined as nothing more than a violent technique of psychological manipulation, and like other techniques it can be used by *anyone*, whatever their ideological orientation or relationship to the state. It can be – and indeed has been – employed by the state, on behalf of state power, or in opposition to state power; by left-wingers, right-wingers, or centrists; by the irreligious or the religious; by avaricious criminals; by non-ideological individuals motivated by idiosyncratic personal motivations; and for an infinite variety of causes. One man’s terrorist is therefore *not* another man’s freedom fighter, as many claim, a phrase which not only confuses means with ends but also falsely suggests that terrorism is not an objectively recognizable phenomenon, but rather one that is entirely subjective or purely in the eyes of the beholder, like beauty. On the contrary, one man’s terrorist should invariably also be another man’s terrorist, since regardless of the underlying cause involved – or whether one sympathizes with or deplors that cause – a terrorist can be identified purely by the methods he or she chooses to employ. It follows that terrorism, as an operational technique, is no more intrinsically immoral than other forms of violence, since it can be employed on behalf of causes that could be variously characterized, depending upon one’s perspective, as “moral,” “amoral,” or “immoral.” In any case, only those organized groups that rely primarily on terrorist techniques can legitimately be described as terrorist groups.

Having clarified the meaning of the term “terrorism” for the purposes of this current study, it is now necessary to describe the scope of the actors that will be considered in this study. First, since state actors and state agents are comprehensively dealt with in other writings, this section only focuses on non-state actors. Second, since both governments and citizens are concerned with any and all sub-national groups that may end up carrying out acts of violence using chemical and biological materials, for the purposes of this study all violent non-state actors will be considered, whether or not they technically fall into the traditional “terrorist” ideological categories. Therefore, this study will include criminal organizations and loners driven by solipsistic impulses, in addition to violent groups motivated by religious and political ideologies. Even so, the concept of terrorism, as it has been defined here, remains important, especially

when considering an actor's motivations for acquiring or employing chemical or biological weapons.

## Classifying the Culprits: The Three Main Categories of Violent Non-State Actors (VNSAs)

### 1. Extremist Political and Religious Groups

Now that the meaning of the term “terrorism” has been clarified, the principal categories of non-state terrorists in recent decades need to be identified. When categorizing such groups, the most useful way to do so is to differentiate between their ideologies. The reason is simple: the primary characteristic of most such groups is the adherence of their members to particular extremist ideologies. Ideologies, unlike the vague conceptions held by most people about how the world operates, are structured, relatively coherent, and often all-encompassing worldviews that purport to explain what is wrong with the world, identify those who are to blame for perpetrating or perpetuating those wrongs, and provide a guide for action that is designed to right those wrongs and thereby usher in a better world for the broader constituencies whose interests the ideologues and their followers claim to represent. In this way, ideologies not only act as crucial perceptual filters through which all external information is refracted and processed, but also as centrally important drivers of the actual behaviors of those who adhere to them.<sup>63</sup> Furthermore, whatever their specific doctrinal tenets may be, extremist ideologies tend to share many features in common – they are generally characterized by Manicheism (a sharp division of the world into “good” and “evil,” devoid of shades of grey or moral ambiguity), monism (the antithesis of pluralism), authoritarianism or totalitarianism, collectivism, utopianism, (non-clinical) paranoia, conspiratorial thinking, and a penchant for demonizing and therefore dehumanizing designated enemies.<sup>64</sup> All of these traits can easily serve to provide a rationale or justification for causing large-scale

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<sup>63</sup> The term “ideology,” which is derived from the French *idéologie* (“the science of ideas”), essentially signifies a “systematic set of ideas.” It was first coined by the French philosopher Destutt de Tracy (1754-1836), but the original concept was subsequently elaborated upon by many subsequent intellectuals, including Karl Marx, Karl Mannheim, and Antonio Gramsci. For a general introduction, see Michael Freeden, *Ideology: A Very Short Introduction* (Oxford and New York: Oxford University Press, 2003). For a recent analysis of the evolving and diverse uses of the term, see Jeffrey M. Bale, *Where the Extremes Touch: Patterns of Collaboration between Islamist Networks and Western Left- and Right-Wing Extremists* (New York: Routledge, forthcoming in 2014), chapter 1.

<sup>64</sup> For the view that “extremism” is a distinct phenomenon with recognizable characteristics, see Jeffrey M. Bale, *Where the Extremes Touch: Patterns of Collaboration between Islamist Networks and Western Left- and Right-Wing Extremists* (New York: Routledge, forthcoming in 2014), chapter 1. Cf. also John George and Laird Wilcox, *American Extremists: Militias, Supremacists, Klansmen, Communists, and Others* (Amherst, NY: Prometheus Books, 1996), 54-62; Gian Mario Bravo, *L'estremismo in Italia* (Rome: Riuniti, 1982), 7-18; Neil J. Smelser, *The Faces of Terrorism: Social and Psychological Dimensions* (Princeton, NJ: Princeton University Press, 2007), 54-80; and Eric Hoffer, *The True Believer: Thoughts on the Nature of Mass Movements* (New York: Perennial, 2002 [1951]), though “true believers” are even more common within sectarian vanguard parties than the mass movements they aspire to lead. It should be pointed out, however, that one can speak both of an “extremism of ends,” which implies that certain parties promote an ideology that envisions the dramatic transformation of fundamental aspects of the existing political and social order (even though their methods of achieving this may not be extreme), and of an “extremism of means,” which implies that certain parties are willing to use methods that are considered extreme if not “beyond the pale” to achieve whatever goals they consider desirable, even if the goals themselves are relatively moderate. The gravest danger generally stems from groups which promote extremist goals and simultaneously advocate the adoption of extreme means to achieve those ends. See also Maxwell Taylor, *The Fanatics: A Behavioural Approach to Political Violence* (London and Washington, DC: Brassey's, 1991), esp. chapter 2, wherein “ten features of fanaticism” are listed that are analogous to several of the characteristics associated with “extremism.”

disruption or carrying out brutal acts of violence against said enemies.

There are five primary types of non-state terrorist groups that have had historical significance during and after the Cold War:

- **Ethno-nationalist separatist and irredentist groups** – groups relying heavily on the technique of terrorism that seek either to establish an independent state for the ethnic, linguistic, cultural, or national community with which they are affiliated, or (especially if they already have their own independent state) to unite all of the members of their community – including those that live in neighboring countries – under the aegis of such a state.
- **Secular left-wing groups** – groups relying heavily on the technique of terrorism that seek to overthrow the capitalist system and either establish a “dictatorship of the proletariat” (Marxist-Leninists) or, much more rarely, a decentralized, non-hierarchical sociopolitical system (anarchists).
- **Secular right-wing groups** – groups relying heavily on the technique of terrorism that seek to restore national greatness (radical nationalists), suppress “alien” or “subversive” social groups (nativists), expel or subordinate troublesome ethnic and cultural minorities (racists), or overthrow the existing democratic and “plutocratic” capitalist systems in order to establish a revolutionary “new order” (neo-fascists).
- **Religious terrorist groups** – groups relying heavily on the technique of terrorism that seek to smite the purported enemies of God, impose strict religious tenets or laws on society (fundamentalists), forcibly insert religion into the political sphere (i.e., those who seek to “politicize” religion and “religionize” politics, such as Christian Reconstructionists and Islamists), and/or bring about Armageddon (apocalyptic millenarians). This type of terrorism comes in five main varieties: 1) Islamist terrorism, both Sunnī and Shīʿī; 2) Jewish fundamentalist terrorism, carried out primarily inside Israel by anti-Zionist *haredim* or “messianic Zionists”; 3) Christian terrorism, which can be further subdivided into terrorism of an Orthodox (mainly in Russia), Catholic ultratraditionalist, or fundamentalist Protestant stamp, and terrorism inspired by the idiosyncratic Christian Identity doctrine popular within the American “militia” milieu; 4) Hindu fundamentalist/nationalist terrorism; and 5) terrorism carried out by apocalyptic religious cults.
- **Single-issue groups**<sup>65</sup> – groups relying on the technique of terrorism that obsessively focus on very specific or relatively narrowly defined causes of various sorts. This category includes organizations from all sides of the political spectrum, e.g., animal rights groups such as the Animal Liberation Front (ALF); anti-communist groups such as the Cuban exile organization Omega 7, the Comando de Caça aos Comunistas (CCC: Communist-Hunting Commando) in Brazil, and the [Grupos] Autodefensas Unidas de Colombia (AUC: United Self-Defense Groups of Colombia); and anti-abortion groups such as the Army of God (AOG) in the United States.

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<sup>65</sup> One may well object to identifying “single-issue groups” as a separate category, for the simple reason that most such groups fall within one of the other four ideological milieus. For example, most radical ecology groups fall into the secular left-wing (or secular right-wing) category, and anti-abortion groups mainly fall into the Christian religious category.

Needless to say, groups within each of these broad categories have distinct ideologies that help to explain what they are for and against, who their friends and enemies are, and what targets they believe they can legitimately attack, but it is also the case that even superficially similar groups within each of these categories and subcategories have their own distinctive and often idiosyncratic doctrines. Moreover, it should be emphasized that these major categories of terrorism are not entirely discrete. Some essentially ethno-nationalist terrorist groups, e.g., have had a Marxist gloss (the PKK, factions of ETA), a religious gloss (certain Sikh groups), or a combination of the two (factions of the IRA). In more recent times, essentially religious terrorist groups have also displayed acute nationalist sentiments (the Islamist groups HAMĀS and al- Jihād al-Islāmī in Palestine), and essentially ethno-nationalist terrorist groups have adopted an increasingly prominent religious coloration (important pro-Islamist factions within the Caucasus separatist movement, such as the Chechens formerly led by Shamil Basayev and the combat groups affiliated with the Imarat Kavkaz [Caucasus Emirate]).<sup>66</sup> These types of complexities need to be kept in mind when considering motivations for or against the use of chemical or biological weapons.

## 2. Criminal Organizations

In addition to political and religious extremists, other organized groups of non-state actors could conceivably have recourse to using, or at least threatening to use, chemical or biological weapons against their opponents. The most important and dangerous groups of this type are organized crime networks in various parts of the world, such as the Italian Cosa Nostra, 'Ndrangheta, and Camorra, their counterparts and homologues in the United States and other Western European countries, the Chinese triads, the Japanese *yakuza*, the Russian *mafya* and similar groups elsewhere in eastern Europe and the Caucasus, Latin American and Southeast Asian drug trafficking cartels, organized crime groups in Nigeria, India, Pakistan, Israel and Turkey, etc. In these contexts, however, the likely motivations for the employment or threatened employment of such weapons would probably be much more pragmatic than the pursuit of more or less utopian ideological agendas by extremists, i.e., related either to the protection of existing illicit activities or the initiation of new profit-making ventures of various sorts. As an example, one could

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<sup>66</sup> The mixed religious and nationalist motivations of HAMĀS and al-Jihād al-Islāmī are widely recognized, but it is the former that clearly predominates in these two groups (in contradistinction to the motives of their political rivals in the PLO). For the “conversion” of certain key Chechen separatist factions to Islamism and their increasing resort to terrorism, see Julie Wilhelmsen, “Between a Rock and a Hard Place: The Islamisation of the Chechen Separatist Movement,” *Europe-Asia Studies* 57:1 (January 2005), 38-46; and Jeffrey M. Bale, “The North Caucasus Conflict and the Potential for Radiological Terrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J. F. Forest (New York: McGraw-Hill, 2012), 270-90. By “Islamism” we are referring to a radically anti-secular and anti-Western Islamic *political ideology* with both revolutionary and revivalist elements. The principal ideological characteristics of Islamism in all of its forms are an outright rejection of Western secular values, an intransigent resistance to “infidel” political, economic, social, and cultural influence over the Muslim world, a pronounced hostility towards less committed and militant Muslims (who are often denounced as “apostates”), and an insistence on the creation of an Islamic state governed by a rigid, puritanical application of the *shāri’a*. See Jeffrey M. Bale, “Islamism,” in *Encyclopedia of Bioterrorism Defense*, ed. Richard F. Pilch and Raymond Zilinskas (New York: Wiley, 2005), 296-8; and Jeffrey M. Bale, “Islamism and Totalitarianism,” *Totalitarian Movements and Political Religions* 10:2 (June 2009), esp. 79-81, 92 (note 32). For more on Islamist doctrine(s), compare Emmanuel Sivan, *Radical Islam: Medieval Theology and Modern Politics* (New Haven: Yale University, 1990); Abderrahim Lamchichi, *L’islamisme politique* (Paris: Harmattan, 2001); Bassam Tibi, *Islamism and Islam* (New Haven: Yale University, 2012); and Ibrahim M. Abu-Rabi’, *Intellectual Origins of Islamic Resurgence in the Modern Arab World* (Albany: SUNY, 1996). See also the contrasting interpretations found in Martin Kramer, ed., *The Islamism Debate* (Tel Aviv: Tel Aviv University/Moshe Dayan Center for Middle Eastern and African Studies, 1997).

easily imagine their possible use by *mafiosi* to poison criminal rivals or perhaps even to threaten to carry out mass casualty attacks against governments that were launching crackdowns on their activities. One could also imagine, however, that CB materials could be employed by criminal organizations for more atavistic and possibly expressive reasons, such as exacting revenge against persons who were thought to have cheated them or violated their codes of *omertà*.

### 3. Individual Actors with Idiosyncratic Motives

In addition to organized political and criminal groups, individuals motivated by a wide variety of personal motives – as opposed to individuals who have embraced extremist ideologies of one sort or another – might conceivably use or threaten to use chemical or biological materials, whether against real or imagined enemies. Since individuals are all too often driven to engage in unanticipated anti-social behavior by internal personal motives (colloquially referred to as “inner demons”), sometimes barely conscious ones, that may be a product of psychopathology, sociopathy, solipsism, extreme eccentricity, or other idiosyncrasies, their potential use of toxic chemical or biological materials to harm others may not even be discernable to, much less predictable by, outside observers. On the other hand, although there are some important historical exceptions, such troubled, delusional, or dysfunctional individuals will generally lack the wherewithal to actually be able to turn their violent fantasies into a reality, especially if they involve “WMD,” whose acquisition, weaponization, and deployment are likely to be beyond the capabilities of most lone individuals who lack scientific knowledge or easy access to dangerous materials.<sup>67</sup> Nevertheless, it is significant that the overwhelming majority of the annual cases involving poisonings or intentional infections with dangerous chemical or biological substances are carried out by individuals with highly personal motives, ones that range from the utterly banal (e.g., killing annoying or unfaithful spouses) to the bizarre if not positively arcane. Hence, it is not inconceivable that certain individuals, acting on the basis of motives that are almost totally obscure to outsiders, could carry-out an attack with CB materials.

### The Potential Multiplicity of Motives

It has already been argued that terrorism is a violent technique of psychological manipulation that necessarily involves three parties – the perpetrator(s), the victim(s), and a wider target audience or audiences – whereas normal acts of violence involve only two parties, the perpetrator(s) and victim(s). From this it follows that attacks which are solely designed to kill large numbers of people are not really acts of bona fide terrorism at all. They are better described as acts of “mass murder” (or perhaps as “acts of war,” if one takes the hyperbolic and often metaphorical rhetoric of both VNSAs and their state opponents at face value). In contrast, the phrase “mass casualty terrorism” properly refers to attacks that are intentionally designed to exert an impact upon wider target audiences by means of the production of

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<sup>67</sup> One of those exceptions was the so-called Alphabet Bomber, a Yugoslav resident alien named Muharem Kurbegovic, who was working on preparing a binary nerve agent when he was apprehended in California in 1974. For more on this case, see Jeffrey D. Simon, “The Alphabet Bomber,” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 71-94.

large numbers of casualties.<sup>68</sup> This key distinction, and others as well, can easily be illustrated by reference to the possible motives behind the catastrophic attacks on 9/11. If the principal purpose of Usāma bin Lādin and Ayman al-Zawāhirī, whose al-Qā'ida network sponsored and later claimed responsibility for those near simultaneous attacks, was simply to kill large numbers of people, it would have constituted an act of mass murder. If their primary aim was simply to destroy the Twin Towers and damage the U.S. economy, it would have constituted an unusually destructive act of sabotage or economic warfare. If their principal purpose had been to exert a psychological impact by physically destroying key symbols of American economic and military power, irrespective of the number of human casualties, it would have been a simple act of terrorism. But if their purpose was to exert a tremendous psychological impact by killing large numbers of people, as seems certain, it constituted an act of “mass casualty terrorism” per se. However, in this instance al-Qā'ida seems to have had multiple aims for launching the attack—to destroy the physical symbols of American power, to damage the U.S. economy severely, to kill military personnel in the Pentagon and political leaders in Congress, to commit mass murder, and/or to commit a traumatic act of mass casualty terrorism.<sup>69</sup>

Of course, 9/11 was an unconventional attack launched with more or less conventional means. By extension, however, one can easily imagine scenarios involving the use of different types of “WMD” that might also serve multiple purposes. Here one needs to distinguish between nuclear weapons and other types of so-called WMD, including chemical and biological weapons (which cannot really produce mass destruction). If, for purposes of illustration and contrast, a nuclear weapon was detonated in a major American city, the aim of the perpetrators could be:

- To kill hundreds of thousands or possibly millions of individuals within the actual blast radius;
- To irradiate an even larger number of individuals, many of whom would likely die, sooner or later, due to excessive radiation exposure;
- To create massive physical destruction in the midst of a large metropolis;
- To wreak economic havoc by obliterating the infrastructure of a national or international center of finance, manufacturing, or commerce;
- To traumatize the remaining residents of the city and all other citizens of the nation, as well as citizens in allied countries, who may believe that other nuclear attacks will be carried out;
- To force the government of the targeted country to accede to their demands;

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<sup>68</sup> Jeffrey M. Bale, “Responses to Questions on CBRN Terrorism,” unpublished essay, 2-3. One of the few authors who has emphasized the need to examine terrorists’ potential use of CBRN weapons explicitly within the framework of the impact that they hope to exert on target audiences is Daniel S. Gressang IV, “Audience and Message: Assessing Terrorist WMD Potential,” *Terrorism and Political Violence* 13:3 (Autumn 2001), 83-106. As he puts it (85), “terrorists are alike in at least one important way: they seek to acquire and maintain some degree of influence over an identifiable audience. While that audience may vary widely, the desire to have and exercise influence is seen as the most basic driving motivation of terrorists, regardless of additional motivational, ideological or theological imperatives.” From this it follows that, when speaking of terrorism in the strict sense, “the content and context of the terrorist’s message to his primary audience is a critical component for understanding the linkage between motive and action.” Daniel S. Gressang IV, “Audience and Message: Assessing Terrorist WMD Potential,” *Terrorism and Political Violence* 13:3 (Autumn 2001), 89. The common neglect of this factor in discussions of WMD terrorism, whether explicit or implicit, is rather odd given that so many terrorism experts acknowledge that *at least* one of the distinguishing characteristics of terrorist violence is that it is intended to influence a wider audience.

<sup>69</sup> Jeffrey M. Bale, “Responses to Questions concerning CBRN Terrorism,” unpublished essay, 2-3.

- To provoke a wider nuclear war;
- To demonstrate their technological and operational prowess;
- To inspire or rally their followers; or
- All or any combination of the above.

Therefore, even in the case of nuclear weapons, which are indisputably weapons of mass destruction, it is not necessarily the case that the only motivation of the perpetrators would be to cause mass casualties.

However, the focus herein is on weaponized chemical and biological agents, so let's consider each in turn. If a certain VNSA opted to carry out an attack using chemical agents or weapons, the aim of the perpetrators could be:

- To assassinate select individuals, either in order to eliminate them physically or, in the case of higher-profile individuals, in order to psychologically traumatize wider audiences who would be affected emotionally by their deaths (e.g., in the case of a U.S. President or a beloved celebrity);
- To kill dozens, hundreds, or thousands of individuals, depending upon the nature of the attack, the type of chemical weapon employed, and the type of target attacked;
- To simultaneously injure or contaminate an even larger number of individuals, depending upon the precise nature and quantity of the chemical materials used;
- To emotionally traumatize other people in the targeted country, whose lack of scientific knowledge and overriding fears of contamination could produce debilitating long term psychological effects;
- To contaminate vital sections of the target area with toxic chemicals, such as a downtown urban business district, so as to require very expensive clean-up efforts and, in the meantime, inflict serious economic damage;
- To kill livestock or poison other important elements of the food supply of a targeted country;
- To demonstrate their technological and operational prowess (though in this case that prowess would be considerably less than in a nuclear attack);
- To inspire or rally their followers; or
- All or any combination of the above.

Similarly, if a certain VNSA opted to carry out an attack with biological agents, the aim of the perpetrators could be:

- To assassinate select individuals, either in order to eliminate them physically or, in the case of higher-profile individuals, in order to psychologically traumatize wider audiences who would be affected emotionally by their deaths (e.g., in the case of a U.S. President or a beloved celebrity);
- To kill dozens, hundreds, thousands, or tens of thousands of individuals, depending upon the nature of the attack, the type of biological agent employed, and the type of target attacked;
- To simultaneously injure or infect an even larger number of individuals via the spreading of diseases, depending upon the precise nature and quantity of the biological agents used (especially



if they are contagious);

- To emotionally traumatize other people in the targeted country, whose lack of scientific knowledge and overriding fears of infection could produce debilitating long term psychological and disruptive social effects;
- To contaminate vital sections of the target area with toxic biological agents, such as a downtown urban business district, so as to require very expensive clean-up efforts and, in the meantime, inflict serious economic damage;
- To infect and kill livestock or poison other important elements of the food supply of a targeted country;
- To demonstrate their technological and operational prowess (though in this case that prowess would be somewhat less than in a nuclear attack);
- To inspire or rally their followers; or
- All or any combination of the above.

Indeed, every type of agent or weapon that falls within the overly broad “WMD” category might likewise be employed for any number of potential reasons, both material and psychological, and not necessarily only to inflict mass destruction or mass casualties. Indeed, in the past, chemical, biological and radiological materials have most often been used to poison or contaminate specific individuals, with the intention of either injuring or murdering them.<sup>70</sup>

In short, the objectives for carrying out CBRN attacks can vary greatly, both in terms of the actual impact sought and the political or religious goals being pursued.<sup>71</sup> Impact-wise, they could be seen as a means to diverse ends, including the precipitation of small or large numbers of casualties, minor or severe material damage, or varying levels of psychological trauma. (Only nuclear weapons are actually guaranteed to cause massive damage and enormous casualties if they are detonated in populous areas.<sup>72</sup>) Alternatively, such attacks could conceivably be carried out as an end in themselves, especially if the perpetrator(s) had some sort of technological fetish or was otherwise driven by an inner compulsion to utilize unconventional weapons, in the same way that setting fires appeals to certain types of arsonists entirely for idiosyncratic, subliminal psychological reasons rather than for rational, instrumental ones (e.g., bilking insurance companies, getting revenge on someone, etc.). As it happens, although most analysts

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<sup>70</sup> This is not only true of frustrated individuals holding personal grudges, but also of non-state groups that wished to eliminate designated enemies and of regimes that intentionally established covert CBW programs in large part to assassinate “enemies of the state,” such as South Africa. See the detailed overviews of both the South African BW and CW programs by Jeffrey M. Bale, “South Africa’s Project Coast: ‘Death Squads,’ Covert State-Sponsored Poisonings, and the Dangers of CBW Proliferation,” *Democracy and Security* 2:1 (January-June 2006), 27-59; and Chandre Gould and Peter Folb, *Project Coast: Apartheid’s Chemical and Biological Warfare Programmes* (Geneva: United Nations Institute for Disarmament Research/Centre for Conflict Resolution, 2002).

<sup>71</sup> The most complete available catalog of prior CBRN terrorist threats, hoaxes, and attacks can be found in the National Consortium for the Study of Terrorism and Responses to Terrorism’s (START) Profiles of Incidents of CBRN-Use by Non-State Actors (POICN) Database. This database currently lists around 500 incidents that occurred from 1990 to 2012.

<sup>72</sup> This presupposes, of course, that the devices function as intended. However, Charles Blair has pointed out that there are no guarantees that nuclear devices, especially improvised nuclear devices, would “function in an optimal sense and cause mass destruction. It is more likely than not that they would fizzle; in such cases certainly a lot of damage would result but it would not be anywhere close to a Hiroshima-like event.” Personal communication from Blair, June 5, 2009.

concerned with these issues have pointed to a variety of possible terrorist motives for employing “WMD,” few if any have as yet attempted to enumerate and evaluate those motives in a systematic fashion.<sup>73</sup> For this very reason, several such purported motives need to be considered in more detail below.

## Influences on Weapons Selection

Before enumerating the various motives that might drive actors towards CB weapons, it is worthwhile examining the process by which VNSAs might select weapons, since this will provide some insight and structure to the discussion which follows. Although terrorists and other non-state actors rarely if ever engage in formal “cost-benefit” analyses and their “rationality” will typically be “bounded” or constrained by their ideological worldviews and may thus not be fully comprehensible to outsiders, they normally carry out their acts of violence in order to achieve more or less calculated operational objectives.<sup>74</sup> To the extent that this is true, whether terrorists choose to employ chemical or biological weapons will largely depend on whether “the operational advantages that their use might be perceived to confer” are seen as outweighing “the operational disadvantages that their use might incur” assuming that a) they have the technical capabilities to do so, and b) the use of such weapons is not utterly antithetical to their ideological agendas and/or psychological make-up.<sup>75</sup> From this perspective, a group’s decision to use CB materials, like its other decisions concerning targeting, other weaponry, and tactics, will often be based on some degree of rational strategic calculation or choice. Crucially, however, it can also be heavily influenced by less rational ideological and psychological factors.

Ideology plays a decisive, and at times even preeminent, role in the selection of weapons, targets, and tactical methods by extremist groups that resort to terrorism.<sup>76</sup> In his book *Understanding Terrorist Innovation*, Adam Dolnik has enumerated many of the reasons why:<sup>77</sup>

Ideology is important as it is an organization’s ideological foundation that frames the worldview of its members and thus provides a sense of collective identity. Ideology is also

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<sup>73</sup> Perhaps the most systematic single effort to address terrorist motivational incentives and disincentives for using WMD is that of Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002). For example, therein (92-103) they discuss the operational pros and cons of using such weapons for indiscriminate attacks on population targets, assassinations, attacking military facilities, doing economic damage, blackmail and intimidation, generating propaganda, attacking key buildings and sites as well as nuclear and chemical facilities (i.e., critical infrastructure), and deterrence.

<sup>74</sup> See especially Martha Crenshaw, “The Logic of Terrorism: Terrorist Behavior as a Product of Strategic Choice,” in *Origins of Terrorism: Psychologies, Ideologies, Theologies, States of Mind*, ed. Walter Reich (Washington, D.C.: Woodrow Wilson Center Press, 1998) 7-24; and Gordon H. McCormick, “Terrorist Decision Making,” *Annual Reviews in Political Science* 6 (2003), 481.

<sup>75</sup> Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), 80 and 91.

<sup>76</sup> Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption,” *Studies in Conflict and Terrorism* 24:3 (May 2001), 193: the “philosophical and ideological views of a group – including both the espoused philosophy of the organization and the “actual” philosophy revealed by the group’s actions – are...critical in determining whether it will seek out new technology.”

<sup>77</sup> Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York: Routledge, 2007), 13-14.

instrumental in identifying the enemy, while also providing the necessary explanation and justification for its targeting. Moreover, it is again the ideology of the group which determines its core objectives and the strategy for how and by what means these objectives are to be achieved. And finally, ideology is also a critical component in determining a group's ambitions, as well as the overall perception of urgency for armed action in order to fulfill these aspirations.

In any event, the manner by which terrorist groups make such decisions is an involved process that necessarily varies somewhat from group to group, even among those within the same ideological milieu, but can in general be characterized as a progressive limitation of the range of weapons or targets.

The discussion that follows can best be framed by considering the general process of weapons selection by VNSAs. In this regard, three primary factors are operative (although there are likely to be a number of ancillary factors in any particular case). First, is the influence exerted, directly or indirectly, by a group's ideology, since ideology is a key – if not *the* key – behavioral driver of extremist groups. A group's ideology, by explicitly providing impetus and boundaries for the group's actions, essentially establishes the outside range of what means are possible to utilize in its attacks, as well as the scale of attack that can be justified under the group's internal moral calculus. Furthermore, in some cases, the ideology itself might push the group's weapons selection decision in a particular direction (more detail on these dynamics will be provided below). For example, the ideology of certain organizations may explicitly inhibit them, whether for moral or arcane doctrinal reasons, from carrying out attacks that are likely to cause mass, indiscriminate casualties. This is true, for example, of less radical eco-terrorist groups which are also likely to be opposed to contaminating the environment. On the other hand, groups such as Aum Shinrikyō, that embrace an ideology that “sanctifies” or “fetishizes” the development and utilization of innovative, high technology or unconventional weapons, are arguably far more likely to try to acquire, develop, and deploy CB weapons rather than to rely solely or even primarily on more conventional weapons.<sup>78</sup>

The second, major factor in weapons selection, which further limits the range of weapons to be considered, is obviously related to the specific operational objective(s) that a violent non-state group is pursuing. Within the broader constraints of what is ideologically permissible, for a given set of operational objectives, certain types of weapons will be viewed as more suitable than others in helping the group to achieve its goals. For example, if a particular organization is primarily interested in causing mass casualties, it is more likely to make use of powerful explosive devices than daggers or pistols. If, on the other hand, an organization wishes to limit the harm or damage it does to specific individuals, it is much more likely to have recourse to a weapon that can wound or eliminate the selected target without

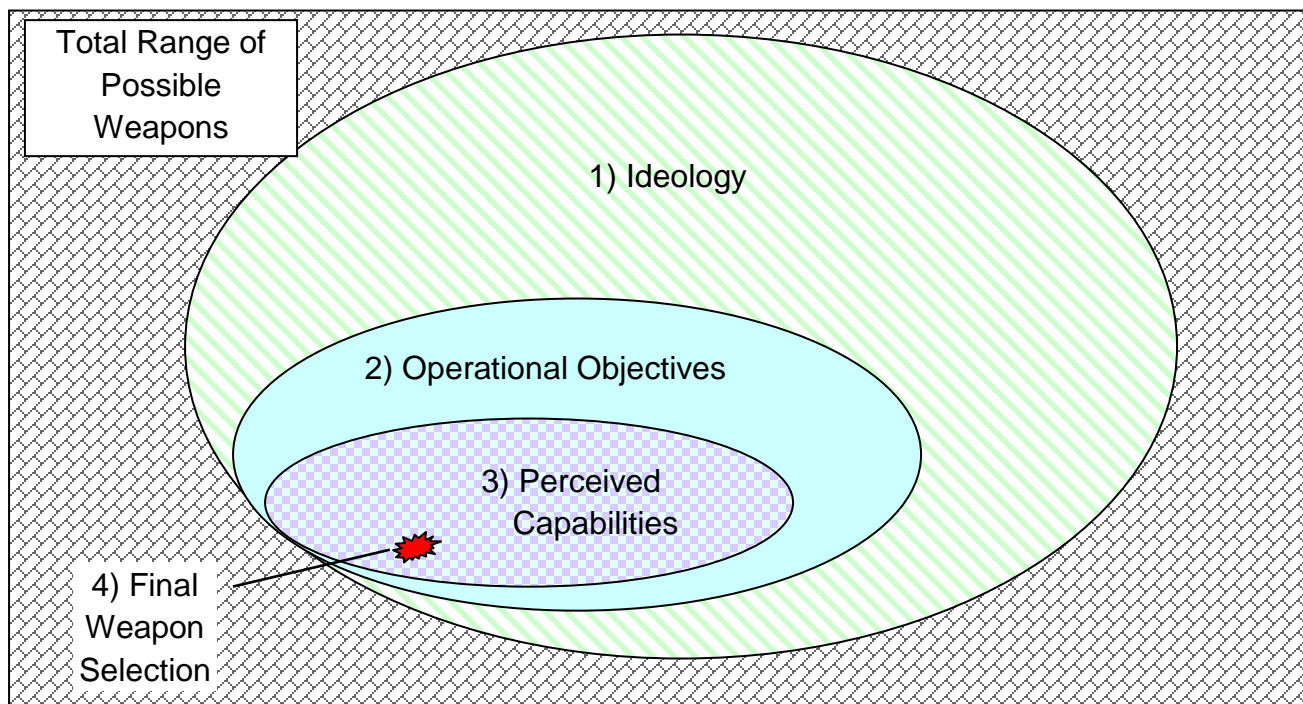
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<sup>78</sup> Cf. James J. F. Forest, “Opportunities and Limitations for WMD Terrorism,” in *Weapons of Mass Destruction and Terrorism*, 2<sup>nd</sup> edition, ed. James Forest and Russell Howard (New York City, NY: McGraw-Hill, 2012), esp. 59-60 (in a subsection entitled “The Centrality of Ideology in WMD Threat Analysis”). See also Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York: Routledge, 2007), 16-17, who rightly highlights the importance of the “expressive” (e.g., historically-, culturally-, ideologically-, psychologically-, and/or emotionally-based) attachment of certain terrorist groups to particular weapons for reasons that are largely non-rational or, at best, only partly rational.

causing indiscriminate casualties or other types of “collateral damage.” Furthermore, part of the consideration at this stage will likely involve the operational characteristics of the intended target (such as the degree of protection, whether it is an enclosed space, etc.), which in some, but by no means all, cases will be selected prior to the weapon. At this stage, pragmatism becomes prominent in the selection of weapons.

At this point the group will consider which of these weapons can feasibly be successfully obtained and employed, given its own operational capabilities. After that determination has been made, a final weapon will be selected and, taking into account information on the target, counterterrorism forces, and so forth, the group will develop a specific plan of weapons acquisition and operational employment.<sup>79</sup>

**Figure 2.1. Terrorist Weapon Selection Process (Progressive Restriction of the Weapon Range)**



Obviously, this is a highly schematic overview of the general process for selecting weapons, targets, and the methods for attacking them, many phases of which are in fact likely carried out simultaneously. Moreover, in some instances, certain phases will be telescoped or eliminated altogether, and there are also no doubt many cases in which such decisions are made in a far more impulsive and haphazard manner. All of these processes will be heavily influenced in particular cases both by the nature of the group and its internal dynamics, above all the characteristics of its leaders and their style and method of

<sup>79</sup> A similar scheme was first developed and elaborated by a Monterey Institute research team headed by myself and Gary Ackerman, specifically in connection with a project designed to assess terrorist motivations for targeting and attacking Critical Infrastructure in the United States.

making decisions, as well as by external factors such as changes in the security environment, the group's links with other actors whose assistance may be necessary, and a variety of other factors. In short, in the "real world" there are many possible paths that may lead from a group's ideological proclivities to its determination of operational objectives to its final selection of weapons and tactics, but these can only be determined with more specificity after in-depth qualitative studies of particular groups have been carried out (as done in Phase II of the current project).

## Operational Objectives for Employing Chemical or Biological Weapons

### 1. **Inflicting Mass Casualties** [*Chemical and Biological, depending upon how one defines "mass casualties"*]

The most obvious motive, and the one that many non-specialists and casual observers seem to think is the only one, is a desire to inflict mass casualties on declared enemies. Certainly, VNSAs that wish to kill large numbers of people might well be interested in acquiring or deploying CB agents insofar as they believe – rightly or wrongly – that such weapons will enable them to accomplish this goal.<sup>80</sup> Indeed, since more and more information about the fabrication of such weapons is becoming available to members of the public, including would-be terrorists, and since "new" types of violent non-state groups increasingly seem to be interested in carrying out mass casualty attacks, some observers have assumed that this will lead them to deploy chemical, biological, radiological, or nuclear weapons in acts of mass casualty terrorism, properly speaking.<sup>81</sup>

There are, however, serious theoretical and practical problems with this assumption, which suggest that this potential transition is anything but inevitable, even apart from the difficulties involved in overcoming technical hurdles or the residual reluctance to transgress long-standing moral taboos.<sup>82</sup> The theoretical problem has to do with scale, specifically how the term "mass casualty" is defined and delimited. Exactly how many people – dozens, hundreds, thousands, tens of thousands, hundreds of thousands, or millions – actually have to be killed or injured for an incident to fall into the "mass casualty" category?<sup>83</sup> The practical problem, which is only tangentially related to how the term itself

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<sup>80</sup> Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles' Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, MA: MIT Press, 1998), 205-6.

<sup>81</sup> Richard A. Falkenrath, "Confronting Nuclear, Biological and Chemical Terrorism," *Survival* 40:3 (Autumn 1998), 53. Compare also Joseph W. Foxell, Jr., "The Debate on the Potential for Mass-Casualty Terrorism: The Challenge to U.S. Security," *Terrorism and Political Violence* 11:1 (Spring 1999), 96, who argues that "mass-destruction terrorism may rapidly become the predominant form of sociopolitical violence in the twenty-first century" and describes "mass-destructive-capability weapons" as "quintessential devices of terror" able to visit "apocalyptic [sic] devastation" that could result in civilian deaths on an "unprecedented" scale; as well as the remarks of Francis H. Marlo, "WMD Terrorism and U.S. Intelligence Collection," *Terrorism and Political Violence* 11:3 (Autumn 1999), 55: "the increasing willingness to engage in mass murder makes terrorists more likely to consider WMD as usable and even preferable to conventional explosives and other traditional terrorist weaponry."

<sup>82</sup> The allusion to "long-standing moral taboos" here refers to the fact that members of many types of extremist groups, like most other people, have historically believed that carrying out attacks with CBRN materials is "beyond the pale," morally speaking. See the discussion below about (most) ethno-nationalist, secular left-wing, and secular right-wing terrorist groups.

<sup>83</sup> Gavin Cameron, "WMD Terrorism in the United States: The Threat and Possible Countermeasures," *Nonproliferation Review* 7:1 (Spring 2000), 163-4. One attempt at definition, albeit of "mass destruction terrorism" rather than "mass casualty terrorism," has been made by Joseph W. Foxell, Jr., "The Debate on the Potential for Mass-Casualty Terrorism: The Challenge to

ends up being defined and delimited by scholars and policymakers, is whether violence-prone groups really need to have recourse to chemical or biological weapons in order to generate “mass casualties,” i.e., relatively large numbers of casualties.

If VNSAs are satisfied with killing “only” dozens or hundreds of people, they will likely find it both easier and less risky to continue employing powerful conventional weapons (perhaps including military-grade explosives) to carry out effective “mass casualty” attacks.<sup>84</sup> Viewed from this perspective, the bombings of the Alfred P. Murrah Federal Building in Oklahoma City by Timothy McVeigh and of the tourist-friendly nightclubs in Bali by Jemaah Islamiyah, not to mention the 9/11 attacks and March 11, 2004, train bombings in Madrid by mainly Moroccan operatives who had links, at least indirectly, to individuals associated with al-Qā’ida, can be classified as acts of “mass casualty terrorism” even though they did not involve the use of “WMD.”<sup>85</sup> On the other hand, if terrorists hope to kill hundreds of thousands or millions of people, they will almost certainly be motivated to acquire and use certain WMD. Yet it is important to emphasize once again that certain types of weapons that have traditionally been categorized as “WMD,” specifically chemical agents and radiological materials, would not enable them to cause nearly that many casualties, even under optimal conditions. For the purposes of this discussion, any VNSA aiming at the wholesale murder of designated enemies would have to acquire and properly disseminate lethal and preferably highly contagious biological pathogens, an action that has the theoretical potential to kill millions but is fortunately also exceedingly difficult to carry out.<sup>86</sup> In sum, even if a particular VNSA was fixated on carrying out the kind of attacks that could produce relatively high death tolls, this would not automatically mean that it would seek to obtain and use CB weapons.<sup>87</sup>

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U.S. Security,” *Terrorism and Political Violence* 11:1 (Spring 1999), 98: “mass-scale violence purposed [sic] to cause immense death tolls enacted through use of weapons capable of killing or sickening large numbers *en masse*.” Yet even he is vague about what “large numbers” might be.

<sup>84</sup> Compare Arpad Palfy, “Weapon System Selection and Mass-Casualty Terrorism,” *Terrorism and Political Violence* 15:2 (Summer 2003), 82: “the use of unconventional [CBRN] weapons is largely dependent on the terrorists’ desired mission outcome...missions *specifically* seeking to cause large amounts of casualties, even if only as a means to a desired end, will tend to employ weapons of a more conventional nature, though will perhaps do so in more elaborate ways. Conversely, terrorist missions seeking to disrupt, intimidate, or otherwise interrupt the regular functioning of a state, *irrespective* of total casualties and fatalities produced, may be tempted to employ chemical or biological-type weapons.” One reason for the common terrorist preference for using conventional explosives in mass casualty attacks – in addition to their proven power and effectiveness – is that “most, if not all, terrorist operations require a level of simplicity and cleverness as far from the maximum threshold of complexity as possible in order to achieve the desired outcomes.” Arpad Palfy, “Weapon System Selection and Mass-Casualty Terrorism,” *Terrorism and Political Violence* 15:2 (Summer 2003), 87.

<sup>85</sup> Compare Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *Nonproliferation Review* 7:1 (Spring 2000), 164. For the Madrid bombings, see Jeffrey M. Bale, *Jihadist Cells and I.E.D. Capabilities in Europe: Assessing the Present and Future Threat to the West* (Carlisle Barracks, PA: United States Army War College – Strategic Studies Institute, 2012), 49-109.

<sup>86</sup> Indeed, if the high casualty figures resulting from an attack – or that could potentially result from an attack – are the sole criteria for identifying them as acts of “WMD terrorism,” then “terrorist attacks using non-conventional [CBR] weapons are not necessarily examples of WMD terrorism. NBC materials do not equate to WMD...It is not the material used, but whether it has been turned into a weapon that could be used effectively to kill many people, that makes the difference.” See Jeffrey M. Bale, *Jihadist Cells and I.E.D. Capabilities in Europe: Assessing the Present and Future Threat to the West* (Carlisle Barracks, PA: United States Army War College – Strategic Studies Institute, 2012).

<sup>87</sup> However, as Gurr and Cole rightly emphasize in Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), 90, large-scale (or mass casualty) attacks are not necessarily

## 2. Psychological Impact [*Chemical and Biological*]

The most important single factor that would arguably motivate terrorists – in the strictest sense of that term – to employ CB weapons is a desire to exert a tremendous psychological impact on one or more target audiences, perhaps including both their enemies, who would be stunned if not cowed, and their supporters, who would be impressed if not inspired.<sup>88</sup> It has been suggested above that if causing mass casualties and/or extensive physical destruction is their sole aim, terrorists may well recognize that conventional terrorist attacks can be every bit as destructive and devastating as chemical and biological attacks, if not more so. (The only clear exception would be the successful detonation of an actual nuclear device.) In such a case, they would not necessarily see any particular advantage in employing these types of materials. But if the primary aim of particular non-state actors is to traumatize a wider target audience (or multiple audiences) psychologically, they are likely to prefer using such unconventional (CB) materials, provided that they have the technical capacity to do so and that the costs that they might incur as a result are not too great. Why? Because only the most spectacular conventional attacks, like those of 9/11, would be likely to have the same emotional impact as even a moderately effective smaller-scale chemical, biological or radiological attack. Due to the lay public's primal fears of contamination and infection from unseen agents, such an unconventional attack that "only" caused dozens of deaths would probably have a more traumatic and terrifying impact than a conventional terrorist attack that killed hundreds.<sup>89</sup> This is certainly the lesson of both the Aum Shinrikyō case, which attracted inordinate attention due to the group's interest in WMD and use of chemical agents, and the 2001 *B. anthracis* letter mailing incidents in the United States. Indeed, given the growing frequency of mass casualty Islamist terrorist bombings, it could be argued that only conventional attacks that result in thousands of deaths will nowadays be likely to have the same psychological *frisson* as successful acts of chemical and biological terrorism, whatever their scale. In that sense CB weapons of all types are almost ideally suited for terrorism

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"indiscriminate," just as smaller-scale attacks are not necessarily "discriminate." For example, the bombings of the U.S. Marine base in Beirut by a Hizballāh front group and the Oklahoma City federal building by McVeigh were both large-scale conventional attacks that were very costly in human lives, but they were quite discriminate insofar as their selection as targets was concerned. After all, the Marines were viewed as "occupying" foreign military personnel, whereas the employees working in the Murrah building were mainly government officials who allegedly served the interests of the anti-American "New World Order." Conversely, if a gunman enters an airport and starts shooting people randomly, that would be a small-scale but "indiscriminate" attack.

<sup>88</sup> Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles' Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, MA: MIT Press, 1998), 206-7; Gordon H. McCormick, "Terrorist Decision Making," *Annual Reviews in Political Science* 6 (2003), 479-80; David Claridge, "Exploding the Myths of Superterrorism," *Terrorism and Political Violence* 11:4 (Winter 1999), 141; Douglass and Livingstone, *America the Vulnerable*, 15-16. This type of action falls under the category of "propaganda" in the analysis of Gurr and Cole in Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), 98-100.

<sup>89</sup> See also the remarks of Jonathan B. Tucker and Amy Sands, "An Unlikely Threat," *Bulletin of the Atomic Scientists* 55:4 (July-August 1999), 49. They also highlight some of the reasons for this disproportionate psychological impact: "[CB weapons] are generally invisible, odorless, tasteless, silent, and insidious," and as a result they tend to "evoke deep human anxieties and instill a qualitatively different type of terror" than, say, cathartic explosions. Compare Richard A. Falkenrath, "Confronting Nuclear, Biological and Chemical Terrorism," *Survival* 40:3 (Autumn 1998), 49. In addition to triggering a "panic incommensurate with the real effects of the weapons," he also lists six other supposed "general consequences" of a major NBC attack: massive casualties, contamination, degraded response capabilities, economic damage, loss of strategic position, and social-psychological damage resulting in political changes.

proper, since their employment is almost guaranteed to exert a profound effect on the psyches of those wider audiences that terrorists are by definition trying to influence with their violent acts.

### 3. **Assassination** [*Chemical and Biological*]

VNSAs, like states, might decide to employ chemical and biological materials to carry out assassinations, which are by definition narrowly targeted, highly selective murders that fall on the opposite end of the spectrum from “mass casualty attacks.” As noted above, most of the prior uses of bona fide chemical, biological have involved efforts to poison one or more individuals.<sup>90</sup> In that sense, far from being used primarily to inflict large numbers of casualties in catastrophic attacks, these types of “WMD” have thus far generally been deployed in tactical or discrete attacks to achieve far more limited and practical effects.<sup>91</sup> Moreover, as Jean Pascal Zanders has noted, many of the past cases of poisoning with such materials can more accurately be “classified as attempts at homicide, suicide, or criminal extortion motivated by financial rather than political gain.”<sup>92</sup> To financial gain one should also add personal animosities and other idiosyncratic individual motives. Attributes of these weapons that make them especially useful for assassination purposes include high toxicity / infectiousness (enabling a smaller delivery package); latency in symptoms (allowing for perpetrators to distance themselves in time and space from victims); and the fact that the effects of some of these agents might be attributed to natural causes (permitting the potential for obscuring the fact of assassination).

### 4. **Incapacitation** [*Chemical and Biological*]

Chemical and biological materials might also be used for the purpose of incapacitating people rather than killing them. One illustrative example in the biological area of previous attempts to incapacitate involved the Rajneesh cult, which used *Salmonella typhimurium* bacteria in an effort to prevent non-members from voting in an upcoming local Oregon election.<sup>93</sup>

### 5. **Contamination and Area Denial** [*Chemical and Biological*]

Apart from the above primary motives or objectives, there are a number of subsidiary operational factors that might cause terrorists to utilize CB weapons. A non-state group may wish to contaminate key areas or facilities, including those which are widely regarded as vital to the normal functioning of a given nation’s “critical infrastructure,” including its economy and political system.<sup>94</sup> Certain highly

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<sup>90</sup> For prior examples, see Alex P. Schmid, “Chemical Terrorism: Precedents and Prospects,” *Synthesis* (Summer 2001), electronic 1, at [www.opcw.org/synthesis/html/s6/p9prt.html](http://www.opcw.org/synthesis/html/s6/p9prt.html) : “the use of the term ‘weapons of mass destruction’ is misleading, since what takes place with such chemical and biological agents has been mostly individual murder by poisoning, or a few killings with a substance that could also be a weapon of mass destruction if used to its full potential.”

<sup>91</sup> Jonathan B. Tucker, “Lessons from the Case Studies,” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 267.

<sup>92</sup> Jean Pascal Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists,” *Nonproliferation Review* 6:4 (Autumn 1999), 19.

<sup>93</sup> Jonathan B. Tucker and Amy Sands, “An Unlikely Threat,” *Bulletin of the Atomic Scientists* 55:4 (July-August 1999), 50. For this case, see further W. Seth Carus, “The Rajneeshees (1984),” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 115-38.

<sup>94</sup> Richard A. Falkenrath, “Confronting Nuclear, Biological and Chemical Terrorism,” *Survival* 40:3 (Autumn 1998), 49, where both “contamination” and “economic damage” are listed, albeit separately, as being among the consequences of a WMD



toxic and persistent chemical and biological agents, such as VX and *Bacillus anthracis*, are particularly well suited to the accomplishment of such an objective.

6. **Ease of Covert Delivery and Delayed Effects:** [*Chemical and Biological*]

A VNSA might decide to deploy chemical and biological materials because they are especially well suited for covert delivery.<sup>95</sup> For example, a small container of such materials can easily be transported to a crowded location, hidden in a trash container or placed under a seat, and then activated or opened so that the substance inside will be released. If the bearer has been provided with certain protections beforehand, he or she can then probably depart unnoticed and safely escape. Moreover, in the case of a biological agent whose harmful effects will not manifest themselves for hours or even days, the escape of its bearer will be virtually assured, long before any symptoms of disease appear. Indeed, a sudden outbreak of various diseases may well be initially regarded as accidental by medical personnel, thereby enabling the perpetrators and/or their covert sponsors to maintain “plausible deniability” – assuming that they actually want to keep their involvement secret instead of boasting about their spectacular unconventional attack.<sup>96</sup>

7. **Ease of Acquisition** [*Chemical (and Biological?)*]

Finally, various toxic chemical agents are relatively easy and inexpensive to acquire, since they can be purchased from agricultural suppliers or easily stolen from various publicly accessible facilities.<sup>97</sup> In the words of Jonathan B. Tucker, “hazardous chemicals are ubiquitous in modern industrial society and hence are more accessible to terrorists than either biological or fissile materials.”<sup>98</sup> Indeed, thus far the most frequently used CB materials by terrorists have been “off-the-shelf” household or industrial chemicals like cyanides and butyric acid, and other experts have noted that the acquisition and use of toxic industrial chemicals (TICs) – such as anhydrous ammonia, chlorine, hydrogen fluoride, or phosgene – “may represent the most effective method for [terrorist] groups to obtain a chemical weapon capability”, as opposed to stealing or synthesizing military-grade chemical warfare agents.<sup>99</sup> Some analysts have also argued that it is still not difficult enough for would-be terrorists to

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terrorist attack. This scheme has been accepted but embellished by Gurr and Cole in Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), 83-5.

<sup>95</sup> Richard A. Falkenrath, “Confronting Nuclear, Biological and Chemical Terrorism,” *Survival* 40:3 (Autumn 1998), 46; Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America’s Achilles’ Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, MA: MIT, 1998), 138-44; Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *Nonproliferation Review* 7:1 (Spring 2000), 166; Jonathan B. Tucker and Amy Sands, “An Unlikely Threat,” *Bulletin of the Atomic Scientists* 55:4 (July-August 1999), 50.

<sup>96</sup> Jonathan B. Tucker and Amy Sands, “An Unlikely Threat,” *Bulletin of the Atomic Scientists* 55:4 (July-August 1999), 50. However, they rightly point out that such a delay might be viewed as a disadvantage by other terrorists, since it may lessen the psychological impact of their attack.

<sup>97</sup> David Claridge, “Exploding the Myths of Superterrorism,” *Terrorism and Political Violence* 11:4 (Winter 1999), 141.

<sup>98</sup> Jonathan B. Tucker, “Chemical Terrorism: Assessing Threats and Responses,” in *Weapons of Mass Destruction and Terrorism*, 1<sup>st</sup> edition, ed. James Forest and Russell Howard (New York City, NY: McGraw-Hill, 2007), 98.

<sup>99</sup> See, respectively, Jonathan B. Tucker, “Chemical Terrorism: Assessing Threats and Responses,” in *Weapons of Mass Destruction and Terrorism*, 1<sup>st</sup> edition, ed. James Forest and Russell Howard (New York City, NY: McGraw-Hill, 2007), 102, wherein he adds that terrorists tend to rely on “equally low-tech” delivery systems for chemical attacks; and Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: CRC Press, 2009), 134-40 (the quote appears on 140).

obtain biological agent culture samples or hazardous bio-waste materials from laboratories or hospitals, especially if one is an employee of those institutions, a university student studying microbiology, a veterinarian, or someone who works for an outside company that may have a legitimate need and legal right to obtain them.<sup>100</sup>

## Ideological and Psychological Motivations for Employing Chemical or Biological Weapons

### 1. Motivational Indicators Deriving from Ideological Proclivities: Ethno-Nationalist, Left-Wing, and Right-Wing Groups

If one hopes to shed light on why certain types of terrorist groups might be more inclined to carry out chemical or biological attacks than others, it is probably useful to divide the postwar history of terrorism into 1) an earlier era dominated by secular (or at least secularized) political terrorist organizations demanding political independence or espousing utopian revolutionary ideologies, whether of the left or right; and 2) a more recent period in which religious terrorism, i.e., terrorism inspired by religious doctrines and theological imperatives, has come to the fore. During this latter period, “a surge of religious fanaticism has manifested itself in spectacular acts of terrorism all across the globe... [a] wave of violence that is unprecedented, not only in its scope and the selection of targets, but also in its lethality and indiscriminate character.”<sup>101</sup> It can be argued that the factors inhibiting or facilitating the use of chemical or biological materials differed somewhat, and in certain respects perhaps quite dramatically, during these two eras.

The first of these two periods, which lasted roughly from the early 1960s to the early 1980s, was dominated on the one hand by ethno-nationalist terrorism and on the other by ideological left- and right-wing terrorism. For practical and/or ethical reasons, these types of groups were generally less likely to resort to chemical or biological terrorism than were insular or transnational groups of religious extremists.

As far as traditional ethno-nationalist groups are concerned, there are two factors that seem to have especially militated against their use of such weapons:

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<sup>100</sup> Cf. Cheryl Loeb, “Jihadists and Biological and Toxin Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: CRC Press, 2009), 164; and Christina Hellmich and Amanda J. Redig, “The question is when: the ideology of Al Qaeda and the reality of bioterrorism,” *Studies in Conflict and Terrorism*, 30 (5), 385-9, for a more extended discussion of these problems.

<sup>101</sup> Magnus Ranstorp, “Terrorism in the Name of Religion,” *Journal of International Affairs* 50:1 (Summer 1996), 43. Of course, as David Rapoport and many others have pointed out – see, e.g., David C. Rapoport, “Fear and Trembling: Terrorism in Three Religious Traditions,” *American Political Science Review* 78:3 (September 1984), 658-77 – religious motivations had long served as the primary inspiration for terrorism, and in that sense their recent flowering in virulent new guises is only surprising insofar as they have partially displaced secular motivations that were once thought to have signaled the decline of religiosity. Alas, since the mid-1970s there has been an unanticipated resurgence of religiosity in many parts of the world. See especially Gilles Kepel, *The Revenge of God: The Resurgence of Islam, Christianity and Judaism in the Modern World* (University Park: Pennsylvania State University, 1994). For case studies illustrating this phenomenon, see David Westerlund, ed., *Questioning the Secular State: The Worldwide Resurgence of Religion in Politics* (London: Hurst, 1996).

- they tended to operate within a delimited geographical sphere, a relatively vulnerable piece of territory occupied by their ethnic confreres, who might thereafter have been subjected to harsh retaliatory measures by those they attacked in this way; and
- they generally hoped to elicit broader international support for their independence struggles or their collective efforts to redress legitimate grievances, support that would have been likely to erode significantly had they crossed the so-called WMD threshold.

One may object that ethnic hatreds (especially those infused with religious sectarianism) often lead to the commission of atrocities against designated “out-groups,” that there are several instances of ethno-nationalist terrorist groups carrying out or threatening to carry out CB attacks,<sup>102</sup> and that a number of such groups, including radical factions of the PLO and IRA, were not dissuaded from conducting other types of cold-blooded, brutal actions that proved to be counterproductive in the sense that they shocked the sensibilities of potential international sympathizers, if not always their own constituents. But such cases involving “WMD” have nonetheless been relatively rare.

As for Cold War-era ideological terrorist groups, similar desires to elicit broader international support and sympathy for their causes may well have served as a brake on their commission of acts of chemical or biological terrorism. Here a distinction should probably be drawn between far left groups that embraced Marxist or anarchist doctrines, and “far right” groups that adhered to neo-fascist or neo-Nazi doctrines,<sup>103</sup> even though all four fall into the category of utopian revolutionary ideologies with quasi-religious characteristics.<sup>104</sup> The former generally targeted specific “class enemies” or representatives of the

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<sup>102</sup> One such case involving the Tamil Tigers has been briefly discussed by John Parachini, “Putting WMD Terrorism into Perspective,” *Washington Quarterly* 26:4 (Autumn 2003), 43-4. Several other cases can be found in START’s POICN database.

<sup>103</sup> Here we are using the term “far right” merely for the sake of convenience and in order to avoid unnecessary confusion, even though fascism (and, to a lesser extent, its atypical, race-obsessed Hitlerian Nazi variant) was in actuality an outgrowth of turn-of-the-century attempts by an odd assortment of disillusioned revolutionaries and radicals to conjoin particular European intellectual currents from both the right and the left, specifically radical nationalism and non-Marxist socialism, and thereby create a new type of revolutionary nationalist movement. See especially Eugen Weber, *Varieties of Fascism: Doctrines of Revolution in the Twentieth Century* (Princeton, NJ: Van Nostrand, 1964); and Zeev Sternhell, “Fascist Ideology,” in Walter Laqueur, ed., *Fascism: A Reader’s Guide. Analyses, Interpretations, Bibliography* (Berkeley: University of California, 1976), 325-406.

<sup>104</sup> In classes that I have taught over the years, I have often described communism and fascism as the “two great secular religions of the twentieth century,” by which I mean that they were able to elicit similar degrees of self-sacrifice among their followers, had pronounced ritualistic and ceremonial aspects, and were rooted in almost equally Manichean worldviews. Even so, these utopian secular revolutionary movements viewed the cataclysmic struggle between good and evil as something that was taking place solely on the material plane of this world, whereas religious movements view it, by definition, as a cosmic struggle that occurs both in this world and – that which is more important – on a higher spiritual plane. For the “cosmic” dimension of religious struggles, see Mark Juergensmeyer, *Terror in the Mind of God: The Global Rise of Religious Violence* (Berkeley: University of California Press, 2003), 148-66. Moreover, self-sacrifice becomes rather easier when one imagines that it will lead to immediate entry into an other-worldly paradise, which is why “martyrdom operations” in the form of acts of “suicide” terrorism are generally carried out by members of extremist religious groups (with the exception of the Tamil Tigers, whose suicide attacks were nonetheless also undergirded by Hindu religious values and reinforced by Hindu ceremonies and symbols, not to mention their cult-like leadership and internal dynamics). Alas, this failure to understand the real nature of the LTTE, together with other factual errors, problematic methodologies, and incomplete data sets, caused Robert Pape to produce some seriously misleading studies on suicide attacks, Robert Pape, *Dying to Win: The Strategic Logic of Suicide Terrorism* (New York: Random House, 2006); and Robert Pape, *Cutting the Fuse: The Explosion of Global Suicide Terrorism and How to Stop It*

“imperialist state of the multinationals,” claimed responsibility for their attacks, and eschewed “WMD” terrorism, whether for moral or purely instrumental political reasons. (Even so, one of their immediate objectives was to provoke state repression so as to awaken the “exploited masses” to the supposedly “fascist” nature of “bourgeois” pseudo-democratic states. It is thus hard to explain why they failed to recognize that conducting a CB attack would have been likely to generate just such an overreaction and crackdown by the authorities.<sup>105</sup>) In general their right-wing counterparts were less liable to claim responsibility and more likely to carry out mass casualty attacks (such as bombings of banks, public squares, commuter trains, and train stations), often in the context of covert “false flag” operations specifically designed to implicate the far left.<sup>106</sup> Despite this, they too rarely displayed any serious interest in CB terrorism.<sup>107</sup> These last remarks are clearly applicable to the veteran neo-fascist terrorists in Europe, but are not nearly as applicable to right-wing radicals elsewhere, who have often been driven by markedly less secular worldviews (e.g., idiosyncratic Christian paramilitary groups in the United States).

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(Chicago: University of Chicago, 2010). For a necessary corrective to Pape, cf. Farhad Khosrokhavar, *Suicide Bombers: Allah's New Martyrs* (London: Pluto Press, 2005); David Bukay, “The Religious Foundations of Suicide Bombings,” *Middle East Quarterly* 13:4 (Fall 2006), 27-36; David Cook and Olivia Allison, *Understanding and Addressing Suicide Attacks: The Faith and Politics of Martyrdom Operations* (Westport, CT: Praeger, 2007); Jonathan Fine, “Contrasting Secular and Religious Terrorism,” *Middle East Quarterly* 15:1 (Winter 2008), 59-69; and Gordon M. Hahn, “What Makes Russia's Jihadists So Dangerous,” Russia: Other Points of View website, April 28, 2010, available at <http://www.russiaotherpointsofview.com/2010/04/what-makes-russias-jihadists-so-dangerous.html>, a devastating rebuttal to the absurd article by Pape and two colleagues that appeared in the *New York Times* on March 31, 2010, “What Makes Chechen Women So Dangerous?”.

<sup>105</sup> Gurr and Cole refer to this cynical strategy of intentionally provoking state repression as “polarizing communities.” See Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), 89. There are two allegations involving the Rote Armee Fraktion (RAF) and CB agents, one in which they supposedly threatened to use stolen canisters of mustard agent against German cities, the other in which botulinum toxin was reportedly found in a makeshift laboratory at an RAF safe house in Paris, but both appear to have been untrue. For details see, respectively, David Claridge, “The Baader-Meinhof Gang (1975),” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 95-106; and Terence Taylor and Tim Trevan, “The Red Army Faction (1980),” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 106-13.

<sup>106</sup> The best illustration of this is provided by the terrorist “strategy of tension” in Italy, but similar tactics were also systematically employed by neo-fascist terrorists in Greece, the Iberian Peninsula, and parts of Latin America. For an overview, see Jeffrey M. Bale, “Terrorism, Right-Wing,” in Bernard A. Cook, ed., *Europe since 1945: An Encyclopedia* (New York: Garland, 2001), volume 2, 1238-40. For a scholarly English-language treatment of the “strategy of tension,” see especially Franco Ferraresi, *Threats to Democracy: The Radical Right in Italy after the War* (Princeton: Princeton University, 1996), especially chapters 4-6. For an insightful introduction to this oft-ignored but crucially important pattern of covert state manipulation of terrorism, see Philip Jenkins, *Images of Terror: What We Can and Can't Know about Terrorism* (Hawthorne, NY: Aldine de Gruyter, 2003), 87-109.

<sup>107</sup> The only case that we know of, which does not appear in any of the available listings of WMD terrorism incidents, was that of Eliodoro Pomar, a nuclear engineer and activist in an Italian neo-fascist terrorist group, the Movimento Politico Ordine Nuovo (MPON: New Order Political Movement), who hatched a plot in the early 1970s to contaminate Roman reservoirs with radioactive materials. See Gianni Flamini, *Il partito del golpe: Le strategie della tensione e del terrore dal primo centrosinistra organico al sequestro Moro* (Ferrara: Bovolenta, 1981-1985), volume 2. There is also another interesting case in Chile in which Eugenio Berríos, a military officer working for the Dirección de Inteligencia Nacional (DINA: Directorate of National Intelligence), the Chilean secret police, was reportedly manufacturing sarin at a DINA “safe house” then frequented by Italian neo-fascist terrorist Stefano delle Chiaie, the historic leader of Avanguardia Nazionale (AN: National Vanguard), and American DINA operative Michael Townley, who was later implicated in the Washington, DC Embassy Row assassination of Orlando Letelier, a former official in Salvador Allende's government. See Samuel Blixen, *El vientre del Cóndor: Del archivo del terror al caso Berríos* (Montevideo: Brecha, 1994), 25.

In sum, although it is true that there are a wide variety of internal and external factors that might cause secular terrorist groups to risk alienating their proclaimed constituencies and would-be sympathizers by perpetrating atrocities of one kind or other, such as a perceived need to demonstrate continued operational effectiveness, rally the spirits of disillusioned members and hardcore supporters, or teach a pointed lesson to their opponents, it is also the case that they previously considered – and will likely continue to consider – certain types of actions to be “beyond the pale,” whether for principled moral reasons or because their negative effects could far outweigh whatever tangible benefits the group might hope to gain from carrying them out. The use of CB weapons appears to have fallen into that “beyond the pale” category for most such groups, irrespective of their level of technical competence. This is because they tend to have a relatively rational understanding of cause-and-effect relationships, more limited immediate political objectives (at times), and an acute sensitivity to the impact of their actions on outside observers, however Manichean their worldviews or utopian their ultimate political goals may be. It is also the case that up until the 1980s few terrorist groups seem to have had sufficient technical knowledge or the type of specialized equipment required to initiate a successful chemical or biological attack, even if they had wished to do so.

## 2. Motivational Indicators Deriving from Ideological Proclivities: Religious Groups

As far as the “new” religious terrorists are concerned, sometimes similar and at other times radically different factors seem to have been involved thus far in inhibiting their deployment of chemical or biological weapons. For example, some analysts have suggested that religious terrorists “seek to appeal to no other constituency than themselves,” whereas others have instead argued that, rather than the particular group to which they belong, the primary “constituency” of violent religious groups is the god(s) they choose to worship and are seeking the favor of.<sup>108</sup> If certain religious groups carry out their violent actions solely in order to kill others, meet the solipsistic emotional needs of their own members, or only to please other-worldly deities, without regard to the effects of those actions on wider human audiences, they should not be described as terrorists at all, strictly speaking.<sup>109</sup> Such groups, given their seeming lack of concern about the psychological and practical effects of their actions in the profane world, are likely to be particularly dangerous precisely because they are more or less unconstrained by external forces.<sup>110</sup>

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<sup>108</sup> Bruce Hoffman, *Inside Terrorism* (New York: Columbia University, 1998), 95; Brian M Jenkins, “Understanding the Link between Motives and Methods,” in *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses* (Alexandria, VA: Chemical and Biological Arms Control Institute, 1997), 48.

<sup>109</sup> It could conceivably be argued that if religious extremists carry out acts of violence specifically to influence the perceptions and behavior of other-worldly entities, then this too could technically fall into the category of terrorism. However, this circumstance is better viewed as a violent attempt to propitiate or curry the favor of supernatural entities whose very existence cannot be proven, much like human sacrifice. Since it does not by definition involve an attempt to influence the behavior and perceptions of human beings on the terrestrial plane, the term terrorism does not seem appropriate in this context.

<sup>110</sup> Indeed, Jackson argues in Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption,” *Studies in Conflict and Terrorism* 24:3 (May 2001), 190, that a group “seeking maximal destruction for the benefit of a divine audience would likely conclude [that highly destructive chemical or biological] weapons would be appropriate to their goals.”

Fortunately, most religious groups are at least partially concerned with events on the terrestrial plane,<sup>111</sup> and some may be as sensitive to the effects of their actions on wider audiences as secular terrorists. It is clear, for example, that a significant number of Islamist terrorists seek to convert other, less-committed Muslims to their own radical brand of Islam in the hopes of eventually recruiting new cohorts of dedicated fighters. In certain contexts, this has probably caused them to avoid carrying out various “beyond the pale” actions that would be likely to alienate a huge potential source of recruits. If, on the other hand, they fail to take cognizance of the alienating effects of their own actions, even on potential supporters, there are usually negative consequences. One excellent illustration of this can be observed in Algeria, where certain Islamist terrorists became so appalled by the Groupe Islamique Armé’s (GIA) systematic carrying out of atrocities that they broke away from that organization, formed their own rival group, the Groupe Salafiste pour la Prédication et le Combat (GSPC), and thence forged an alliance with al-Qā’ida.<sup>112</sup> Another example is the critical July 9, 2005 letter sent by al-Zawāhirī to Iraqi jihadist leader Abū Mus‘āb al-Zarqāwī because the latter’s brutal behavior towards and attacks against other Muslims was turning outraged Iraqis against al-Qā’ida’s local affiliate.<sup>113</sup>

In any event, the general consensus among experts seems to be that, given their sectarian religious worldviews, religious terrorists are more willing – and therefore likely – to violate traditional moral taboos against the use of chemical or biological weapons than their secular counterparts.<sup>114</sup> “To the

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<sup>111</sup> Compare John V. Parachini, “Comparing Motives and Outcomes of Mass Casualty Terrorism involving Conventional and Unconventional Weapons,” *Studies in Conflict and Terrorism* 24:5 (September 2001), 399, who points out that since “there is some evidence that some of the perpetrators of mass casualty violence do mix religion with other motivations, the charge that the new terrorism is predominantly religiously inspired overstates the case.” To illustrate this point, he cites the case of 1993 World Trade Center bomb-maker Ramzī Yūsuf, whose lack of religiosity was “conspicuous.” See John V. Parachini, “Comparing Motives and Outcomes of Mass Casualty Terrorism involving Conventional and Unconventional Weapons,” *Studies in Conflict and Terrorism* 24:5 (September 2001), 391-2. There is no doubt, however, that most Islamist terrorists are deeply and indeed fanatically religious, so much so that secularized Westerners typically find it difficult to comprehend their motivations or actions. See, e.g., Jeffrey M. Bale, “Jihadist Ideology and Strategy and the Possible Employment of ‘WMD,’” in Gary A. Ackerman and Jeremy Tamsett, eds., *Jihadists and Weapons of Mass Destruction* (New York: CTC Press, 2009), esp. 6-28; or Terry McDermott, *Perfect Soldiers. The 9/11 Hijackers: Who They Were, Why They Did It* (New York: Harper, 2006), 49 (for an interesting example). For more general perspectives rightly emphasizing, albeit at times idiosyncratically, the intrinsic fanaticism of most religious terrorists, cf. Laurent Murawiec, *The Mind of Jihad* (New York: Cambridge University Press, 2008); Neil J. Kressel, *Bad Faith: The Danger of Religious Extremism* (Amherst, NY: Prometheus Books, 2007); and Barry Cooper, *New Political Religions, or an Analysis of Modern Terrorism* (Columbia, MO: University of Missouri Press, 2005).

<sup>112</sup> See, e.g., Rohan Gunaratna, *Inside Al Qaeda: Global Network of Terror* (New York: Berkley, 2003), 183-6; and the more nuanced summary of Jason Burke, *Al-Qaeda: Casting a Shadow of Terror* (London: I. B. Tauris, 2003), 194-8. Indeed, there have long been serious internal disputes within the jihadist milieu over the permissibility of indiscriminately targeting civilians (especially but not exclusively Muslim civilians) and under what circumstances it is justifiable, disputes which have in recent years become even more acrimonious and divisive.

<sup>113</sup> See “Letter from al-Zawahiri to al-Zarqawi,” translation published on the Global Security website at [http://www.globalsecurity.org/security/library/report/2005/zawahiri-zarqawi-letter\\_9jul2005.htm](http://www.globalsecurity.org/security/library/report/2005/zawahiri-zarqawi-letter_9jul2005.htm).

<sup>114</sup> Hoffman, *Inside Terrorism*, p. 94; Bruce Hoffman, “Terrorism and WMD: Some Preliminary Hypotheses,” *Nonproliferation Review* 4:3 (Spring-Summer 1997), 45-50; Bruce Hoffman, “Holy Terror”: *The Implications of Terrorism Motivated by a Religious Imperative* (Santa Monica: RAND, 1993); Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *Nonproliferation Review* 7:1 (Spring 2000), 169-70; James K. Campbell, “On Not Understanding the Problem,” in *Hype or Reality?: The “New Terrorism” and Mass Casualty Attacks*, ed. Brad Roberts (Alexandria, VA: Chemical and Biological Arms Control Institute, 2000), 30-33; Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), 22-32, 126-48; Tucker, “Lessons from the Case Studies,” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), pp. 261-2; and Marlo, “WMD Terrorism and U.S. Intelligence Collection,” p. 55. One of the first studies to emphasize the greater WMD

extent that violent extremist groups are absolutely convinced that they are doing God's bidding, virtually any action that they decide to undertake can be justified, no matter how heinous, since the 'divine' ends are thought to justify the means."<sup>115</sup> This certainly does not mean, however, that every violence-prone group within the "religious" category is equally likely to perpetrate mass casualty attacks or have recourse to such weapons. On the contrary, many analysts have rightly emphasized the importance of recognizing key theological, historical, and cultural distinctions, not only between different religious traditions but also between diverse and often sectarian groups within those broader traditions.<sup>116</sup> For example, Gressang warns that

[t]he notion that a religious imperative offers a greater propensity for violence and a greater likelihood of WMD use is problematic, since religious motivation explanations may not explore the dynamic in sufficient depth. The resulting danger lies in the potential to overgeneralize and stereotype motivations. Emphasizing the religious imperative could also lead to the unintended incorporation of biases against differing religious orientations. We [might] assume the worst...based more on our interpretations of the group's core beliefs than their motives and outcome expectations.<sup>117</sup>

Other specialists have openly challenged this entire idea, in part because the historical record indicates that most CBRN terrorist plots were hatched by non-religious groups and in part because they view both secular terrorists and religious terrorists as equally rational actors.<sup>118</sup> However, we remain convinced

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dangers posed by religious terrorists in general and by cults in particular is that of David F. Ronfeldt and William Sater, *The Mindsets of High-Technology Terrorists: Future Implications from an Historical Analog* (Santa Monica: RAND, 1981). For both sides of the issue, see the heated debate engaged by Richard A. Falkenrath, "Confronting Nuclear, Biological and Chemical Terrorism," *Survival* 40:3 (Autumn 1998), 56-57. See Joseph F. Pilat, "Apocalypse Now- or Never?" in "WMD Terrorism: An Exchange," *Survival* 40:4 (Winter 1998-1999), 172-3, wherein Falkenrath's supposed depiction of religious terrorists as "unconstrained mass killers" is described as a "caricature"; and Falkenrath's reply in Richard A. Falkenrath, "Unknowable Threats, Prudent Policies," in "WMD Terrorism: An Exchange," *Survival* 40:4 (Winter 1998-1999), p. 181.

<sup>115</sup> Jeffrey M. Bale, "Islamism," in *Encyclopedia of Bioterrorism Defense*, ed. Richard F. Pilch and Raymond Zilinskas (New York: Wiley, 2005), 298. Compare Charles Selengut, *Sacred Fury: Understanding Religious Violence* (Walnut Creek, CA: AltaMira, 2003), 6-9; and Bruce Hoffman, "Holy Terror": *The Implications of Terrorism Motivated by a Religious Imperative* (Santa Monica, CA: RAND Corporation, 1993), 12.

<sup>116</sup> See Daniel S. Gressang IV, "Audience and Message: Assessing Terrorist WMD Potential," *Terrorism and Political Violence* 13:3 (Autumn 2001), 100-2, who among other things distinguishes between religious groups that are essentially calling for political and social change, despite their overheated theological rhetoric, and those who "call for destruction as a necessary precondition for achieving [their] objectives." For his part, Mark Juergensmeyer has sought to distinguish between "ethnic religious nationalism" and "ideological religious nationalism": the former "*politicizes* religion by employing religious identities for political ends," whereas the latter "*religionizes* politics [by putting] political issues and struggles within a sacred context." See Mark Juergensmeyer, "The Worldwide Rise of Religious Nationalism," *Journal of International Affairs* 50:1 (Summer 1996), 5. Many other more or less subtle distinctions can and have been made, justifiably or not, between different types of religious groups and their motivations. For an excellent example of the value of adopting a historically-grounded contextual approach to violent religious groups, see David C. Rapoport, "Fear and Trembling: Terrorism in Three Religious Traditions," *American Political Science Review* 78:3 (September 1984), which deals with three notorious pre-modern terrorist groups from entirely different religious traditions.

<sup>117</sup> Daniel S. Gressang IV, "Audience and Message: Assessing Terrorist WMD Potential," *Terrorism and Political Violence* 13:3 (Autumn 2001), 88.

<sup>118</sup> See esp. David C. Rapoport, "Terrorism and Weapons of the Apocalypse," *National Security Studies Quarterly* 6:3 (Summer 1999), 49-67. Cf. also Victor H. Asal and R. Karl Rethemeyer, "Islamist Use and Pursuit of CBRN Terrorism," *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: CRC Press, 2009), 352; Victor H. Asal,

that in the future religious terrorists are more likely to deploy such weapons than terrorists adhering to secular belief systems, no matter how radical these latter may be.

Certain types of religious groups seem to be much more prone than others to carrying out acts of catastrophic violence, with or without the use of “WMD.” In some cases this is mainly attributable to the content of their religious worldviews, whereas in others it is primarily a result of the authoritarian internal structures or dynamics of the group itself. In still other cases it is a product of both.

As far as religious beliefs are concerned, groups motivated by apocalyptic millenarian religious doctrines seem to be particularly dangerous, since such doctrines postulate: 1) the imminent destruction of the existing world order, which is viewed as thoroughly and irremediably “evil”; 2) a terrible fate for the majority of immoral, unenlightened people; 3) the playing of a key role by a select group of very special people – the true followers of the doctrine, namely, themselves – who will thus be spared the tragic fate of others; and 4) that the collapse of the existing order will usher in an “earthly paradise,” created by and for those same special people, which will be free of want, hardship, suffering, strife, oppression, immorality, and everything else that is “evil.”<sup>119</sup> Except in cases where they are persuaded to passively await the fulfillment of prophecy instead of taking any precipitant actions, the adherents of such doctrines may well be motivated to hasten the coming destruction of the existing world by carrying out extreme acts of violence against the “satanic” forces that now rule it. This was certainly the case with groups such as Aum Shinrikyō and the Covenant, the Sword, and the Arm of the Lord.<sup>120</sup>

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Gary Ackerman, and R. Karl Rethemeyer, “Connections can be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism* 35 (2012), 246; and Adam Dolnik, “All God’s Poisons: Re-evaluating the Threat of Religious Terrorism with Respect to Non-conventional Weapons,” in Russell D. Howard and Reid L. Sawyer, eds., *Terrorism and Counterterrorism: Understanding the New Security Environment* (Guilford, CT: McGraw-Hill, 2004), 159-77. However useful this argument downplaying religious fanaticism may be, both of the assumptions upon which it is based are open to challenge. If anything, the historical record indicates that Islamist groups (and certain other, even more apocalyptic religious groups) have been disproportionately interested in the pursuit of CBRN weapons, an interest which can hardly be ascribed primarily to factors such as “connectivity,” and it is hard to argue that terrorists motivated by beliefs in supernatural entities whose very existence cannot be proven are nonetheless every bit as “rational” as those who have a materialistic worldview (even if the former are still able to engage in effective operational planning, as they often are). Cf. Monica Duffy Toft, “Got Religion? The Puzzling Case of Islam and Civil War,” *International Security* 31 (2007), 100-1: “religion is based more on faith than on reason, and extremist religious beliefs are therefore relatively impervious to the kind of rational discourse and considered compromise that politics often affords.” This does not mean, of course, that analysts should overestimate the rationality of people who are not religious, especially non-religious extremists, as “rational choice” theorists so often do.

<sup>119</sup> Ted Daniels, ed., *A Doomsday Reader: Prophets, Predictors, and Hucksters of Salvation* (New York: New York University, 1999), 2. See further Jeffrey M. Bale, “Apocalyptic Millenarian Group Radiological and Nuclear Terrorism Threat Assessment,” unpublished report for DND, 2012. For an excellent historical analysis of apocalyptic millenarianism, see Norman Cohn, *The Pursuit of the Millennium: Revolutionary Millenarians and Mystical Anarchists of the Middle Ages* (New York: Oxford University, 1990).

<sup>120</sup> For the doctrinal motivations of these two groups, see Ian Reader, *Religious Violence in Contemporary Japan: The Case of Aum Shinrikyo* (Honolulu: University of Hawaii, 2000); Manabu Watanabe, “Religion and Violence in Japan Today: A Chronological and Doctrinal Analysis of Aum Shinrikyo,” *Terrorism and Political Violence* 10:4 (Winter 1998), 80-100; and Kerry Noble, *Tabernacle of Hate: Why They Bombed Oklahoma City* (Prescott, Ontario: Voyageur, 1998), a revealing insider account of the CSA. Perhaps not surprisingly, both groups planned and/or attempted to employ WMD against their “evil” enemies. See David E. Kaplan, “Aum Shinrikyo (1995),” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 207-26; Milton Leitenberg, “Aum Shinrikyo’s Efforts to Produce Biological Weapons: A Case Study in the Serial Propagation of Misinformation,” *Terrorism and Political Violence* 11:4 (Winter 1999), 149-58; and Jessica Eve Stern, “The Covenant, the Sword, and the Arm of the Lord (1985),” in *Toxic Terror: Assessing*



Second, religious communities whose members believe that they will absolve themselves of all their prior sins and immediately ascend to a heavenly paradise, or perhaps obtain certain other temporal or cosmic rewards, if they sacrifice themselves for their gods are also prone to carry out acts of extreme violence. This can easily lead to the commission of horrific acts of purifying violence, including “suicide” bombings, that the protagonists believe will lead to a full atonement for their earthly sins and the other-worldly rewards that follow therefrom. In the present era, for example, the absolute conviction that dying whilst waging jihad against infidels or apostates will result at once in ascension to Paradise, as opposed to spending time in the Muslim equivalent of Purgatory, has motivated dedicated members of both Sunnī and Shī‘ī Islamist groups to carry out martyrdom operations. In other instances, such as the case of Heaven’s Gate, the violence of the believers may instead be turned inward rather than directed outward against external enemies.<sup>121</sup>

On the other hand, religious organizations that are firmly ensconced within an exposed, vulnerable piece

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*Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 139-57. Yet it is also the case that Aum’s CB attacks were sometimes carried out for partially practical reasons, e.g., to eliminate external critics or former members, test delivery methods, and divert the attention of the authorities once a police crackdown on the group seemed imminent. Compare Schmid, “Chemical Terrorism,” electronic p. 3; Marlo, “WMD Terrorism and U.S. Intelligence Collection,” p. 56; and Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists,” 28.

<sup>121</sup> For more on Heaven’s Gate, see Robert W. Balch, “Bo and Peep: A Case Study of the Origins of Messianic Leadership,” in Roy Wallis, ed., *Millennialism and Charisma* (Belfast: Queen’s University, 1982), 13-72; Robert W. Balch, “Waiting for the Ships: Disillusionment and the Revitalization of Faith in Bo and Peep’s UFO Cult,” in James Lewis, ed., *The Gods Have Landed: New Religions from Other Worlds* (Albany, NY: SUNY, 1995), 137-66; Rodney Perkins and Forrest Jackson, *Cosmic Suicide: The Tragedy and Transcendence of Heaven’s Gate* (Dallas, TX: Pentaradial, 1997); Robert W. Balch and David Taylor, “Making Sense of the Heaven’s Gate Suicides,” in David G. Bromley and J. Gordon Melton, eds., *Cults, Religion, and Violence* (Cambridge and New York: Cambridge University, 2002), 209-29; and Christopher Partridge, “The Eschatology of Heaven’s Gate,” in Kenneth C. G. Newport and Crawford Gribben, eds., *Expecting the End: Millennialism in Social and Historical Context* (Waco, TX: Baylor University, 2006), 49-66. Sometimes the mass deaths of adherents of the People’s Temple and Ordre du Temple Solaire (OTS: Order of the Solar Temple) are misleadingly placed in this same category, but in both of those cases several group members were murdered outright and, at least in the former, other members were then forced at gunpoint to “commit suicide.” For an excellent introduction to the OTS, see John R. Hall and Philip D. Schuyler, “The Mystical Apocalypse of the Solar Temple,” in *Apocalypse Observed: Religious Movements and Violence in North America, Europe, and Japan*, ed. John R. Hall, Phillip D. Schuyler, and Sylvaine Trinh (London and New York: Routledge, 2000), 111-48. For empathetic if not sympathetic accounts, see Jean-François Mayer, *Les mythes du temple solaire* (Geneva: Georg, 1996); Jean-François Mayer and Elijah Siegler, “Our Terrestrial Journey is Coming to an End’: The Last Voyage of the Solar Temple,” *Nova Religio* 2:2 (April 1999), 172-96. For critical investigations, see Arnaud Bédard, Gilles Bouleau, and Bernard Nicolas, *L’Ordre du temple solaire: Les secrets d’une manipulation* (Paris: Flammarion, 2000); Jean-Luc Chaumeil, *L’affaire de la Ordre du temple solaire: Le dossier secret* (Benfield: ACM, 2001); and Rosemarie Jatton, *En quête de vérité: Ordre du temple solaire* (Geneva: Slatkine, 2000). For works emphasizing the intelligence and right-wing backgrounds of certain OTS founders and leaders, see Serge Caillet and Raymond Bernard, *L’Ordre rénové du temple: Aux racines du Temple solaire* (Paris: Dervy, 1997); and Renaud Marhic, *L’ordre du temple solaire: Enquête sur les extrémistes de l’occulte II* (Bordeaux: Horizon chimérique, 1996). Recently, conspiratorial interpretations suggesting that the murders were carried out at the behest of powerful political, financial, and criminal interests in France have appeared. As for Jonestown, I have yet to run across a study of the group that I consider entirely satisfactory, since most are overly sympathetic academic analyses, more or less sensationalistic journalistic treatments, or insider accounts by survivors. Among the more valuable books on the subject are Ken Levi, ed., *Violence and Religious Commitment: Implications of Jim Jones’s People’s Temple Movement* (University Park, PA: Pennsylvania State University, 1982); Judith Mary Weightman, *Making Sense of the Jonestown Suicides: A Sociological History of the People’s Temple* (Lewiston, NY: Edwin Mellen, 1983); Tom Reiterman and John Jacobs, *Raven: The Untold Story of Reverend Jim Jones and His People* (New York: Dutton, 1982); and Deborah Layton, *Seductive Poison: A Jonestown Survivor’s Story of Life and Death in the People’s Temple* (New York: Anchor, 1999).

of territory or actively engaged in a broader array of conventional political activities are probably less likely to risk their own complete destruction by carrying out an attack that would be likely to precipitate the most extreme forms of retaliation. However fanatical some of their cadre may be, it would be extremely risky for established Islamist groups like Hizballāh, HAMĀS, and al-Jihād al-Islāmī to engage in chemical or biological attacks, whether against Israel or the United States, since their entire lands could conceivably be occupied or physically destroyed in response.<sup>122</sup> In short, it may well be possible to deter such groups from carrying out CB attacks against democratic states in the same way that so-called “rogue regimes” occupying a fixed territory can be deterred from doing so. Nonetheless, this situation could quickly change if such groups felt that the time to launch a global jihad had arrived, that there was no possible way to achieve their goals using conventional measures, or that their very existence was threatened.

Moreover, these same restraining factors do not apply to certain other types of religious groups. First and foremost among these are transnational Islamist groups like al-Qā’ida, which are spread all over the globe and do not depend for their survival on their continued occupation or control of specific territories. This seems to be borne out by the fact that in recent years several leaders of al-Qā’ida and its affiliated groups have openly boasted of their intent to acquire and deploy “WMD.” For example, Usāma bin Lādin himself stated that acquiring weapons of all types, including nuclear weapons, was a Muslim “religious duty.”<sup>123</sup> Moreover, evidence found in al-Qā’ida camps in Afghanistan or obtained from certain captured members indicates that the group was interested in carrying out radiological terrorist attacks, acquiring and testing chemical agents, and planning to produce dangerous biological materials, including “Agent X” (i.e., *B. anthracis*), botulinum toxin, *Yersinia pestis*, and Hepatitis A and C.<sup>124</sup>

A second major category of religious (or, for that matter, political) organizations that are unlikely to be restrained by environmental factors are insular cult-like groups which seem to act largely on the basis of their own internal imperatives.<sup>125</sup> Although such groups typically view certain external occurrences as

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<sup>122</sup> Although Hizballāh did in fact carry out several mass casualty terrorist attacks against Western embassies and military bases inside Lebanon in the 1980s, which might easily have provoked a harsh retaliation, those attacks were made during an earlier phase of the organization’s development, when it was still largely a client group of the Sepāh-i Pasdārān (Guardians [of the Iranian Revolution] Corps). The more thoroughly that Hizballāh is integrated into mainstream Lebanese politics, the less likely it may be to carry out these types of attacks in the future, whether inside or outside of Lebanon.

<sup>123</sup> *Time*, December 24, 1998, transcript of interview with Usāma b. Lādin. For recent examples of jihadist support for the use of “WMD,” most notably the May 2003 *fatwā* issued by Saudi shaykh Nāsir ibn Hāmid al-Fahd and Abū Mūs’ab al-Sūrī’s 2004 and 2005 strategic analyses, see Reuven Paz, “Global Jihad and WMD: Between Martyrdom and Mass Destruction,” in Hillel Fradkin et al., eds., *Current Trends in Islamist Ideology, Volume 2* (Washington, DC: Hudson Institute, 2005), pp. 74-86; and Bale, “Jihadist Ideology and Strategy,” pp. 27-37. For specific allegations concerning al-Qā’ida’s purported acquisition of various types of “WMD,” see McCloud et al., “Chart: Al-Qā’ida’s WMD Activities.”

<sup>124</sup> For an excellent analysis of al-Qā’ida’s attitudes and capabilities with respect to “WMD,” see Sammy Salama and Lydia Hansell, “Does Intent Equal Capability?” *Nonproliferation Review* 12:3 (November 2005), 615-53. For its biological agent activities, see the critical summary by Milton Leitenberg, *Assessing the Biological Weapons and Bioterrorism Threat* (Carlisle, PA: U.S. Army War College, Strategic Studies Institute, 2005), 28-39. For the group’s chemical agent testing, see “Disturbing scenes of death show capability with chemical gas,” CNN, August 19, 2001.

<sup>125</sup> Nowadays, the use of the term “cult” is the subject of bitter controversy among scholars in the field of Religious Studies, in part because it has all too often been applied in an imprecise or partisan fashion. The best introduction to the polarizing controversies in this field is provided by Benjamin Zablocki and Thomas Robbins, eds., *Misunderstanding Cults: Searching for Objectivity in a Controversial Field* (Toronto: University of Toronto Press, 2001). In order to avoid unnecessary terminological

signs and portents of future cosmic events that have been foretold by their leaders, and are likely to become even more paranoid and apocalyptic in response to any sign of hostility from mainstream society or repressive actions taken by the state, their actions often seem ultimately to be the products of a combination of idiosyncratic theological conceptions and authoritarian intragroup dynamics that may have little or nothing to do with specific developments in the outside world. Hence it should come as no surprise to discover that these types of groups are often responsible for carrying out sudden acts of horrific violence that seem to be triggered primarily by internal processes or mechanisms. Such was apparently the case with the Ordre du Temple Solaire (OTS: Order of the Solar Temple) in Switzerland and Quebec and the Movement for the Restoration of the Ten Commandments of God in Uganda.

In sum, there is not necessarily any direct correlation between religious extremism and a particular terrorist group's decision to employ chemical or biological weapons, much less any automatic relationship between the two. Many other factors are also undoubtedly involved, so the most that can be said is that under certain circumstances religious extremism can be a very important contributory factor in permitting a group to rationalize its acquisition, development, or use of "WMD."

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confusion, a "religious cult" can be defined, in the strict sense of the term, as any religious organization which systematically employs well-known techniques of coercive persuasion, irrespective of the precise nature of its theological doctrines. When it comes to assessing whether particular small-scale social organizations, non-mainstream or otherwise, are bona fide cults, or whether they merely display certain cult-like features, all one needs to do is pay careful attention to their internal social control mechanisms and authority structures. This is not all that hard to do as long as one remains skeptical about the claims of leaders and true believers, is allowed to conduct fieldwork or at least observe the group for a time, is able to obtain detailed inside information from present and former members, and knows what telltale signs to look for. The following can all be viewed as warning signs of coercive persuasion:

- a) selective recruitment of psychologically vulnerable targets
- b) initial deception concerning group affiliation and purposes
- c) application of extreme and often degrading forms of peer group pressure, including forced public "confessions"
- d) ongoing isolation from mainstream society (especially relatives and friends) at retreats
- e) sensory overload
- f) sleep and protein deprivation
- g) constant surveillance or enforced lack of privacy
- h) exploitation of labor (12-16 hour work days)
- i) confiscation of personal assets
- j) intense ideological indoctrination
- k) sexual exploitation
- l) physical abuse and imprisonment
- m) authoritarian forms of charismatic leadership

Religious, therapeutic, political, or hybrid groups that possess all or most of these characteristics can legitimately be categorized as thought reform cults, whereas those that exhibit only a few of these traits can perhaps best be described as "cult-like" or potentially "cultic." To portray religious groups with these characteristics as nothing more than "harmless" alternative religions and "innocent" victims of religious persecution defies all logic. The above remarks originally appeared in Jeffrey M. Bale, "The Cult Wars, Part I," *Hit List* 2:4 (January-February 2001). One of the few works devoted exclusively to "political cults" is that of Dennis Tourish and Tim Wohlforth, *On the Edge: Political Cults Right and Left* (Armonk, NY: M. E. Sharpe, 2000). For three insider accounts of political cults, see Amy B. Siskind, *The Sullivan Institute/Fourth Wall Community: The Relationship of Radical Individualism and Authoritarianism* (Westport, CT: Praeger, 2003); Alexandra Stein, *Inside Out: A Memoir of Entering and Breaking Out of a Minneapolis Political Cult* (St. Cloud, MN: North Star, 2002); and Janja Lalich, *Bounded Choice: True Believers and Charismatic Cults* (Berkeley: University of California, 2004).

### 3. Motivational Indicators Deriving from Ideological Proclivities: Assorted Single-Issue Groups, Lone Actors, and Techno-Fetishists

Moreover, there are also other types of VNSA that might be attracted to using chemical or biological weapons. Some analysts have singled out groups bent on revenge, assorted right-wing extremists, ad hoc groups of like-minded people, and disturbed lone individuals as being especially prone to adopt such weapons.<sup>126</sup> Furthermore, terrorist organizations with scientific and technological pretensions or fetishes might be more apt to employ high-tech weapons, including “WMD,” assuming that they were actually able to acquire or develop them. (In this context, cult groups with worldviews inspired by science fiction motifs, including the Church of Scientology and the Raëlians, perhaps warrant special attention, all the more so if they promote genetic engineering or the use of other advanced scientific technologies and techniques.)<sup>127</sup> Whether such a techno-fetish is the product of a secular or religious ideology may or may not turn out to be particularly relevant.

To sum up, these are the types of groups that are most likely to employ chemical or biological weapons for primarily ideological reasons:

- **Those whose doctrines explicitly advocate or encourage the “terrorizing” of their demonized and therefore dehumanized enemies, the causing of mass casualties, the outright extermination of “evildoers,” or the total destruction of the “corrupt” existing world order (including Sunnī jihadist groups with a global agenda that explicitly advocate targeting the “far enemy”)**
- **Those with apocalyptic millenarian doctrines which mandate that believers take violent action themselves in order to bring about the prophesied “end times” (as opposed to passively awaiting the outcome of ongoing cosmic clashes between “good” and “evil” supernatural beings)**
- **Those with avid scientific or technological doctrinal fetishes that wish to display their technical prowess by using advanced or novel weapons to “smite” their enemies.**

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<sup>126</sup> <sup>126</sup> Jonathan B. Tucker and Amy Sands, “An Unlikely Threat,” *Bulletin of the Atomic Scientists* 55:4 (July-August 1999), 49-50, 52; Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America’s Achilles’ Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, MA: MIT, 1998), 194-202.

<sup>127</sup> For Scientology, compare the overly sympathetic accounts of J. Gordon Melton, *The Church of Scientology* (Salt Lake City: Signature/CESNUR, 2000); and James R. Lewis, *Scientology: Religious Consciousness in a Technological Age* (New York: Garland, 1991), with the critical accounts of Roy Wallis, *The Road to Total Freedom: A Sociological Analysis of Scientology* (New York: Columbia University, 1977); Jon Atack, *A Piece of Blue Sky: Scientology, Dianetics, and L. Ron Hubbard Exposed* (New York: Carroll, 1990); Bent Corydon, *L. Ron Hubbard: Messiah or Madman?* (Fort Lee, NJ: Barricade, 1996); Russell Miller, *Bare-Faced Messiah: The True Story of L. Ron Hubbard* (New York: H. Holt, 1988); and Robert Kaufman, *Inside Scientology: How I Joined Scientology and Became Superhuman* (New York: Olympia, 1972). Of particular interest is the well-researched monograph that exposes the covert activities of the Church of Scientology’s special operations unit, “Scientology’s Secret Service: Inside Scientology’s Intelligence Agencies,” available at: <http://www.xs4all.nl/~kspaink/cos/SecrServ/go.html>. For the Raëlians, see especially Susan J. Palmer, *Aliens Adored: Raël’s UFO Religion* (New Brunswick: Rutgers University, 2004). Compare also George D. Chrystides, “Scientific Creationism: A Study of the Raëlian Church,” in Christopher Partridge, ed., *UFO Religions* (London and New York: Routledge, 2003), 45-61. In the Raëlian case, however, it seems likely that the group’s essentially hedonistic orientation will serve to impede its eventual resort to apocalyptic violence.

- **Those that are obsessed with getting revenge and believe that they have a moral “right” to kill millions of real or imagined enemies.**

Groups that possess more than one of these doctrinal obsessions or motivations are arguably likely to be particularly prone to want to acquire “WMD,” including chemical and biological weapons.

### **Motivational Indicators Not Dependent Upon Ideological Proclivities**

There also appear to be other warning signs that particular terrorist groups, irrespective of their specific ideologies, might at some point be inclined to produce or deploy chemical or biological weapons. Some of these are organizational in nature, some behavioral. If we combine the insights of James K. Campbell and Jonathan Tucker, for instance, all of the following characteristics may be viewed as potential indicators of a terrorist group’s propensity to employ such materials:<sup>128</sup>

- **Those directed by sadistic, megalomaniacal, or delusional but nonetheless charismatic and authoritarian leaders.**
- **Those that are socially isolated, do not seriously aim to appeal to – much less claim to represent – a broader constituency, and are thus relatively unconcerned about the negative “blowback” resulting from their actions.**
- **Those whose actual levels of violence have been progressively escalating over time.**
- **Those that have consistently displayed innovation in their use of weapons and/or tactics, or at least a willingness to take higher-than-normal risks.<sup>129</sup>**
- **Those that go out of their way to recruit people with relatively advanced technical or scientific skills.**
- **Those with sufficient financial resources to subsidize the acquisition or development of such weapons.**
- **Those that have relatively easy access to chemical or biological materials.**
- **Those (with sufficient technical means) which are in such desperate straits, real or imagined, that they come to feel they have nothing left to lose by employing every means at their disposal to smite their hated enemies.<sup>130</sup>**

Needless to say, terrorist groups that display several of the above characteristics are particularly worrisome in this context.

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<sup>128</sup> Compare James K. Campbell, “On Not Understanding the Problem,” in *Hype or Reality?: The “New Terrorism” and Mass Casualty Attacks*, ed. Brad Roberts (Alexandria, VA: Chemical and Biological Arms Control Institute, 2000), 35-39; and Jonathan Tucker, “Lessons from the Case Studies,” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. Jonathan Tucker (Cambridge, MA: MIT, 2000), 255-63.

<sup>129</sup> Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption,” *Studies in Conflict and Terrorism* 24:3 (May 2001), 203.

<sup>130</sup> Ehud Sprinzak, “On Not Overstating the Problem,” in *Hype or Reality?: The “New Terrorism” and Mass Casualty Attacks*, ed. Brad Roberts (Alexandria, VA: Chemical and Biological Arms Control Institute, 2000), 6.

## The Role of Opportunity

Finally, there is the question of whether the opportunistic, unplanned acquisition of chemical or biological agents might, in and of itself, induce a terrorist group that was previously uninterested in pursuing such weapons to suddenly and unexpectedly cross the “WMD” threshold. Would the temptation to use them become much greater if particular terrorist groups inadvertently and unexpectedly happened to stumble across such materials? Although such a scenario cannot be ruled out, our view is that extremist groups that were previously uninterested in causing mass casualties, whether for ideological or practical reasons, would not suddenly be motivated to do so simply because they happened to acquire chemical or biological materials. The same goes for most individuals. However, they might well be tempted to exploit their sudden possession of those materials in efforts to deter or blackmail opponents, sell them for money, or elevate their own status.

## Motivational Indicators for Actions Other Than Direct Use to Cause Harm

Thus far, this section on terrorist motivations has focused exclusively on the issue of which groups and individuals might be motivated, whether for diverse operational reasons, to fulfill arcane doctrinal injunctions, or possibly for incomprehensible personal reasons, to actually *employ* chemical or biological materials in terrorist attacks. It has not focused on the question of whether VNSAs might be motivated to acquire such materials for other, less destructive purposes, i.e., for purposes not involving the actual use of those materials in attacks. When a broader view is taken and other possible motivations for acquiring such materials are considered, it is likely that the number of potential groups that might be motivated to obtain them will increase, perhaps significantly.

Other possible motivations that non-state extremists or individual malefactors might have for trying to acquire chemical or biological materials fall broadly into four main categories:

- 1) **Deterrence:** To deter opponents from taking certain threatening actions – just as states sometimes feel compelled to develop nuclear weapons programs in order to effectively deter hostile action by enemy states, so too might certain non-state groups believe that acquiring dangerous CB materials would enable them to deter potential enemies from attacking them;
- 2) **Coercion:** To blackmail opponents into taking certain desired actions – certain non-state groups or individuals might seek to compel their enemies, including incumbent regimes, invading powers, or other targeted states, to do something specific that they want (e.g., release imprisoned group members, withdraw military forces, cease aggressively hunting them down, grant the peoples they claim to represent more autonomy, etc.) by threatening to use chemical or biological materials to attack them. (For example, this seems to have been the Chechens’ primary motive for acquiring, displaying, and threatening to employ radiological materials against Russia);

- 3) **Building the Brand:** To augment the prestige, status, or influence of their group in relation to states or rival non-state groups. It goes without saying that an extremist group which managed to acquire certain deadly materials, especially from a secured facility, would immediately force its opponents to sit up and take notice and might also thereby serve to inspire its supporters by seemingly giving itself an operational and psychological edge over its enemies and rivals;
- 4) **Commerce:** to sell such materials for profit on the black market (or perhaps even back to the original possessors) in order to raise money to acquire desired equipment and resources.

These types of motives for acquiring chemical or biological materials, being more intrinsically pragmatic and more likely to be inspired by “realist” considerations than, say, an apocalyptic desire to destroy the existing world or exterminate designated enemies, are likely to be applicable to a much wider array of non-state extremist and terrorist groups. In that sense, it is not only would-be terrorist and individual users of such materials that must be taken into consideration by policymakers and the security services.

### Explaining Non-Use

Given that several categories of non-state groups have just been flagged as being more prone to carry out attacks using chemical or biological weapons, the obvious question is why so few such attacks have been carried out up until now.<sup>131</sup> The rarity of biological attacks is understandable, especially given the difficulties of obtaining, weaponizing, and disseminating biological pathogens, but this same rarity is also characteristic for cruder, small-scale chemical attacks, which almost any reasonably professional terrorist group could likely carry out if it was really determined to do so. Several analysts have explained this by claiming that terrorists, whatever their ideological predispositions, tend to be “conservative” in terms of their adoption of new techniques and new technologies.<sup>132</sup> Even if this claim is true, which is arguable, external pressures to carry out ever more spectacular attacks so as to obtain publicity or display their prowess, a perceived need to adopt new trends and precedents that have already been set by other and perhaps even rival groups, or a desire to “mimic” states that have launched successful

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<sup>131</sup> For a good short analysis, see Ron Purver, “Understanding Past Non-Use of CBW,” in *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses*, ed. Brad Roberts (Alexandria, VA: Chemical and Biological Arms Control Institute, 1999), 65-73.

<sup>132</sup> See, e.g., Brian Jenkins, “Defense Against Terrorism,” *Political Science Quarterly* 101:5 (1986), 777; Bruce Hoffman, “Terrorist Targeting: Tactics, Trends, and Potentialities,” *Terrorism and Political Violence* 5:2 (Summer 1993), 13-14; and Richard Clutterbuck, “Trends in Terrorist Weaponry,” *Terrorism and Political Violence* 5:2 (Summer 1993), 130-9. But cf. the more in-depth analyses of Brian A. Jackson, *Organizational Learning and Terrorist Groups* (Santa Monica, CA: RAND Corporation, [February] 2004), 8-18; Brian A. Jackson, John C. Baker, Kim Cragin, John Parachini, Horacio R. Trujillo, and Peter Chalk, *Aptitude for Destruction, Volume 1: Organizational Learning in Terrorist Groups and Its Implications for Combatting Terrorism* (Santa Monica, CA: RAND Corporation, 2005); Brian A. Jackson, John C. Baker, Kim Cragin, John Parachini, Horacio R. Trujillo, and Peter Chalk, *Aptitude for Destruction, Volume 2: Case Studies of Organizational Learning in Five Terrorist Groups* (Santa Monica, CA: RAND Corporation, 2005); and Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York: Routledge, 2007). Yet the latter has been forced to conclude (pp. 175-6) that “most terrorist campaigns have witnessed a relatively small amount of innovation. The limited innovation we have seen has been more at the incremental level of improvement of existing tactics and technologies, as opposed to radical innovation of a new methodology or weaponry per se.”

attacks may all cause normally reticent groups to take risks and make a qualitative leap in their tactical or technical arsenals.<sup>133</sup>

One point that surely needs to be emphasized is that the operational methods, tactics, and weapons used by terrorists in the past cannot, in and of themselves, allow us to predict their future behavior with any certainty.<sup>134</sup> At best they can only provide us with general guidelines – specifically, some indications of the multiplicity of factors that may end up influencing the choice of particular tactics and weapons by today’s terrorist groups. As Sprinzak has noted, it would be advisable to carry out a systematic study of the “psycho-political” reasons why former terrorists adopted certain weapons and tactics rather than others, especially the members of groups that considered but eventually rejected the use of “WMD.”<sup>135</sup> However, even if the motives that earlier generations of terrorists had for adopting certain types of unconventional or innovative weapons were better understood, this would not necessarily allow us to predict the future use of chemical or biological weapons by particular groups with any certainty. As the history of warfare has repeatedly demonstrated, weapons and tactics often undergo a very gradual process of development over a long period of time before being suddenly and unexpectedly transformed, sometimes for reasons that make little or no apparent military sense, except perhaps in hindsight.<sup>136</sup> For example, as late as 1400 very few observers could have predicted the coming substitution of highly efficient missile weapons such as composite recurve bows, which had been used for centuries by some of the world’s most formidable military forces, by clumsy, primitive, and seemingly ineffective hand-held firearms. Such forecasting problems are both compounded and temporally compressed in our current era of rapid technological change.

In short, assuming that they had the technological capacity and/or access to the necessary materials, it is very hard to explain why particular terrorist groups might decide to adopt – or not adopt – new weapons and tactics, at least without inserting informants into their ranks or interrogating captured group members. It is harder still to determine why so few have previously carried out even crude terrorist attacks with toxic chemicals (many of which are used in agricultural or industrial production) or biological toxins, especially given that such attacks are not only relatively easy to launch but would also be likely to exert a much more profound impact on the psychological states of target audiences than conventional terrorist attacks.

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<sup>133</sup> Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America’s Achilles’ Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, MA: MIT, 1998), 207-13.

<sup>134</sup> See Dan Verton, *Black Ice: The Invisible Threat of Cyber-Terrorism* (Emeryville, CA: McGraw-Hill/Osborne, 2003), xix-xx: “we judge the future of terrorism solely on the basis of...historical examples at our own peril...we cannot disregard the use of new and innovative tactical measures that are designed to augment the psychological and even physical impact of traditional violent terrorist attacks.”

<sup>135</sup> Ehud Sprinzak, “On Not Overstating the Problem,” in *Hype or Reality?: The “New Terrorism” and Mass Casualty Attacks*, ed. Brad Roberts (Alexandria, VA: Chemical and Biological Arms Control Institute, 2000), 14-15.

<sup>136</sup> Cf. the remarks, specifically concerning terrorism, made by Dan Verton, *Black Ice: The Invisible Threat of Cyber-Terrorism* (Emeryville, CA: McGraw-Hill/Osborne, 2003), xix: “terrorism...evolves at tectonic speeds over many decades, making the process of discerning subtle changes in tactics extremely difficult, even for the trained eye. But there is a danger to this. Like seismologists who fail to detect the movements of the Earth’s tectonic plates and the increasing pressure those movements cause, we can be caught by surprise by a massive, life-threatening earthquake when we fail to pick up on the subterranean changes in terrorism.”



There seem to be three main motivational reasons why these types of low-grade but nonetheless fear-inducing chemical and biological attacks have been relatively rare. First, many non-state groups still probably seek to avoid crossing the “WMD” threshold because they are concerned about alienating the sympathies of their proclaimed constituents or their potential international supporters. This will also be true for those VNSAs dependent upon support from a state sponsor or subject to strong direct control by said sponsor. Only the most fanatical, insular, solipsistic, or desperate extremists will fail to concern themselves with, or fail to take cognizance of, the broader negative impact that their violent actions are likely to have. Fortunately, not many existing groups fall into this wholly “expressive” or perhaps other-worldly category, as opposed to the primarily “instrumental” and this-worldly category. Nor are they likely to in the future.

Second, conventional terrorist weapons such as military grade explosives are likely to do far more damage, both to human beings and to property, than crude chemical or biological attacks. Why, in the final analysis, should terrorist groups risk experimenting with dangerous, “new-fangled” substances instead of relying upon the tried and true conventional methods of destruction that they are already intimately familiar with? As long as these methods continue to be effective, there will be little incentive for most such organizations to adopt more exotic and unpredictable techniques or technologies. Indeed, although it may well be rash to describe most terrorists as “conservative” in their methods, only a few rather peculiar extremist groups are likely to be radically innovative. According to Jackson, those that are “most likely to pursue and successfully deploy new technologies” are “tapped into new technology options, open and hungry for new ideas, willing to take risks, not afraid to fail, and driven by [their] environment to pursue novelty.”<sup>137</sup> If they have access to necessary human and financial resources, collaborative relations with outsiders who have both tacit and explicit knowledge, and enough time to experiment with different techniques and technologies, then their “technology adoption efforts are likely to be successful.”<sup>138</sup>

Third, the very same fears about the horrific effects of WMD that beset the general populace tend to be shared by members of terrorist groups who likewise lack enough specialized scientific knowledge to be able to distinguish between, say, the realities of CB agents and their own paranoid fears. Irrational phobias about possible contamination, infection, and disease are common to scientific laymen throughout the world, including terrorists themselves. Hence, only the most dedicated fanatics would probably be willing to risk dying slowly and painfully after inadvertently contracting an exotic incurable disease, being contaminated by toxic chemicals, doses of radiation, or otherwise being exposed to an unseen toxin, especially after witnessing their gruesome effects on television after actual outbreaks of hemorrhagic fever, or even after seeing frightening fictional films about outbreaks of plague. Suicide bombers are also much more likely to prefer going out with a sudden, painless, glorious bang rather than

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<sup>137</sup> Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption,” *Studies in Conflict and Terrorism* 24:3 (May 2001), 203. For a fuller discussion, see pp. 188-203.

<sup>138</sup> Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption,” *Studies in Conflict and Terrorism* 24:3 (May 2001), 203.

a lingering, painful, inglorious whimper.<sup>139</sup> And even assuming that a few actually volunteered to serve as “human guinea pigs” in this way, no one else is likely to want to follow in the footsteps of self-styled “martyrs” who are observed dying a horrible death after being willingly exposed to lethal doses of biological pathogens.

Unfortunately, all three of these restraining factors may now be gradually breaking down. As noted above, certain “new” categories of VNSA are seemingly less concerned about local or world opinion than their traditional counterparts, and the bigger psychological payoff that would surely result from even a small-scale chemical or biological attack may increasingly appeal to today’s VNSAs, especially after having witnessed the panic that temporarily ensued in the wake of Aum Shinrikyō’s 1995 sarin attack in Tokyo and, more recently, the 2001 *B. anthracis* letter mailings. Finally, greater and greater levels of scientific and technological literacy may over time lead to the attenuation of extreme fears of inadvertent contamination whilst handling chemical or biological materials among terrorists themselves, thereby increasing the likelihood that they would be willing to assume the attendant risks involved in carrying out such attacks.

Moreover, none of these three factors help to explain why VNSAs have so rarely targeted chemical plants or transports carrying dangerous chemicals, or why they have not carried out low-level and relatively simple CB attacks on vulnerable animal and plant foodstuffs. After all, attacks on chemical facilities or transports could be easily carried out using conventional operational methods, with respect both to modes of attack and weaponry, that are the norm for most terrorist groups, and such attacks could conceivably cause hundreds of thousands of casualties and extensive physical destruction and contamination. Low-tech CB attacks on the agricultural industry are relatively simple to carry out, since it is not difficult, say, to infect herds of cows with Foot and Mouth Disease (FMD), and the economic consequences could be financially ruinous.<sup>140</sup> Hence these much simpler types of “CB” attacks potentially offer would-be terrorists lots of “bang for their buck,” both in terms of causing actual human and material damage and in terms of generating traumatic psychological effects on wider audiences. The fact that so few terrorist groups with the capability to carry out these types of attacks have actually done so is itself an indication that most VNSAs are not as motivated to cause mass destruction or mass casualties, much less to employ CB materials in attacks, as many analysts seem to assume a priori.

### Concluding Thoughts Regarding Motivational Aspects of CB Acquisition and Use

If one had to sum up the motivational situation with respect to possible VNSA use of chemical and biological agents, taking all of the complexities noted above into account, what would the bottom line be?

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<sup>139</sup> See Adam Dolnik, “Die and Let Die: Exploring Links between Suicide Terrorism and Terrorist Use of Chemical, Biological, Radiological, and Nuclear Weapons,” *Studies in Conflict and Terrorism* 26:1 (January-February 2003), 30.

<sup>140</sup> Cf. Lt. Col. Kenneth Hassler, *Agricultural Bioterrorism: Why It is a Concern and What We Must Do* (Carlisle Barracks, PA: U.S. Army War College, USAWC Strategy Research Project, [April] 2003); Mark Wheelis, *Agricultural Biowarfare and Bioterrorism* (Edmonds, WA: Edmonds Institute, 2000); Mark Wheelis, Rocco Casagrande, and Laurence V. Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, 2<sup>nd</sup> edition, ed. James Forest and Russell Howard (New York City, NY: McGraw-Hill, 2012), 365-78.

Suppose that one was to encompass all of the world's VNSAs within the borders of a single large circle, in terms of their visual depiction. In that case, only a relatively small subset of the organizations within that larger circle could be accurately characterized as being highly motivated to acquire or employ chemical and biological materials as weapons. Contrary to the naïve views peddled by certain analysts, it is simply not the case that most violent extremist or criminal groups have a serious interest in using CB weapons. And among that small subset of groups which are more or less interested, an even tinier subset currently have both the human and financial resources and the technical capabilities to successfully weaponize and effectively deploy such materials in attacks, terrorist or otherwise.

In short, for a complex variety of ideological, historical, pragmatic, and/or contextual reasons, the vast majority of VNSAs are not currently motivated to – and are not suddenly likely to become highly motivated to – carry out acts of CB terrorism. This is why CB terrorism threat assessments, which tend to assume that all terrorist groups would be interested in employing CB weapons if only they had the capabilities, or which focus exclusively upon their real or imagined technical capabilities without considering their motivations, or which concern themselves solely with target vulnerabilities, should be viewed with a great deal of skepticism.

On the other hand, to the extent that scientific knowledge and technical expertise in relation to dangerous chemical and biological agents become more widely disseminated, or that actual methods for weaponizing and disseminating such agents suddenly become much easier, it is more likely that the small aforementioned subset of groups that really are interested in carrying out CB attacks will be able to do so with some degree of success. That is the bad news. Even in this case, however, it is far more probable that VNSAs will successfully be able to carry out relatively crude, small-scale attacks with “off-the-shelf” TICs that might kill dozens or hundreds or at most thousands, or employ certain easy-to-extract biological toxins to assassinate their enemies, than perpetrate sophisticated attacks with truly dangerous and contagious biological agents that could potentially infect and kill millions.<sup>141</sup> Hence although the U.S. government and its allies must prepare for possible worst-case scenarios, they should also recognize that those scenarios are much less likely to materialize.

## **CAPABILITY-RELATED ASPECTS OF NON-STATE CHEMICAL OR BIOLOGICAL USAGE<sup>142</sup>**

This portion of the review explores the capability-related aspects of CB non-state adversaries. It then describes a variety of organizational and resource factors required to successfully carry out a CB attack, including a discussion of emerging technological and geopolitical issues that should be taken into account

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<sup>141</sup> For a preliminary analysis of the threat posed by small-scale, targeted CB attacks, not mass casualty CB attacks, see Dana A. Shea and Frank Gottron, *Small-Scale Terrorist Attacks Using Chemical and Biological Agents: An Assessment Framework and Preliminary Comparisons* (Washington, DC: Congressional Research Service, [May] 2004), available at <http://www.fas.org/irp/crs/RL32391.pdf>.

<sup>142</sup> This portion of this chapter was written by Mila Johns and Markus K. Binder.

in any analysis. The various methods of CB agent acquisition as these pertain to non-state adversaries are discussed in-depth, as are the sundry delivery mechanisms, as well as the technical challenges associated with each mode of acquisition and method of delivery. The review also includes two appendices, on chemical and biological weapons respectively, which provide certain technical information on the agents themselves, as well as present some of the unique characteristics associated with CB attacks.

## Group Organizational Attributes

The structural dynamics of a terrorist organization can impact the ability of the group to engage in chemical or biological attacks. Studies indicate that **organizational age and experience** are key factors in whether a terrorist group chooses to pursue CBRN capabilities.<sup>143</sup> Chronologically older groups may have the resources and experience to do so, however such organizations may be constrained by an “institutionalization’ effect” that develops over time, nudging the group towards joining the “legitimate’ world of politics”.<sup>144</sup> Conversely, while fledgling terrorist organizations may be significantly more motivated towards weapon innovation, the lack of experience possessed by these groups decreases the probability of CBRN pursuit or use.<sup>145</sup> Therefore, all else being equal, terrorist groups that are old enough to have gained experience, but not yet entered an advanced age where their behavior has become moderated, likely pose the greatest danger. The **size** of an organization, as well as its level of embeddedness within the “web of global terrorist alliances,” are also pronounced indicators of the group’s likelihood of attempting to achieve CBRN capabilities; larger groups and those with connections to key network nodes with numerous connections pose a greater risk than their smaller, less integrated, peers.<sup>146</sup>

With respect to the effects of the group’s ideology on its CB capabilities, while conventional wisdom would suggest that groups with a fundamentalist ideology would be more likely to eschew the trappings

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<sup>143</sup> See Victor H. Asal, Gary A. Ackerman, and R. Karl Rethemeyer, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism* 35, no. 3 (2012): 229-254.

<http://dx.doi.org/10.1080/1057610X.2012.648156>; Victor H. Asal and Karl R. Rethemeyer, “Islamist Use and Pursuit of CBRN Terrorism,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton: Taylor and Francis Group, LLC, 2009), 335.

<sup>144</sup> See Victor H. Asal and Karl R. Rethemeyer, “Islamist Use and Pursuit of CBRN Terrorism,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton: Taylor and Francis Group, LLC, 2009), 348; Adam Dolnik, “Understanding terrorist innovation,” chap. 7 in *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007).

<sup>145</sup> See Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007); Victor H. Asal and Karl R. Rethemeyer, “Islamist Use and Pursuit of CBRN Terrorism,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton: Taylor and Francis Group, LLC, 2009), 335.; Victor H. Asal, Gary A. Ackerman, and R. Karl Rethemeyer, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism* 35, no. 3 (2012): 229-254.

<http://dx.doi.org/10.1080/1057610X.2012.648156>. Dolnik notes that the hypothesis that groups that engage in more frequent conflict with opponent forces (i.e. more experienced groups) are more likely to be both willing and capable of weapons innovation is at least partially supported in the case studies he examines.

<sup>146</sup> Victor H. Asal, Gary A. Ackerman, and R. Karl Rethemeyer, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism* 35, no. 3 (2012): 229-254.

<http://dx.doi.org/10.1080/1057610X.2012.648156>.

of modernity, an archaic worldview does not preclude these terrorist organizations from effectively utilizing modern technologies.<sup>147</sup> This counterintuitive dynamic does not, however, appear to suggest that comfort and familiarity with modern technologies make a terrorist organization more likely to demonstrate the level of innovation typically associated with pursuit of unconventional weapons.

Concomitantly, internal organizational structure has been widely viewed as a decisive element in the level of innovation a terrorist group pursues.<sup>148</sup> Jean Pascal Zanders contends that only groups which are “vertically organized, highly integrated and ideologically uniform”<sup>149</sup> possess the necessary drive, determination, and purposefulness of intent required to achieve a sophisticated covert chemical or biological weapons capability. At the same time, the recent trend towards decentralization within the milieu of terrorist organizations has raised concerns that smaller, ‘home-grown’ groups, particularly in technologically advanced countries, may be better situated to pursue chemical and/or biological capabilities.<sup>150</sup> Such fears appear to be confirmed by the “overwhelmingly supportive views of the online jihadi community on the issue of using CBRN”<sup>151</sup> and the increase in the number of so-called ‘micro actors’<sup>152</sup> (individual, self-motivated terrorists) with technological skills. The reality, however, is that an increase in the number of small cells motivated to develop CBRN programs does not mean that these groups or individuals have the corresponding capabilities necessary to do so. “In fact,” Dolnik notes, “there seems to be an inverse relationship between the two.”<sup>153</sup> While decentralized cells are initially more likely than their structured peers to fly under the radar of intelligence and law enforcement officials, the members of these small group generally lack training in terrorist tactics and tradecraft; it is thus far more probable that these cells will seek traditional, easily accessible weapons for attacks rather than attempt the long-term, highly secretive process of pursuing CBRN agents.<sup>154</sup> In sum, while Zanders

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<sup>147</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 43.

<sup>148</sup> See Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 1-63; Cheryl Loeb, “Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 153-172.

<sup>149</sup> Jean Pascal Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists,” *The Nonproliferation Review* 6, no. 4 (Fall 1999), cited in Jeffrey M. Bale and Gary A. Ackerman. *How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons*. (Report for Center for Nonproliferation Studies, 2007), 46.

<sup>150</sup> Adam Dolnik, “13 Years Since Tokyo: Re-Visiting the ‘Superterrorism’ Debate,” *Perspectives on Terrorism* 2, no. 2 (January 2008): 3-11. <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/25/html>.

<sup>151</sup> Adam Dolnik, “13 Years Since Tokyo: Re-Visiting the ‘Superterrorism’ Debate,” *Perspectives on Terrorism* II, no. 2 (January 2008): 3-11. <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/25/html>.

<sup>152</sup> Raphael Perl, “Selected Papers, 4 Tendencies in Global Terrorism,” in “*Countering Terrorism: Biological Agents, Transportation Networks, and Energy Systems. Summary of a U.S.-Russian Workshop*, Committee on Counterterrorism Challenges for Russia and the United States et al. (Washington, DC: The National Academies Press, 2009), 27-28.

<sup>153</sup> Adam Dolnik, “13 Years Since Tokyo: Re-Visiting the ‘Superterrorism’ Debate,” *Perspectives on Terrorism* II, no. 2 (January 2008): 3-11. <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/25/html>.

<sup>154</sup> See Adam Dolnik, “13 Years Since Tokyo: Re-Visiting the ‘Superterrorism’ Debate,” *Perspectives on Terrorism* II, no. 2 (January 2008): 3-11. <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/25/html>; Raphael Perl, “Selected Papers, 4 Tendencies in Global Terrorism,” in “*Countering Terrorism: Biological Agents, Transportation Networks, and Energy Systems. Summary of a U.S.-Russian Workshop*, Committee on Counterterrorism Challenges for Russia and the United States et al. (Washington, DC: The National Academies Press, 2009), 27.

arguably overstates the importance of more rigid, formal structures and it appears as if decentralized networks (and even superempowered lone actors) might still succeed in developing a high-end CB capability (as shown by the Bruce Ivins case), there are certainly **advantages to a centralized, hierarchical structure** in terms of implementing weapons adoption decisions.

The complex relationship between a terrorist organization's leader's personality and the group's ability to pursue unconventional weapons is widely noted, but remains poorly understood. While "dogmatic, charismatic leaders who exercise methods of social conditioning"<sup>155</sup> are a hallmark of those organizations most frequently cited as potentially seeking CBRN, from a capability-related perspective there is mixed evidence as to the role a terrorist leader's personal characteristics play in facilitating the innovation required to successfully develop such programs. Aum Shinrikyo and al-Qa'ida have notably conducted targeted recruitment amongst educated individuals with specialized skills,<sup>156</sup> presumably at the behest of their leaders, however case studies conducted by Dolnik suggest limited utility for "the background, the value system, and the authority of a leader"<sup>157</sup> as an innovation variable. It is just as possible that the leader's temperament may have a negative impact on an organizations' level of technical or scientific capability, either through the quality of followers that the group is able to attract<sup>158</sup> or, in the case of more extreme ideologues, by restricting the pool of potential recruits to those that embrace the same ideology.<sup>159</sup> On the other hand, case studies by Adam Dolnik indicate that the presence of an **unquestioned leader specifically focused on innovation** has been shown in some cases to increase the likelihood that a terrorist organization will succeed in adopting new technologies.<sup>160</sup>

Internal group dynamics might also contribute to the potential for a terrorist organization to pursue a chemical or biological weapons capability. With respect to organizational cohesion, there is some, albeit inconclusive, evidence that terrorist organizations which face **internal factionalization** have a higher

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<sup>155</sup> Jeffrey M. Bale and Gary A. Ackerman, "How Serious is the 'WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons," (Report for Center for Nonproliferation Studies, 2007), 50.

<sup>156</sup> Milton Leitenberg, *Assessing the Biological Weapons and Terrorism Threat* (Report for the Strategic Studies Institute, December, 2005), 39. <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubid=639>.

<sup>157</sup> See Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007), 158. While Dolnik's case studies offer mixed results as to the utility of "the background, the value system, and the authority of a leader" as an innovation variable, it does inform the group dynamic. The overarching conclusion drawn is that having an uncontested leader who is motivated towards innovation makes a terrorist organization more likely to successfully achieve the desired innovation.

<sup>158</sup> See Jeffrey M. Bale and Gary A. Ackerman, "How Serious is the 'WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons," (Report for Center for Nonproliferation Studies, 2007). The authors note that leaders who rely on charisma and conditioning may attract a lower quality of followers who "despite having scientific backgrounds....are unlikely to be among the more successful in their respective fields."

<sup>159</sup> See Jean Pascal Zanders, "Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists," *The Nonproliferation Review* 6, no. 4 (Fall 1999), cited in Jeffrey M. Bale and Gary A. Ackerman. *How Serious is the 'WMD Terrorism' Threat?: Terrorist Motivations and Capabilities for Using Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons*. (Report for Center for Nonproliferation Studies, 2007), 49.

<sup>160</sup> Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007), 160.

likelihood of innovating as a method of regaining group cohesion.<sup>161</sup> The extent to which group members are permitted to participate in the organization's decision-making is, however, not indicative of its orientation towards or against innovation.

Last, the **pace of operations** engaged in by an organization might have an effect on its CB development capabilities. This assessment is supported by Brian Jackson, who notes it is improbable that terrorist organizations which are reliant upon continuous operations "to maintain their structural integrity"<sup>162</sup> would have the capacity or mindset necessary to invest in a long-term CBRN program.

### The Question of Resources

The level of resources a terrorist organization possesses is a crucial metric of the likelihood the group will successfully achieve a chemical or biological weapons capability. An endeavor of such magnitude is inherently resource-intensive; access to substantial financial capital can severely curtail the number of terrorist groups which are able to realistically attempt a chemical/biological program. Non-monetary assets, such as connections through which required materials can be obtained, members with specialized scientific and/or tacit knowledge, and a private and secure facility in which to produce and store chemical or biological agents, are also crucial components for such a program.<sup>163</sup> Technological changes, such as synthetic biology and chemical microreactors (discussed later), may, however, be substantially reducing the resource requirements for production of CB weapons and, of course, if organizations receive CB weapons from external sources (e.g., as a gift from a state patron) then the resource requirements, while still not zero, will be reduced dramatically.

While the specific resource requirements for both chemical and biological weapons/agents will be discussed further in their respective sections, it should be noted that even terrorist organizations which possess the above resources and logistics are by no means guaranteed to be successful. The case of Aum Shinrikyo illustrates the immense technical challenge of developing such a unconventional arsenal; despite "an unrivaled amount of resources equaling nearly \$1 billion, a team of no less than 20 graduate level scientists, and state of the art laboratories and equipment, it failed to kill a single person with a

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<sup>161</sup> See Adam Dolnik, "Understanding terrorist innovation," chap. 7 in *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007). Two of the four case studies Dolnik examines indicate that internal dissent was likely a factor in a group's move towards innovation.

<sup>162</sup> Brian A. Jackson, "Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption," *Studies in Conflict and Terrorism* 24 (2001), cited in Jeffrey M. Bale and Gary A. Ackerman. *How Serious is the 'WMD Terrorism' Threat?: Terrorist Motivations and Capabilities for Using Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons*. (Report for Center for Nonproliferation Studies, 2007), 46.

<sup>163</sup> See Victor H. Asal, Gary A. Ackerman, and R. Karl Rethemeyer, "Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons," *Studies in Conflict and Terrorism* 35, no. 3 (2012): 229-254.

<http://dx.doi.org/10.1080/1057610X.2012.648156>; Markus Binder and Michael Moodie, "Jihadists and Chemical Weapons," in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 131-152.; See Adam Dolnik, "Understanding terrorist innovation," chap. 7 in *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007). Jeffrey M. Bale and Gary A. Ackerman, "How Serious is the 'WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons," (Report for Center for Nonproliferation Studies, 2007), 1-70.

biological weapon.”<sup>164</sup> In short, its entire five year effort to develop biological weapons was a comprehensive failure.<sup>165</sup> The group then channeled their resources toward acquiring a chemical weapons capacity, a program which proved far more effective.

Aum’s technical struggles would appear to suggest that thus only a paltry fraction of terrorist organizations, i.e., those possessing copious resources, would be able to achieve a sophisticated chemical or biological weapons capability. At the same time, the Aum case may be *sui generis*, in that other idiosyncratic organizational elements precluded success irrespective of the amount of resources it possessed, which may not be the case for future CB adversaries. Dolnik in particular cautions against the belief that a group “with more general scientific knowledge could not succeed in launching a less sophisticated CBRN attack”<sup>166</sup> that resulted in a low casualty count.

## Chemical Terrorism Capability Requirements

### *Acquisition and Production of Chemical Agents*

There are a number of methods by which a terrorist organization may achieve a chemical weapons capability.<sup>167</sup> First, the group can endeavor to produce the chemical agent autarkically, obtaining the necessary precursor chemicals through theft or semi-legitimate purchases. Second, military-grade chemical weapons may be acquired via a direct transfer from a state sponsor, or stolen from a state-level weapons program.<sup>168</sup>

### *Independent Production*

Analysts regard indigenous production as a probable avenue of acquisition for terrorists seeking chemical weapons. After selecting the type of agent most suitable for its strategic goals – nerve agents for high lethality, vesicants for an attack designed to manifest more slowly, etc. – a terrorist organization must then obtain the requisite precursor chemicals and equipment.<sup>169</sup> The ease with which these materials can be procured is a matter of some debate, though extensive diffusion of dual-use technology and widespread use of toxic industrial chemicals (TICs), combined with the continued use of CW precursors in industrial processes, suggests that “a determined terrorist group would be able to gain

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<sup>164</sup> Adam Dolnik, “13 Years Since Tokyo: Re-Visiting the ‘Superterrorism’ Debate,” *Perspectives on Terrorism* II, no. 2 (January 2008): 3-11. <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/25/html>.

<sup>165</sup> William Rosenau, “Aum Shinrikyo's Biological Weapons Program: Why Did it Fail?,” *Studies in Conflict & Terrorism* 24 no. 4, (2001) 291, <http://dx.doi.org/10.1080/10576100120887>

<sup>166</sup> Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York & London: Routledge, 2007), 177.

<sup>167</sup> This section does not include terrorist attacks on industrial facilities to release CB agents in situ, which is covered in a later section.

<sup>168</sup> Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 134.

<sup>169</sup> Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 137.



access”<sup>170</sup> to at least limited quantities of such components without significant difficulty. Additionally, an individual or individuals with the appropriate level of scientific expertise – varying according to the agent type and purity desired – must be secured. The advanced education and training required to overcome the substantial technical hurdles of manufacturing nerve agents, for example, may present an opportunity for unemployed weaponeers of former state-level programs to monetize their expertise, though this potential threat decreases with the passage of time, as these scientists age and their experience becomes dated and decays.<sup>171</sup>

Interestingly, however, terrorists have rarely pursued indigenous production as an acquisition strategy for a chemical weapons capability. Only a handful of such cases have been documented, the most notable of which involved Aum Shinrikyo and al-Qa’ida.<sup>172</sup> Aum’s success in acquiring bulk amounts of the chemical precursors for producing nerve agents highlighted lapses in the Japanese, and potentially the global, chemical security architecture.<sup>173</sup> The Chemical Weapons Convention (CWC), instituted in 1997, has contributed to improved tracking of the trade in particular CW precursors, through the creation of chemical ‘schedules’ and requiring increased monitoring of domestic chemical industries. Unfortunately, the CWC was not designed to curtail the transfer of relatively small amounts of precursors, which, while insufficient to produce enough agent for military use, would still provide adequate feedstock for a CW used in a terrorist attack. Moreover, lax security measures at chemical plants and during transportation still present opportunities for terrorist exploitation.<sup>174</sup>

### Acquisition from a State Program

For a terrorist organization intent on obtaining a chemical weapons capability, the most direct route is to acquire such a weapon from a state program. The likelihood that a state will directly transfer chemical weapons to even its closest proxy is considered by many to be extremely remote.<sup>175</sup> There is little strategic advantage to the state in arming terrorists with such weapons and to do so would violate

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<sup>170</sup> Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 140.

<sup>171</sup> See Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 146-147; Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 50.

<sup>172</sup> See Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 138.

Jonathan B. Tucker, “Chemical Terrorism: Assessing Threats and Responses,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 217.

<sup>173</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 52.

<sup>174</sup> See Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 140.

<sup>175</sup> See Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 135; Daniel Byman, “Iran, Terrorism, and Weapons of Mass Destruction,” *Studies in Conflict and Terrorism* 31, no. 3 (2008): 169-181. Doi: 10.1080/10576100701878424

deeply-held international norms.<sup>176</sup> A chemical attack resulting from direct state transfer of chemical weapons would provoke widespread condemnation and risk retaliatory action from the targeted country.<sup>177</sup> It is worth noting, however, that this calculus may change if a regime finds itself confronting an existential threat.<sup>178</sup>

Additionally, there is the potential for terrorists to obtain chemical weapons from state-level programs through more indirect channels. Disaffected contingents within a regime, including members of the military or the scientific program itself, “might elect to make CW agents or weapons available to [terrorists] in contravention of state policy”<sup>179</sup> for ideological reasons or financial gain. A terrorist group may also procure chemical weapons from a state program by means of theft or diversion. This method of acquisition is of particularly acute concern during times of unrest in countries which possess chemical weapons. As the ongoing civil war in Syria starkly illustrates, internal political instability can translate into opportunities for a terrorist organization to capture or divert such weapons both where these have been deployed to the battlefield and through the seizure of CW stockpiles located in contested areas.

Under the CWC, nations with declared chemical arsenals are working towards the destruction of these stockpiles. The political and financial costs of this eradication, however, have resulted in significant delays for both the United States and Russia.<sup>180</sup> There is considerable concern over the latter’s remaining chemical weapons stockpiles; “inadequate physical protection and accounting at some of the Russian depots have rendered the chemical weapons they contain vulnerable to theft or diversion”<sup>181</sup> by terrorists as well as criminal elements.

### Acquisition by Other Means

There is some debate over the threat posed by,<sup>182</sup> or even the existence of,<sup>183</sup> an international black market for unconventional weapons, including CW. There has, however, “been an increase in the linkages between terrorist and criminal networks”<sup>184</sup> in recent decades, potentially increasing the risk that

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<sup>176</sup> Daniel Byman, “Iran, Terrorism, and Weapons of Mass Destruction,” *Studies in Conflict and Terrorism* 31, no. 3 (2008): 169-181. Doi: 10.1080/10576100701878424

<sup>177</sup> See Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 135-136; Daniel Byman, “Iran, Terrorism, and Weapons of Mass Destruction,” *Studies in Conflict and Terrorism* 31, no. 3 (2008): 169-181. Doi: 10.1080/10576100701878424

<sup>178</sup> Daniel Byman, “Iran, Terrorism, and Weapons of Mass Destruction,” *Studies in Conflict and Terrorism* 31, no. 3 (2008): 169-181. Doi: 10.1080/10576100701878424

<sup>179</sup> Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 136.

<sup>180</sup> Jonathan B. Tucker, *War of Nerves: Chemical Warfare From World War I to Al-Qaeda* (New York: Random House, 2006), 382.

<sup>181</sup> Jonathan B. Tucker, *War of Nerves: Chemical Warfare From World War I to Al-Qaeda* (New York: Random House, 2006), 382.

<sup>182</sup> Jonathan B. Tucker, “Chemical/Biological Terrorism: Coping with a New Threat,” *Politics and the Life Sciences* 15, no. 2 (September, 1996), 170-171. <http://www.jstor.org/stable/4236227>.

<sup>183</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 51-52.

<sup>184</sup> David A. Poplack and Patricia Taft, “Threat Convergence: New Pathways to Proliferation?” (Zurich, Switzerland: The Fund

weapons stolen or diverted from state programs could end up in the hands of terrorists.<sup>185</sup> Also of concern are the nexuses between criminal organizations that engage in drug trafficking and terrorist organizations. The illicit resources utilized to manufacture drugs “could support the production of chemical agents and homemade explosives for terrorist ICDs [improvised chemical devices].”<sup>186</sup>

Between the end of World War I and 1970, numerous nations that possessed chemical weapons disposed of these munitions by dumping them into the sea. Though it is highly improbable that terrorists would undertake a salvage mission to obtain a chemical weapons capability, munitions containing choking, blood, blister, and nerve agents can be found in unsecured seabed dumpsites across the globe. The unintended recovery of such weapons, some of which still contain viable agents, most often by fishermen, has occurred with fair regularity in areas; there thus exists the remote possibility that these recovered, sea-dumped chemical munitions could find their way onto the putative black market.<sup>187</sup>

### *Development of Delivery Mechanism*

#### *Spray/Aerosol*

Aerosolization is generally the most effective method of dissemination for chemical agents but it is not an absolute requirement. Unlike biological agents, which require extensive preparation to convert to an aerosol form, many liquid forms of toxic or weaponized chemical agents readily vaporize when exposed to standard environmental conditions upon release.<sup>188</sup> The challenges of obtaining an ideal droplet size for optimal vaporization for chemical agent delivery, as well as the complexity associated with identifying suitable environmental conditions of wind, temperature, altitude, moisture, sunlight, time of day<sup>189</sup> – are compounded by the need for a reliable delivery system. Aerosolized chemical agents can be delivered into a target population through various mechanisms, many of which are relatively simple to produce or improvise. The effort is simplified by the consideration that even sub-optimally sized droplets create a substantial hazard, either through contact or by accelerating the process of vaporization. Sprayers with a multitude of nozzle types may be used, though special care must be taken to ensure that the agent particles will not clog the nozzle or otherwise malfunction during release.<sup>190</sup> Aum utilized an improvised

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for Peace, n.d.), 11. <http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?ots591=0c54e3b3-1e9c-be1e-2c24-a6a8c7060233&lng=en&id=45479>.

<sup>185</sup> David P. Auerswald, “Deterring Nonstate WMD Attacks,” *Political Science Quarterly* 121, no.4 (Winter 2006-2007):543-568. <http://www.jstor.org/stable/20202762>.

<sup>186</sup> Jonathan B. Tucker, “The Role of the Chemical Weapons Convention in Countering Chemical Terrorism,” *Terrorism and Political Violence* 24, no. 1 (2012): 105-119. Doi: 10.1080/09546553.2011.611839.

<sup>187</sup> Paul F. Walker, “Sea-Dumped Chemical Munitions” (presentation to the United Nations Second Committee, New York, NY, November 11<sup>th</sup>, 2010), 1-23. <http://globalgreen.org/docs/publication-168-1.pdf>.

<sup>188</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 52.

<sup>189</sup> See Charles Blair, “CBRN Training Presentation,” (Presentation to the National Consortium for the Study of Terrorism and Responses to Terrorism (START), College Park, MD, July 7-8, 2012). Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 52.

<sup>190</sup> Jonathan B. Tucker, *War of Nerves: Chemical Warfare From World War I to Al-Qaeda* (New York: Random House, 2006), 335.

vaporizer consisting of a hot plate and a fan to disseminate a cloud of sarin.<sup>191</sup> Crop-dusters and unmanned aerial vehicles (UAVs or drones) can also be modified to deliver aerosolized chemical agents.<sup>192</sup>

### Contamination of Food, Water, and Consumer Products

The contamination of food and/or the water supply is generally viewed as an impractical delivery method for chemical agents,<sup>193</sup> due to the difficulties of producing and introducing enough agent of sufficient purity to overcome standard quality-control processes and the effects of dilution. However, this assessment may be overly optimistic and skewed by an analytical focus on very large scale incidents and the potential vulnerability of this infrastructure cannot be completely disregarded.<sup>194</sup> Prior unsuccessful plots and attempts to attack water systems<sup>195</sup> and high-profile incidents of consumer product tampering such as the 1982 Tylenol murders<sup>196</sup> indicate that despite ongoing efforts to improve the safety and security these systems remain viable targets for determined terrorists. There have been many incidents involving the deliberate poisoning of food and beverages that have resulted in several dozen fatalities or injuries. Attacks of this sort have often been mounted by disturbed individuals and should be well within the technical capabilities of almost any terrorist group or other VNSAs.<sup>197</sup>

### Explosive Dispersal

Military-grade munitions are the traditional delivery system for chemical weapons. These highly sophisticated devices, which include artillery shells, bombs, specialized spray tanks, rockets, binary munitions, and missile systems,<sup>198</sup> would in the vast majority of circumstances need to be acquired from a state chemical weapons program through transfer, theft, or illicit purchase. As tailored chemical warfare systems these are presumed to be extremely effective dissemination methods although they may be less effective in the hands of terrorists lacking appropriate training, or key delivery components such as aircraft or artillery.

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<sup>191</sup> Jonathan B. Tucker, *War of Nerves: Chemical Warfare From World War I to Al-Qaeda* (New York: Random House, 2006), 337.

<sup>192</sup> Charles Blair, "CBRN Training Presentation," (Presentation to the National Consortium for the Study of Terrorism and Responses to Terrorism (START), College Park, MD, July 7-8, 2012).

<sup>193</sup> Jeffrey M. Bale and Gary A. Ackerman, "How Serious is the 'WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons," (Report for Center for Nonproliferation Studies, 2007), 53-56.

<sup>194</sup> Jonathan B. Tucker, "Chemical Terrorism: Assessing Threats and Responses," in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 218.

<sup>195</sup> Hamid Mohtadi and Antu Murshid, "A Global Chronology of Incidents of Chemical, Biological, Radioactive, and Nuclear Attacks: 1950-2005," (University of Minnesota: July 7<sup>th</sup>, 2006): 6-65.

<http://www.ncfpd.umn.edu/Ncfpd/assets/File/pdf/GlobalChron.pdf>

<sup>196</sup> "Chicago Division: A History," Federal Bureau of Investigation. <http://www.fbi.gov/chicago/about-us/history/history>.

<sup>197</sup> See the National Consortium for the Study of Terrorism and Responses to Terrorism's (START) Profiles of Incidents of CBRN-Use by Non-State Actors (POICN) Database.

<sup>198</sup> Charles Blair, "CBRN Training Presentation," (Presentation to the National Consortium for the Study of Terrorism and Responses to Terrorism (START), College Park, MD, July 7-8, 2012).

Improvised chemical devices (ICDs) are far more likely to be used by terrorists to deliver chemical agents.<sup>199</sup> Relatively crude and ineffective combinations of chemical agents (chlorine tanks) and traditional explosives were used in attacks by al-Qa'ida in Iraq (AQI) between 2006-2007, marking "the first time that jihadists have employed chemicals as a weapon with even a modicum of effectiveness."<sup>200</sup> While the chlorine gas released by these ICDs did not succeed in significantly augmenting the casualty count derived from the explosives alone, the attacks represent a significant advance on past efforts and hint at a potential for future terrorist use.

### Facility attacks

In addition to systems specifically designed to deliver chemical agents, TICs may also be disseminated to a target population through an attack on facilities where these agents are manufactured or stored. An estimated 15,000 such facilities exist throughout the United States; a terrorist assault or act of sabotage could easily endanger more than tens of thousands of people.<sup>201</sup> Attacks on facilities of this type may be especially appealing as they have the potential to enable terrorists to utilize chemical agents while only requiring the execution of a moderately sophisticated conventional attack, negating the hurdles associated with the acquisition, production, storage, transportation, of dangerous chemical agents. A limited understanding of the fundamentals of chemical agent delivery (environmental factors most of all) and the capacity to identify suitable facilities would be required to mount such an attack. Beyond this, the remainder of the necessary knowledge and skills would be those more typically associated with conventional terrorist operations including the capacity to reconnoiter a location, handle small arms and make use of basic explosives. A group that could draw on the expertise of a chemical engineer would have an advantage insofar as they might be able to make better use of the facility to deliver a more effective attack (for instance by over-pressurizing storage tanks). Due to the resources necessary to accomplish an attack of this nature, the terrorist organizations mostly likely to successfully undertake such an endeavor would be a larger, more experienced group with a demonstrated history of armed assaults on facilities and possessing members with expertise in explosives. However, it is possible that attacks may also be mounted by smaller, less experienced groups, including those without ideological motivations.<sup>202</sup>

The potential for a facility attack to induce a massive number of casualties is underscored by the "egregiously poor"<sup>203</sup> security at many chemical plants and the example of industrial disasters such as Bhopal<sup>204</sup> and the more recent West, Texas fertilizer explosion.<sup>205</sup> These factors, combined with the small

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<sup>199</sup> Jonathan B. Tucker, "The Role of the Chemical Weapons Convention in Countering Chemical Terrorism," *Terrorism and Political Violence* 24, no. 1 (2012): 105-119. Doi: 10.1080/09546553.2011.611839.

<sup>200</sup> Markus Binder and Michael Moodie, "Jihadists and Chemical Weapons," in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 374-376.

<sup>201</sup> Margaret E. Kosal, "Terrorism Targeting Industrial Chemical Facilities: Strategic Motivations and the Implications for U.S. Security," *Studies in Conflict and Terrorism* 29, no. 7 (December 2006):719-751. Doi: 10.1080/10576100600702006.

<sup>202</sup> The example of a Texas group planning to plant explosives at a local chemical facility as a distraction to enable a robbery is relevant. Sam Howe Verhovek, *New York Times*, April 25, <http://www.nytimes.com/1997/04/25/us/us-officials-link-klan-faction-to-1-of-4-people-held-in-texas-bomb-plot.html>.

<sup>203</sup> Margaret E. Kosal, "Terrorism Targeting Industrial Chemical Facilities: Strategic Motivations and the Implications for U.S. Security," *Studies in Conflict and Terrorism* 29, no. 7 (December 2006):719-751. Doi: 10.1080/10576100600702006.

<sup>204</sup> Thousands were killed, and thousands more sickened, when methyl isocyanate (MIC) was released by the Union Carbide

window of opportunity to effectively treat victims,<sup>206</sup> may make TIC facilities an enticing target for a group seeking to commit an act of chemical terrorism without acquiring a chemical weapons capability.

### Other Methods of Chemical Agent Dissemination

While the techniques for disseminating chemical agents examined above are the most probable for terrorists to use, it is by no means an exhaustive list. Various other delivery methods have and will likely continue to be utilized in chemical attacks. Terrorists have, for example, plotted attacks employing reaction devices, in essence crude binary chemical weapons where two non-toxic chemicals combine to produce a lethal agent, as a delivery method for the blood agent hydrogen cyanide.<sup>207</sup> A chemical agent may be injected into or placed directly onto victims, as Aum demonstrated with the nerve agent VX in 1994.<sup>208</sup> Direct exposure may also occur via the contamination of a commonly touched surface with a persistent agent that is absorbed cutaneously, such as VX.

### Which Types of Terrorist Organizations Are Likely to Meet These Requirements?

While the exact requirements of acquisition, production, and delivery mechanism vary based on the specific chemical agent that a terrorist organization seeks to employ, there are general indicators that signal which types of groups are most likely to successfully meet such requirements. Acquiring the *precursor materials and technology* necessary to produce a chemical agent has significantly decreased in difficulty due to the proliferation of TICs, dual-use technology, and scientific advances (see section on Chemical Sciences below) and thus is likely within the reach of most terrorist groups with at least a moderate level of funding and logistical infrastructure. The hurdles to the *production* of chemical agents differ widely according to the agent, with simple TIC agents like chlorine and hydrogen cyanide requiring essentially no production, up through the moderately difficult to synthesize vesicants and the most technically demanding warfare-grade nerve agents. So, terrorist organizations that possess members with technical expertise in the chemical sciences, as well as those which have the financial and logistical resources necessary to fund and securely house production facilities, are those most likely to be able to

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plant in Bhopal, India on December 3, 1984. The Bhopal disaster remains “the deadliest chemical incident in history”. See Margaret E. Kosal, “Terrorism Targeting Industrial Chemical Facilities: Strategic Motivations and the Implications for U.S. Security,” *Studies in Conflict and Terrorism* 29, no. 7 (December 2006):719-751. Doi: 10.1080/10576100600702006; Jonathan B. Tucker, “The Role of the Chemical Weapons Convention in Countering Chemical Terrorism,” *Terrorism and Political Violence* 24, no. 1 (2012): 105-119. Doi: 10.1080/09546553.2011.611839.

<sup>205</sup> Investigators blame ammonium nitrate in massive West explosion, *Dallas News*, May 6, 2013, <http://www.dallasnews.com/news/west-explosion/headlines/20130506-investigators-blame-ammonium-nitrate-in-massive-west-explosion.ece>

<sup>206</sup> Jonathan B. Tucker, “The Role of the Chemical Weapons Convention in Countering Chemical Terrorism,” *Terrorism and Political Violence* 24, no. 1 (2012): 105-119. Doi: 10.1080/09546553.2011.611839.

<sup>207</sup> For more on this al- Qa’ida-designed device, known as *al-mubtakkar*, see Jonathan B. Tucker, “The Role of the Chemical Weapons Convention in Countering Chemical Terrorism,” *Terrorism and Political Violence* 24, no. 1 (2012): 105-119. Doi: 10.1080/09546553.2011.611839; Markus Binder and Michael Moodie, “Jihadists and Chemical Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 83-97.

<sup>208</sup> Jonathan B. Tucker, *War of Nerves: Chemical Warfare From World War I to Al-Qaeda* (New York: Random House, 2006), 339.

produce “higher-end” chemical warfare agents. While Aum Shinrikyo is consistently cited as the prime example of such an organization, in the current threat context, several al-Qa’ida affiliates operating out of safe havens (such as al-Shabaab, AQIM, and AQAP) could conceivably produce vesicants, with the more well-endowed groups, such as Hizballah and certain technically-oriented apocalyptic cults, being most likely to have the capacity to produce nerve agents.

The requirements for *disseminating* a chemical agent are notably lower. While a group with the knowledge, financial, and logistical resources may opt for a more technically sophisticated delivery method, most chemical agents can be sprayed, used to contaminate food, water, and/or consumer products, or delivered via direct exposure without considerable difficulty. Thus, many terrorist organizations are likely to be able to successfully disseminate a chemical agent should they be able to acquire one, with the harm potential varying considerably depending on the toxicity of the agent. It should be noted, however, that “the purity of the agent and efficiency of the delivery [mechanism] can have a large impact on the ultimate effects on an attack,”<sup>209</sup> with factors such as aerosol or vapor concentration (affected by location and meteorological conditions) and the capabilities of first responders often making the difference between a small-scale and mass-fatality attack.

## Biological Terrorism Capability Requirements

### *Acquisition and Production of Biological Agents*

A group seeking to weaponize biological agents has two principle procurement options: the agent can be identified and developed into a weapon internally or it can be obtained from a state program.<sup>210</sup>

#### Independent production

A terrorist organization that intends to cultivate a biological agent suitable for use in a weapon will

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<sup>209</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 53.

<sup>210</sup> There has also been speculation about the existence of a ‘black market’ for biological agents. This scenario is closely linked to insider proliferation from state programs, but with transnational criminal organizations playing the role of intermediary between scientists, military officials, or similar regime personnel and terrorist organizations. The proliferation threat from such avenues appears to have been largely curtailed by the development of international programs designed to reduce the likelihood of former bioweaponeers from countries such as Libya, Iraq, South Africa, and the Soviet Union turning to the black market as a source of employment. Additionally, criminal organizations are profit-driven enterprises that seek “business opportunities that provide large payoffs with minimal risks”; given the retaliation that a biological terrorist attack would expose involved parties to, such rational actors are likely to avoid voluntary trafficking in biological weapons and other WMDs. See David P. Auerswald, “Deterring Nonstate WMD Attacks,” *Political Science Quarterly* 121, no.4 (Winter 2006-2007):543-568. <http://www.jstor.org/stable/20202762>; Amy E. Smithson, *Toxic Archipelago: Preventing Proliferation from the Former Soviet Chemical and Biological Complexes*, The Stimson Center Report No. 32, December 1999. [http://www.stimson.org/images/uploads/research-pdfs/Toxic\\_Archipelago.pdf](http://www.stimson.org/images/uploads/research-pdfs/Toxic_Archipelago.pdf); Cheryl Loeb, “Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 163.

confront numerous technical and logistical hurdles. Specialized scientific knowledge is generally thought to be an essential component of such a strategy,<sup>211</sup> however there are indications that “producing a potent biological warfare agent [may] involve far fewer technical hurdles than is generally believed.”<sup>212</sup>

The first step is identification of the desired pathogen, including a choice between contagious and non-contagious organisms. A suitable strain of the pathogen must then be acquired, sources of which can include state BW defensive or offensive programs and microbial culture collections, which may be exploited through theft or ‘legitimately’ via front companies.<sup>213</sup> Alternatively, a terrorist organization may seek to procure a microorganism found in nature;<sup>214</sup> to date, however, there is no evidence that this acquisition method has ever been successfully exploited.<sup>215</sup>

Once a suitable pathogen has been acquired, the next stage is production of the agent. Cultivation of a weapons-grade BW agent requires scientific laboratory equipment to safely mass-produce the pathogen. The ease with which such specialized, yet often dual-use, equipment can be obtained is a matter of

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<sup>211</sup> Milton Leitenberg, *Assessing the Biological Weapons and Bioterrorism Threat*, (Report for the Strategic Studies Institute, December 2005), 46. <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubid=639>.

“Five essential requirements must be mastered in order to produce biological agents:

- One must obtain the appropriate strain of the disease pathogen.
- One must know how to handle the organism correctly.
- One must know how to grow it in a way that will produce the appropriate characteristics.
- One must know how to store the culture, and to scale-up production properly.
- One must know how to disperse the product properly.”

<sup>212</sup> Jonathan B. Tucker, “New Questions about the FBI’s Anthrax Case: Valid Concerns or Red Herring?” *WMD Junction* (August, 2011), 22-40. [http://wmdjunction.com/110822\\_fbi\\_anthrax.htm](http://wmdjunction.com/110822_fbi_anthrax.htm).

<sup>213</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 53-54.

The following are the possible sources of seed stocks:

- a. **The natural environment:** many harmful microorganisms are endemic across wide areas and can be collected directly from the soil or from infected animals. The drawbacks of this method include the difficulty of isolating the organism from the sample and ensuring a sufficiently virulent strain for the purposes of a biological weapon. Aum Shinrikyo sent a mission to Zaire during the Ebola outbreak of 1992, ostensibly to provide medical assistance. It is believed that Aum’s true purpose was to collect samples of the Ebola virus.
- b. **Purchasing seed stocks from a culture collection:** while culture collections in the United States now have stricter controls (after Larry Wayne Harris, an individual with dubious motives, purchased *Yersinia pestis* (plague-causing organisms) in 1995), many collections in other countries lack even basic controls. Moreover, by setting up front companies, terrorist groups such as Aum Shinrikyo have succeeded in “legitimately” purchasing dangerous pathogens.
- c. **Theft of seed stocks** from hospital, university, or commercial laboratories.
- d. **Transfer of seed stocks from a state-level biological weapons program:** while this avenue implies greater risks for all parties, it could enable terrorists to obtain more advanced biological weapons agents, such as organisms cultured for antibiotic resistance.
- e. **Creation of pathogen from genetic building blocks:** although this has recently become at least a theoretical possibility, it is extremely doubtful that any terrorist group currently possesses the requisite technology or expertise. However, with so many Soviet-era bioweaponeers apparently looking for work and the inevitable diffusion of technology, this possibility may not remain quite so remote in the future.

<sup>214</sup> Cheryl Loeb, “Jihadists and Biological and Toxin Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 165.

<sup>215</sup> Milton Leitenberg, “Assessing the Threat of Bioterrorism,” in *Terrorizing Ourselves: Why U.S. Counterterrorism Policy is Failing and How to Fix It*, ed. Benjamin H. Friedman et al. (Washington D.C.: Cato Institute, 2010), 179.



debate.<sup>216</sup> The ease with which a terrorist organization can produce useful quantities of agent will vary based on the specific agent and intended purity of the final product. Once sufficient amounts of the pathogen have been carefully cultivated to ensure the necessary virulence, the agent must then be properly stored until it is weaponized to match the requirements of the specific delivery mechanism that will be utilized in an attack.<sup>217</sup> Achieving a weaponized biological agent through this highly complex and challenging process is thought to be “most likely within reach of dedicated, sophisticated, and highly organized ... terrorist groups” only.<sup>218</sup>

The production of biologically derived toxins, most notably ricin, may also present an appealing option for a terrorist group. Manufacturing ricin does not require specialized technology or knowledge; on the contrary, recipes for the toxin’s production are easily accessible via the Internet as is the basic material, castor bean plants.<sup>219</sup>

Last, recent advances in biotechnology also present a possible avenue of exploitation for terrorists interested in developing a biological weapons capability. The potential exists for a group utilizing commercially available technology to create, or genetically modify, pathogens for increased virulence. The actual extent of this threat is unclear; some scholars question whether terrorists would have the incentive to devote scant resources to such ambitious endeavors,<sup>220</sup> while others contend that as advances in the life sciences become increasingly ubiquitous in modern society, terrorists will seek to co-opt them.<sup>221</sup> Thus, while there is at least the theoretical possibility that bio-agents might be synthesized *de novo* from genetic building blocks, this is probably beyond the capabilities or interest of most terrorist groups, at least in the short term (see the more detailed discussion below).

### State programs

State biological warfare programs are another channel through which a terrorist organization may achieve a biological weapons capability. Scholars generally view the prospects of a state directly

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<sup>216</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 53-54.

<sup>217</sup> See Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 54-56.

Cheryl Loeb, “Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 165.

<sup>218</sup> Cheryl Loeb, “Jihadists and Biological and Toxin Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 165.

<sup>219</sup> Gregory D. Koblentz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 204.

<sup>220</sup> Gregory D. Koblentz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 214-215.

<sup>221</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

transferring a biological weapon to a terrorist group as unlikely,<sup>222</sup> with the important caveat that the likelihood may increase under specific circumstances. The provision of such a weapon to a terrorist group poses significant risks for a state. There is an inherent loss of control over the weapon's end use once in the hands of even the closest proxy group, including the possibility that the weapon may be used against the regime itself.<sup>223</sup> In addition, such a transfer may expose the state to retaliation from the target of the terrorists' attack. As the science of microbial forensics becomes increasingly sophisticated, the probability that a state can avoid detection of its role in a biological attack will begin to diminish.<sup>224</sup>

It has also been noted that states sponsors of terrorism seek to "preserve their clients' eligibility for a place at the bargaining table"<sup>225</sup>; the use of weapons that so clearly violate deeply held international taboos would undermine this goal.<sup>226</sup> Conversely, certain conditions may increase the possibility of a state directly equipping a terrorist organization with biological weapons. If, for instance, a state perceives that an attack could be carried out while avoiding attribution of the source material to itself, the potential for proliferation becomes greater.<sup>227</sup> A period of intense political instability presents a more probable, and thus more critical, scenario in which a state may convey a biological weapon to a terrorist group. A regime that faces what it perceives as an imminent or existential threat has a higher propensity to disregard conventional constraints against such actions.<sup>228</sup>

Terrorist organizations may also obtain a biological weapons capability from a state program in a less direct manner. Individual scientists or technicians within such programs, who may be sympathetic to the ideology or aspirations of a group, or those who may be induced to provide materials for financial gain, or are coerced under duress, represent potential points of proliferation.<sup>229</sup> In a similar vein, scientists previously employed in the defunct BW programs of states such as South Africa and the former Soviet

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<sup>222</sup> Jeffrey M. Bale and Gary A. Ackerman, "How Serious is the 'WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons," (Report for Center for Nonproliferation Studies, 2007), 60; David P. Auerswald, "Deterring Nonstate WMD Attacks," *Political Science Quarterly* 121, no.4 (Winter 2006-2007):543-568. <http://www.jstor.org/stable/20202762>.

<sup>223</sup> David P. Auerswald, "Deterring Nonstate WMD Attacks," *Political Science Quarterly* 121, no.4 (Winter 2006-2007):543-568. <http://www.jstor.org/stable/20202762>.

<sup>224</sup> See Cheryl Loeb, "Jihadists and Biological and Toxin Weapons," in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 164. Gregory D. Koblenz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 219.

<sup>225</sup> Victor H. Asal and Karl R. Rethemeyer, "Islamist Use and Pursuit of CBRN Terrorism," in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton: Taylor and Francis Group, LLC, 2009), 335-358.

<sup>226</sup> Daniel Byman, "Iran, Terrorism, and Weapons of Mass Destruction," *Studies in Conflict and Terrorism* 31, no. 3 (2008): 169-181. Doi: 10.1080/10576100701878424.

<sup>227</sup> Gregory D. Koblenz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 217.

<sup>228</sup> See Daniel Byman, "Iran, Terrorism, and Weapons of Mass Destruction," *Studies in Conflict and Terrorism* 31, no. 3 (2008): 169-181. Doi: 10.1080/10576100701878424; Gregory D. Koblenz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 219.

<sup>229</sup> See Gregory D. Koblenz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 219; Milton Leitenberg, "Assessing the Threat of Bioterrorism," in *Terrorizing Ourselves: Why U.S. Counterterrorism Policy is Failing and How to Fix It*, ed. Benjamin H. Friedman et al. (Washington D.C.: Cato Institute, 2010), 178-179.

Union are possible sources of the technical expertise and/or biological agents desired by terrorists.<sup>230</sup> While concern over the threat of these ‘bioweaponeers’ seeking to trade on their skills for financial gain is not unfounded,<sup>231</sup> “available evidence indicates that to date, proliferation from state-run offensive BW programs has been minimal.”<sup>232</sup>

### Development of Delivery Mechanism

#### Aerosols

Aerosolization, the rendering of an agent, either wet or dry, into “a cloud of solid particles suspended in the air,”<sup>233</sup> is the optimal form in which to initially deliver a biological pathogen. In this state, the weaponized agent can be disseminated most effectively through the use of sophisticated or improvised sprayers, nebulizers, or even a simple fire extinguisher.<sup>234</sup>

The production of a dry aerosolized agent, with particle size within the precise range (1-10 microns) required for inhalation infection, is considered by most experts to be an exacting technical process.<sup>235</sup> This view appears to be borne out; only a single terrorist group, resource-rich Aum Shinrikyo, is known to have successfully aerosolized a weaponized biological agent, an achievement blunted by the fact that Aum had acquired a benign strain of the pathogen.<sup>236</sup>

The investigation of the 2001 *Bacillus anthracis* attacks in the United States, however, has raised the prospect that “producing a potent biological weapon agent involves far fewer technical hurdles than is generally believed”<sup>237</sup> and thus may be within the reach of not only determined terrorist organizations, but also lone actors. The Amerithrax mailings, determined by the FBI to have been perpetrated solely by

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<sup>230</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>231</sup> See Gregory D. Koblenz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 139; Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>232</sup> Milton Leitenberg, “Assessing the Threat of Bioterrorism,” in *Terrorizing Ourselves: Why U.S. Counterterrorism Policy is Failing and How to Fix It*, ed. Benjamin H. Friedman et al. (Washington D.C.: Cato Institute, 2010), 164.

<sup>233</sup> Cheryl Loeb, “Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 156.

<sup>234</sup> William C. Patrick III, “Biological Terrorism and Aerosol Dissemination,” *Politics and the Life Sciences* 15, no 2. (1996): 208-210. <http://www.jstor.org/stable/4236239>.

<sup>235</sup> See David Franz, “Bioterrorism Defense: Controlling the Unknown,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 190; Gregory D. Koblenz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 214; Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 55.

<sup>236</sup> See Gregory D. Koblenz, *Living Weapons: Biological Warfare and International Security* (Ithaca: Cornell University Press, 2009), 212; Richard Danzig, et al, *Aum Shinrikyo: Insights Into How Terrorists Develop Biological and Chemical Weapons*, (Center for New American Security, July, 2011), 23-26.

[http://www.cnas.org/files/documents/publications/CNAS\\_AumShinrikyo\\_Danzig\\_1.pdf](http://www.cnas.org/files/documents/publications/CNAS_AumShinrikyo_Danzig_1.pdf).

<sup>237</sup> Jonathan B. Tucker, “New Questions about the FBI’s Anthrax Case: Valid Concerns or Red Herring?” *WMD Junction* (August, 2011). [http://wmdjunction.com/110822\\_fbi\\_anthrax.htm](http://wmdjunction.com/110822_fbi_anthrax.htm).

Dr. Bruce Ivins – an anthrax researcher at the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) – have been the lone incident of terrorism in which a virulent biological agent was successfully aerosolized.<sup>238</sup>

Other considerations and difficulties surrounding the large-scale delivery of aerosolized biological agents include the geographic and atmospheric conditions of the attack site and the effectiveness of the selected method of dissemination.<sup>239</sup> Aum, for example, was unable to deliver a slurry form (a less refined, wet aerosolization) of *Bacillus anthracis* due to continually clogging sprayers.<sup>240</sup>

### Food- and Water-borne Contamination

The contamination of a target population's food or water supply is often identified as a potential target for a biological terrorist attack.<sup>241</sup> The reality, however, is that contamination on the scale necessary to effectively cause widespread casualties presents more challenges than an initial assessment might suggest. While a rather straightforward method of delivery – the pathogen can simply be dumped into a reservoir or introduced to a food processing plant – that poses significantly fewer hurdles than aerosolization, it also tends to decrease the agent's effectiveness.<sup>242</sup> Certainly in an attack on a reservoir, massive quantities of a biological agent would be required to counteract the effects of dilution and the various steps intended to ensure the safety of drinking water supplies although even these steps are not always effective.<sup>243</sup> Although there is some confidence that supply chain safety measures designed to eliminate contaminants before transmission to the public should be able to diminish the effectiveness of attempts to introduce pathogens into the food supply there are reasons for doubt.<sup>244</sup> As a general principle, attacks with biological agents that utilize food, water or other consumer products as a delivery mechanism are possible with relatively low levels of technical expertise on the part of the perpetrators as has been illustrated by numerous past examples of unintentional food contamination.<sup>245</sup> There have been

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<sup>238</sup> "Amerithrax or Anthrax Investigation," Federal Bureau of Investigation. <http://www.fbi.gov/about-us/history/famous-cases/anthrax-amerithrax/amerithrax-investigation>

<sup>239</sup> Cheryl Loeb, "Jihadists and Biological and Toxin Weapons," in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 156-157.

<sup>240</sup> Richard Danzig, et al, *Aum Shinrikyo: Insights Into How Terrorists Develop Biological and Chemical Weapons*, (Center for New American Security, July, 2011), 25. [http://www.cnas.org/files/documents/publications/CNAS\\_AumShinrikyo\\_Danzig\\_1.pdf](http://www.cnas.org/files/documents/publications/CNAS_AumShinrikyo_Danzig_1.pdf)

<sup>241</sup> See Cheryl Loeb, "Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 156-157.; Ali Nouri and Christopher Chyba, "Biotechnology and Biosecurity," in *Global Catastrophic Risks* (New York: Oxford University Press: 2008), 450-476.; Leo J. Schep et al. "Ricin as a Weapon of Mass Terror – Separating Fact from Fiction," *Environment International* 35, no. 8 (November, 2009): 1267-1271. [http://forenzika.unist.hr/Portals/6/docs/Katedre/Kemija/24\\_Ricin.pdf](http://forenzika.unist.hr/Portals/6/docs/Katedre/Kemija/24_Ricin.pdf)

<sup>242</sup> Cheryl Loeb, "Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 157.

<sup>243</sup> Laurie Garrett, *The Coming Plague*, (New York, NY: Farrar, Straus and Giroux, 1994), 428-431.

<sup>244</sup> See Cheryl Loeb, "Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 157; Leo J. Schep et al. "Ricin as a Weapon of Mass Terror – Separating Fact from Fiction," *Environment International* 35, no. 8 (November, 2009): 1267-1271. [http://forenzika.unist.hr/Portals/6/docs/Katedre/Kemija/24\\_Ricin.pdf](http://forenzika.unist.hr/Portals/6/docs/Katedre/Kemija/24_Ricin.pdf)

<sup>245</sup> Jonathan B. Tucker, "Chemical Terrorism: Assessing Threats and Responses," in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 218. See also "FACTBOX-

many small-scale incidents involving the deliberate contamination of food and beverages with a variety of pathogens that have resulted in fatalities or injuries.<sup>246</sup> Attacks of this sort have often been mounted by disturbed individuals and should be well within the technical capabilities of almost any terrorist groups or other VNSAs. This type of attack is further simplified by the ability of pathogens to replicate within the delivery medium, in contrast to chemical agents. Relatively mature (if perennially underfunded) disease detection and identification mechanisms that form part of the food safety infrastructure, at least in developed countries, mean that even if a large-scale contamination effort were successful, the responsible foodstuff could be identified in a reasonably short space of time and hence steps taken to limit exposure before casualties reached very high levels. It is thus most probable that any such attack that is successful would be of a geographically localized nature.<sup>247</sup>

### Self-infection & Other Methods

Alternatively, terrorists may attempt to utilize more conventional methods to disseminate weaponized biological pathogens. A biological weapon, as opposed to a biological warfare agent, obtained directly from a state program would almost assuredly be accompanied by a military-grade delivery system such as “cluster bombs, artillery shells, rockets, [or] sophisticated sprayers.”<sup>248</sup> In a similar vein, a terrorist organization with proficiency in explosives may exploit this strength by adding biological agents or biological waste materials to more traditional bombings. While an attack that employs biowaste (such as raw sewage or contaminated hospital discards) may not yield a larger number of casualties, the psychological fallout it would produce, combined with the ease of access to these materials, could make this an attractive option.<sup>249</sup> Finally, and perhaps most troublingly, there is the possibility (discussed above in the motivation section) that some terrorists would infect themselves with a contagious pathogen.<sup>250</sup> This “ultimate permutation of a suicide attack”<sup>251</sup> would allow a terrorist to circulate within a target population, exposing large numbers of individuals to the agent in a virtually undetectable manner and, depending on the agent’s infectiousness and incubation period, potentially spreading widely before it is identified.

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Major food poisoning outbreaks in U.S.,” *Reuters*, December 15, 2010. <http://www.reuters.com/article/2010/12/15/food-sickness-idUSN1514411920101215>

<sup>246</sup> See the National Consortium for the Study of Terrorism and Responses to Terrorism’s (START) Profiles of Incidents of CBRN-Use by Non-State Actors (POICN) Database.

<sup>247</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 55-56.

<sup>248</sup> Cheryl Loeb, “Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 156.

<sup>249</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>250</sup> See Cheryl Loeb, “Jihadists and Biological and Toxin Weapons,” in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 156; Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>251</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

## Attacks on Crops and Livestock

A terrorist organization may seek to employ a biological agent that, for either ethical or strategic reasons, does not produce human casualties.<sup>252</sup> An act of agricultural terrorism could be particularly appealing to a group for numerous reasons, including the decreased personal risk in utilizing pathogens that target livestock and/or crops and the relatively modest hurdles involved in obtaining these agents.<sup>253</sup>

More significant, however, may be the ease with which such biological agents can be disseminated to targets.<sup>254</sup> Crops occupy vast, unsecured fields in remote areas, allowing easy access for terrorists who need only “expos[e] a mass of sporulating fungi to the air immediately upwind of a target field”<sup>255</sup> to produce an agricultural blight. The most substantial obstacle lies in releasing the agent under optimal weather conditions.<sup>256</sup>

Infecting livestock with an animal pathogen also presents an enticing option. The greatest return on investment will come from the use of a highly contagious agent such as the Foot and Mouth Disease virus. An agent preparation can be directly applied to individual animals or “disseminated with a simple atomizer in close proximity to target animals.”<sup>257</sup> Either method of exposure may be accomplished with particular effectiveness in a location where large number of animals are kept in close quarters; pathogens targeting livestock are highly contagious and such conditions heighten the rapid transmission of disease.<sup>258</sup>

It should also be noted that biological agriterrorism aims to inflict economic, as opposed to psychological, disturbances in the target nation.<sup>259</sup> This increases the risk that terrorists may “release pathogens in

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<sup>252</sup> Barry Kellman, *Bioviolence: Preventing Biological Terror and Crime*, (Cambridge: Cambridge University Press, 2007), 41.

<sup>253</sup> Mark Wheelis, Rocco Casagrande, and Laurence Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 232.

<sup>254</sup> Mark Wheelis, Rocco Casagrande, and Laurence Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 233.

<sup>255</sup> Mark Wheelis, Rocco Casagrande, and Laurence Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 233.

<sup>256</sup> Ali Nouri and Christopher Chyba, “Biotechnology and Biosecurity,” in *Global Catastrophic Risks* (New York: Oxford University Press: 2008), 468.

<sup>257</sup> Mark Wheelis, Rocco Casagrande, and Laurence Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 232.

<sup>258</sup> Mark Wheelis, Rocco Casagrande, and Laurence Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 232.

<sup>259</sup> Mark Wheelis, Rocco Casagrande, and Laurence Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 232.

several locations in an attempt to initiate multiple, simultaneous outbreaks”<sup>260</sup> of crop or livestock disease to maximize the potential for the imposition of international trade controls on the target country.

### *Which Types of Terrorist Organizations Are Likely to Meet These Requirements?*

The exact requirements for the successful acquisition, production, and deployment of a delivery mechanism for a biological weapon vary considerably based on the specific biological agent that a terrorist organization seeks to employ (from biological toxins like ricin to contagions like *Y. Pestis*) and it is thus difficult to generalize across the entire spectrum of biothreats. First, there is no firm consensus regarding the level of difficulty inherent in acquiring the *materials and technology* necessary to produce a given biological agent. Some experts contend that “the needed equipment [is] of a specialized nature, others describe the equipment as dual-use and easy to obtain.”<sup>261</sup> Yet, it is reasonable to infer that a terrorist organization seeking to independently produce a biological agent would, at a minimum, need the financial resources, as well as the credentials (real or forged) to purchase necessary equipment. The hurdles to the actual *production* of biological agents also differ according to the agent; the technical expertise required to produce an agent with high virulence and lethality is significant and likely beyond the reach of most terrorist organizations save those which possess members with high levels of *techne* and *metis* in the biological sciences and financial and logistical resources necessary to fund and securely house production facilities. At the other end of the scale, however, is ricin. As numerous recent cases have demonstrated, castor beans are not terribly difficult to acquire, detailed instructions for the toxin’s preparation can be found online, and even a crude ricin mixture can be lethal.<sup>262</sup>

The requirements necessary for successfully *disseminating* a biological agent are also quite challenging although the level of challenge is highly dependent upon the scale of the planned attack. While a group with the knowledge, financial, and logistical resources may theoretically be able to accomplish the complex processes of milling and aerosolizing a biological agent, it should be noted that not only was Aum, with its extraordinary level of resources, unable to attain such a delivery mechanism, but even state-level biological weapons programs have failed in this regard.<sup>263</sup> As with chemical agents, while

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<sup>260</sup> Mark Wheelis, Rocco Casagrande, and Laurence Madden, “Biological Attack on Agriculture: Low-Tech, High-Impact Bioterrorism,” in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill/Contemporary Learning Series, 2008), 233.

<sup>261</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 53.

<sup>262</sup> See Kim Severson and Robbie Brown, “Georgia Men Held in Plot to Attack Government,” *The New York Times*, November 2, 2011, <http://www.nytimes.com/2011/11/03/us/georgia-men-held-in-plot-to-attack-government.html>; Jonathan Kaminsky, “Man Charged with Mailing Ricin Letter to Judge in Washington State,” *Reuters*, May 23, 2013, <http://www.reuters.com/article/2013/05/23/us-usa-security-ricin-idUSBRE94M05X20130523>; Associated Press, “Mississippi: Man is Charged Anew in Ricin Case,” *The New York Times*, November 21, 2013, <http://www.nytimes.com/2013/11/22/us/mississippi-man-is-charged-anew-in-ricin-case.html?ref=ricinpoison>; “Actress Shannon Richardson Pleads Guilty in Ricin Case,” *BBC News*, December 10, 2013, <http://www.bbc.co.uk/news/world-us-canada-25326964>.

<sup>263</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007), 55.

basic contamination, as a technique requiring a relatively low level of expertise, may be a method of dissemination well within the grasp of many terrorist groups, a successful mass-casualty attack would require large amounts of highly refined, lethal agent within a relatively constrained time period and as such represents an exponentially more challenging undertaking beyond the grasp of the majority of contemporary or projected terrorist groups. However, if a terrorist organization is able to acquire or produce a communicable biological agent and contains a member/members willing to engage in a suicide attack, then dissemination via self-infection is within the means of most terrorist actors.

## Emerging Issues

Rapid advancements in commercial and industrial technology and continuous scientific developments that have potential applications in both the military and civilian realms, coupled with the phenomenon of globalization, have increased both terrorist's capabilities and their opportunity for acquiring a chemical or biological weapons capability. Each of these areas, however, also presents unique challenges, often creating new obstacles to successful use of such weapons.

### *Scientific Advancements*

In recent years, innovations in a number of scientific and technological fields have produced advanced technologies that possess the potential to be exploited by terrorists seeking a chemical or biological weapons capacity. Many advanced technologies, previously restricted to military consumers, have legitimate applications in the civilian sector and are now readily available on the commercial market.<sup>264</sup> This rapid diffusion of technological and scientific advances – in areas such genetic engineering, biotechnology, vaccine production, and other life sciences – into society as a whole, and the commercial sphere in particular, raises dilemmas over the extent to which access to certain technological advances should be restricted.

### *Biosciences*

Evans and Hays note that “advances in seemingly innocuous fields have found potent military applications,”<sup>265</sup> an observation that is particularly relevant regarding the bioscience and biotechnology industries. Advancements in biotechnology have dramatically shifted the environment in which such research is conducted from the traditional laboratories of government or academia. Private research companies have poured substantial funds into developing an extensive infrastructure of facilities and personnel for investigating emerging life science technologies, with an eye toward significant profits.<sup>266</sup>

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<sup>264</sup> See Stern, Jessica. *Ultimate Terrorists*. Cambridge, MA: Harvard University Press, 2001: 10; Marlo, Francis H. “WMD Terrorism and US Intelligence Collection.” *Terrorism and Political Violence* 11 (Autumn, 1999).

<sup>265</sup> William M. Evans and Bret B. Hays, “Dual-Use Technology in the Context of the Non-Proliferation Regime.” *History and Technology* 22, no. 1 (March 2006): 105-113. Doi: 10.1080/07341510500517850.

<sup>266</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.



The impact of this shift can be seen in the increasing commercial availability of products marketed to a much broader audience: it is now possible to order “pieces of DNA as long as 40,000 bases – longer than the genome of many viruses,”<sup>267</sup> while “kit[s] for extracting DNA can be purchased for \$200”.<sup>268</sup> The wide-spread availability of such unprecedented technical resources has dramatically reduced the requirements, financial and logistic, for illicit production of biological agents. The smaller footprint presented by many of these technologies also substantially increases the difficulty of detecting attempts by terrorist organizations to achieve a biological weapons capability.<sup>269</sup>

Conferring antibiotic resistance to a given strain of bacteria can entail the use of basic techniques such as selective culturing or more advanced methods used in genetic engineering such as plasmid/cassette transfer and other techniques. The goal of such work is to increase the lethality of microbes and render them resistant to antibiotic treatments thereby making a given bacterial strain more difficult to treat or cure.<sup>270</sup> Such work was undertaken by the Soviet Union’s state-level biological weapons program, under the ‘Ferment’ program, where scientists attempted to develop various strains of multi-antibiotic resistant bacteria: *Burkholderia mallei* (glanders), *Burkholderia pseudomallei* (melioidosis), *Bacillus anthracis* (anthrax), *Yersinia pestis* (plague), and *Francisella tularensis* (tularemia).<sup>271</sup> However, even the extensive Biopreparat program faced enormous challenges in these endeavors, not least the difficulties of increasing one of the desired qualities without diminishing others.<sup>272</sup> The level of expertise, tacit knowledge, facilities, funding, materials, and time that would be required to produce such a biological weapon is extremely prohibitive, thus making it all but impossible to imagine that a terrorist organization would attempt to pursue such a weapon. Technological advances may, however, bring such capabilities within the grasp of non-state actors in the near future.

The only serious attempt to date to create an ethnic-based weapon has been South Africa’s state-level biological weapons program, which proved a failure.<sup>273</sup> The principle behind an ethnic-based weapon involves the emerging RNA interference (RNA-I) technology. RNA-I technology was originally developed to interfere with very specific gene functions of viruses at the molecular level. Specifically, small-interfering RNA molecules (siRNA) are used to target certain gene functions of viruses (replication) preventing or mitigating an infection.<sup>274</sup> Although these early efforts were unsuccessful, there is a

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<sup>267</sup> Ali Nouri and Christopher Chyba, “Biotechnology and Biosecurity,” in *Global Catastrophic Risks* (New York: Oxford University Press: 2008), 458.

<sup>268</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>269</sup> David Franz, “Bioterrorism Defense: Controlling the Unknown,” In *Weapons of Mass Destruction and Terrorism*, edited by Russell D. Howard and James J.F. Forest. McGraw-Hill/Contemporary Learning Series, 2008: 184–197.

<sup>270</sup> Barry Kellman, *Bioviolence: Preventing Biological Terror and Crime* (Cambridge: Cambridge University Press, 2007): 49.

<sup>271</sup> Milton Leitenberg and Raymond Zilinskas, *The Soviet Biological Weapons Program: A History* (Cambridge MA: Harvard University Press, 2012): 71.

<sup>272</sup> Igor Domaradsky, *Biowarrior*, (New York City, NY: Prometheus Books, 2003): 218.

<sup>273</sup> Michael Tu, “Lessons from History,” chap. 4 in *Double-Edged Innovations: Preventing the Misuse of Emerging Biological/Chemical Technologies*, ed. Jonathan Tucker, 64-75. Defense Threat Reduction Agency Report, July 2010. <http://www.dtic.mil/dtic/tr/fulltext/u2/a556984.pdf>

<sup>274</sup> Matthew Metz, “RNA Interference,” chap. 12 in *Double-Edged Innovations: Preventing the Misuse of Emerging Biological/Chemical Technologies*, ed. Jonathan Tucker, 173-190. Defense Threat Reduction Agency Report, July 2010. <http://www.dtic.mil/dtic/tr/fulltext/u2/a556984.pdf>

possibility that with the addition of currently available information from the Human Genome Project, a perpetrator could potentially exploit the high specificity of siRNAs and RNA-I technology to target certain gene alleles unique to a given ethnic group/race. Such a weapon could theoretically inhibit or paralyze crucial metabolic or immune functions in a given target.<sup>275</sup>

While the appeal of a biological weapon that would target only members of a certain ethnic group is obvious for a number of terrorist organizations, the probability of achieving such a weapon is very low. As noted by Matthew Metz, RNA-I technology requires a combination of skills “not yet codified in the scientific literature.”<sup>276</sup> If a terrorist organization was to attempt to reproduce this technology, the group would likely need an entire team of well-trained scientists with tacit knowledge in genetic engineering, genomics, cell culture, microbiology, and medicinal chemistry.<sup>277</sup> The research and development process could likely take years and millions of dollars of sustained investment. The technology could theoretically be stolen; about a dozen companies currently work with RNA-I technology. There would remain, however, the hurdle of adapting it for ethnic-based targeting. While RNA-I technology should be monitored in coming years, it is most unlikely to be exploited by terrorists seeking to create an ethnic-based biological weapon, at least not in the short term.

## Chemical Sciences

Advances in the chemical industry have yielded “miniaturization of complete set-ups for chemical syntheses to a suitcase or even to a shoe-box size”<sup>278</sup>, which carries obvious implications for the challenge of preventing illicit production of toxic chemical agents by terrorists. The diminutive size of these ‘pocket’ microreactors pose significant challenges in terms of detection, let alone monitoring, the synthesis of highly toxic chemical agents.<sup>279</sup> Though construction of microreactors is currently confined to highly trained individuals, the rapid diffusion of the basic technology required, as well as the publically available information regarding chemical synthesis on the internet, have led experts to assert that “in the future, without any doubt, they can be fabricated in a regular workshop.”<sup>280</sup> Microreactors also greatly reduce the need for safety considerations; because smaller amounts of volatile chemicals are produced at

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<sup>275</sup>Matthew Metz, “RNA Interference,” chap. 12 in *Double-Edged Innovations: Preventing the Misuse of Emerging Biological/Chemical Technologies*, ed. Jonathan Tucker, 173-190. Defense Threat Reduction Agency Report, July 2010. <http://www.dtic.mil/dtic/tr/fulltext/u2/a556984.pdf>

<sup>276</sup> Matthew Metz, “RNA Interference,” chap. 12 in *Double-Edged Innovations: Preventing the Misuse of Emerging Biological/Chemical Technologies*, ed. Jonathan Tucker, 173-190. Defense Threat Reduction Agency Report, July 2010. <http://www.dtic.mil/dtic/tr/fulltext/u2/a556984.pdf>

<sup>277</sup> Matthew Metz, “RNA Interference,” chap. 12 in *Double-Edged Innovations: Preventing the Misuse of Emerging Biological/Chemical Technologies*, ed. Jonathan Tucker, 173-190. Defense Threat Reduction Agency Report, July 2010. <http://www.dtic.mil/dtic/tr/fulltext/u2/a556984.pdf>

<sup>278</sup> Holger Lowe, Volker Hessel, and Andreas Mueller, “Microreactors. Prospects Already Achieved and Possible Misuse,” *Pure and Applied Chemistry* 74, no. 12 (2002): 2271-2276. <http://pac.iupac.org/publications/pac/pdf/2002/pdf/7412x2271.pdf>.

<sup>279</sup> Holger Lowe, Volker Hessel, and Andreas Mueller, “Microreactors. Prospects Already Achieved and Possible Misuse,” *Pure and Applied Chemistry* 74, no. 12 (2002): 2271-2276. <http://pac.iupac.org/publications/pac/pdf/2002/pdf/7412x2271.pdf>.

<sup>280</sup> Holger Lowe, Volker Hessel, and Andreas Mueller, “Microreactors. Prospects Already Achieved and Possible Misuse,” *Pure and Applied Chemistry* 74, no. 12 (2002): 2271-2276. <http://pac.iupac.org/publications/pac/pdf/2002/pdf/7412x2271.pdf>.

any one time, expenditures on safety equipment and procedures can be reduced.<sup>281</sup>

### *Role of International Conventions*

In light of the above developments, terrorist organizations may be able to acquire the requisite equipment to produce chemical or biological agents with increasing ease.<sup>282</sup> In response to the general threat of BW and CW production, international conventions, such as the Chemical Weapons Convention (CWC) and the Biological and Toxin Weapons Convention (BTWC) have been implemented to prevent the proliferation of chemical and biological weapons. The effectiveness of such protocols, especially in the context of non-state actors, has been limited by a number of factors. For the CWC, these include non-universal adoption, the large number of chemical plants producing significant quantities of precursors or restricted chemicals, shifts in chemical production to jurisdictions less capable of monitoring or securing facilities, changes in the technology of production including the introduction of chemical plants capable of rapid reconfiguration for the production of different chemical products, and, most importantly, the fact that it was “negotiated in the historical context of the Cold War, [thus] it was not designed to deal with chemical threats from non-state actors,”<sup>283</sup> making the detection of illicit acquisition of small quantities of regulated chemicals extremely challenging. Due to the recognized limitations of the treaty, less formal arrangements such as the Australia Group have been put in place to control access to technologies with potential dual-use applications. Even these, however, arguably do little to control the availability of small quantities of CW agents or equipment to non-state actors.

The Biological and Toxin Weapons Convention has encountered many similar challenges, including varying levels of commitment by members of the international community in actively preventing the proliferation of dual-use technologies.<sup>284</sup> One problem for the BTWC is that, unlike the CWC, it lacks a verification protocol and does not place active obligations upon its member states to ensure the control of technologies or materials. In addition to flagrant violations of the BTWC, such as that by the Soviet Union, there have also been many unintended, though still significant actions that tend to reduce its effectiveness. In 2003, for example, it was revealed that:

“the U.S. [Department of Defense] had been selling surplus equipment of the kind that could be used precisely for producing BW pathogens, and that some of the equipment purchased by middlemen in the United States had been resold to buyers in, among other countries, the Philippines, Malaysia, Egypt, Canada, Dubai, and the United Arab Emirates (UAE), ‘for transit to

<sup>281</sup> Holger Lowe, Volker Hessel, and Andreas Mueller, “Microreactors. Prospects Already Achieved and Possible Misuse,” *Pure and Applied Chemistry* 74, no. 12 (2002): 2271-2276. <http://pac.iupac.org/publications/pac/pdf/2002/pdf/7412x2271.pdf>.

<sup>282</sup> See Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles' Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack*, (Cambridge: Belfer Center Studies in International Security, 1998). Cited in Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007).

<sup>283</sup> Jonathan B. Tucker, “The Role of the Chemical Weapons Convention in Countering Chemical Terrorism,” *Terrorism and Political Violence* 24, no. 1 (2012): 105-119. Doi: 10.1080/09546553.2011.611839.

<sup>284</sup> William M. Evans and Bret B. Hays, “Dual-Use Technology in the Context of the Non-Proliferation Regime.” *History and Technology* 22, no. 1 (March 2006): 105-113. Doi: 10.1080/07341510500517850.

other countries prohibited from receiving exports of trade security controlled items.' U.S. officials in the past had identified individuals in Canada, the Philippines, Dubai, and in the UAE who are known to be involved in transshipments to terrorist-supporting countries. The sales had been made by the Defense Reutilization and Marketing Service, which in 3 1/2 years had sold 18 safety cabinets, 199 incubators, 521 centrifuges, 65 evaporators, and 286,000 full-body protective suits."<sup>285</sup>

Cases such as this illustrate the real world challenges and limitations that are faced in curbing both the unwitting and the intentional proliferation of dual-use CB technology.

### *Role of the Internet (Knowledge Transfer)*

While state-level treaties aim to prevent the diffusion of concrete materials and technologies, it is the transfer of knowledge about how to produce hazardous chemical or biological agents that is perhaps the most significant challenge. The internet, with its myriad methods of instantaneous communication and anonymizing techniques, has often been cited by experts as a serious concern in the transfer of scientific and technical knowledge to terrorists seeking a chemical or biological capability.<sup>286</sup> Loeb explicitly states that the internet "has expanded the availability of the knowledge and specialized equipment needed to produce biological weapons, such as seed stocks and culture collections, well beyond traditional scientific and technical communities"<sup>287</sup>. In this vein, there are numerous resources, even old countercultural staples like the Anarchist Cookbook and the Poisoner's Handbook, available online, which provide terrorists with specific instructions of varying degrees of accuracy on how to obtain and prepare chemical and biological agents.<sup>288</sup> While such technical information is also contained in scientific publications, the internet has drastically widened the audience to which it is easily accessible, making it an invaluable resource for terrorists.<sup>289</sup>

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<sup>285</sup> Milton Leitenberg, *Assessing the Biological Weapons and Bioterrorism Threat*, Strategic Studies Institute, December 2005, <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubid=639>.

<sup>286</sup> See Adam Dolnik, "13 Years Since Tokyo: Re-Visiting the 'Superterrorism' Debate," *Perspectives on Terrorism* 2, no. 2 (January 2008): 3-11. <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/25/html>; Cheryl Loeb, "Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009).; Martin Rees, *Our Final Hour: A Scientist's Warning* (New York: Basic Books, 2003).; Michael Kenny, "Beyond the Internet: Metis, Techne, and the Limitations of Online Artifacts for Islamist Terrorists," *Terrorism and Political Violence* 22, no. 2 (2010): 177-197. Doi: 10.1080/09546550903554760; Brian A. Jackson, "Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption," *Studies in Conflict and Terrorism* 24, no. 3 (2001): 183-213. [http://www.rand.org/content/dam/rand/pubs/reprints/2007/RAND\\_RP1248.pdf](http://www.rand.org/content/dam/rand/pubs/reprints/2007/RAND_RP1248.pdf)

<sup>287</sup> Cheryl Loeb, "Jihadists and Biological and Toxin Weapons, in *Jihadists and Weapons of Mass Destruction*, ed. Gary Ackerman and Jeremy Tamsett (Boca Raton, FL: Taylor and Francis Group, LLC, 2009), 163.

<sup>288</sup> Michael Kenny, "Beyond the Internet: Metis, Techne, and the Limitations of Online Artifacts for Islamist Terrorists," *Terrorism and Political Violence* 22, no. 2 (2010): 177-197. Doi: 10.1080/09546550903554760. Kenny notes, however, that information about unconventional weapons found online is often inaccurate and/or incomplete.

<sup>289</sup> Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (New York: I.B. Tauris, 2002). The authors note that the internet has drastically increased the ease with which terrorists can access information such as "college textbooks, academic journals, industry publications...plac[ing] themselves higher along the learning curve than terrorists from previous decades."

While the internet can thus provide terrorists with the *techne*, the ‘settled knowledge’, of how to produce chemical or biological agents, there are meaningful elements of this knowledge that cannot be so easily transferred. *Metis*, the experiential knowledge that comes from hands-on familiarity with the materials necessary for the production of these agents, “requires practice and learning-by-doing, which is difficult to obtain from the Internet, no matter how many online manuals one reads or instructional videos one watches.”<sup>290</sup> Such tacit knowledge is more unique to the individual and consists of trouble-shooting capability, ‘tricks of the trade’, specialized procedures, hands-on knowledge, etc. Both *techne* and *metis* are essential components for the potential development of chemical and/or biological agents by terrorist organizations and it is far less clear that the internet can serve as a transmitter of *metis* in the CBW domain.

### Scientific Publications

In recent years, there have been significant concerns regarding the public availability of published scientific literature and related dual-use research, particularly in the biological field. The increasing diffusion of research on biological agents and biotechnology into the public realm has created an ongoing debate within the biosecurity and biodefense communities regarding possible use of such information by terrorist organizations.<sup>291</sup> There is particular apprehension that the publication of scientific literature, widely available on the internet, could unintentionally provide such a group with the blueprints to produce a novel or enhanced pathogen, with devastating consequences.

The tension between the scientific need to publish and share results and the vested interest in keeping research that, in the hands of terrorists seeking a chemical or biological capability, could potentially have devastating outcomes, is a sensitive yet pressing issue. Significant questions remain about what limits should be set on certain publications and the responsibility of authors, editors, and publishers, which must be balanced against the realities of the demands of the academic and scientific communities, where publication is essential to job security and dissemination of research is critical to the scientific process.<sup>292</sup> While scientists have been known to, at times, adopt self-imposed restrictions on research in sensitive areas, there is no formal mechanism through which to prevent widespread publication of such research.

Some experts have advocated for continued review and ongoing oversight of scientific work by proposing ‘self-governing’ mechanisms for research with biosecurity implications. In 2006, the Fink Committee Report created the National Science Advisory Board for Biodefense (NSABB) as a voluntary mechanism where editors of peer-reviewed journals could send research articles in order to gauge their biosecurity

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<sup>290</sup> Michael Kenny, “Beyond the Internet: Metis, Techne, and the Limitations of Online Artifacts for Islamist Terrorists,” *Terrorism and Political Violence* 22, no. 2 (2010): 177-197. Doi: 10.1080/09546550903554760.

<sup>291</sup> Ronald M. Atlas and Malcolm Dando, “The Dual-Use Dilemma for the Life Sciences: Perspectives, Conundrums, and Global Solutions,” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 4, no. 3 (2006): 276-286.

<sup>292</sup> Shmuel C. Shapira and Meir Oren, “Ethical Issues of Bioterror,” *Studies in Conflict & Terrorism* 29, no. 5 (2006): 395-401. Doi: 10.1080/10576100600695390.

implications.<sup>293</sup> There have also been suggestions that scientists in disciplines with national security implications be required to obtain security clearances, though many argue that implementing such a system would jeopardize the cherished ideal of ‘academic freedom’.<sup>294</sup>

In recent years, however, there have been attempts to censure publications on bioterrorism threats and on research regarding genetic-manipulation of microorganisms which have the potential to “create vaccine- or antibiotic-resistant strains or species that might be targeted to specific human characteristics or races.”<sup>295</sup> The 2011 submission of a paper detailing a modification of a strain of the H5N1 (avian flu) virus, designed to make the virus more transmissible amongst ferrets, is the latest publication of this type to generate intense controversy.<sup>296</sup> Ron Fouchier, a leading virologist at the Erasmus Medical Center in Rotterdam, submitted his work on the H5N1 strain to the prominent academic journal *Science*. There was extreme reluctance, and indeed, active opposition, to publish Fouchier’s article by the US National Science Advisory Board for Biosecurity (NSABB), due to the concern that the findings could aid terrorists in creating a biological weapon.<sup>297</sup> Many scientists actively spoke out against such research, arguing that, given the enormous potential risks and implications associated with such modifications, virologists must actively engage with government, institutional oversight boards, and the public itself on questions such as lab security, safety practices, and how to prevent the proliferation of pathogenic viral materials.<sup>298</sup> The controversial article was eventually published in a special edition of the journal in 2012; its findings were extrapolated upon, and in May 2013, Chinese researchers were able to successfully manipulate the H5N1 serotype in guinea pigs, sparking further outrage within the scientific community.<sup>299</sup>

### Specialized Education/Personnel

In addition to the detailed scientific information available in open sources, members of terrorist organizations which seek a chemical or biological weapons capacity can acquire requisite knowledge and skills through legitimate educational programs. This path of *techne* and *metis* acquisition has been

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<sup>293</sup> Ronald M. Atlas and Malcolm Dando, “The Dual-Use Dilemma for the Life Sciences: Perspectives, Conundrums, and Global Solutions.” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 4, no. 3 (2006): 276-286.

<sup>294</sup> Shmuel C. Shapira and Meir Oren, “Ethical Issues of Bioterror,” *Studies in Conflict & Terrorism* 29, no. 5 (2006): 395-401. Doi: 10.1080/10576100600695390.

<sup>295</sup> Shmuel C. Shapira and Meir Oren, “Ethical Issues of Bioterror,” *Studies in Conflict & Terrorism* 29, no. 5 (2006): 395-401. Doi: 10.1080/10576100600695390.

<sup>296</sup> Simon Wain-Hobson, “H5N1 viral-engineering dangers will not go away,” *Nature*, March 27<sup>th</sup>, 2013. <http://www.nature.com/news/h5n1-viral-engineering-dangers-will-not-go-away-1.12677>.

<sup>297</sup> Bruce Alberts, “Introduction H5N1.” *Science* 336, no. 6088 (2012): 1521, <http://www.sciencemag.org/content/336/6088/1521.full>.

<sup>298</sup> Simon Wain-Hobson, “H5N1 viral-engineering dangers will not go away,” *Nature*, March 27<sup>th</sup>, 2013. <http://www.nature.com/news/h5n1-viral-engineering-dangers-will-not-go-away-1.12677>; James W. Le Duc and David R. Franz, “Genetically Engineered Transmissible Influenza A/H5N1: A Call for Laboratory Safety and Security,” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 10, no. 1 (2012): 153-4. Doi: 10.1089/bsp.2012.0006

<sup>299</sup> Steve Connor, “‘Appalling irresponsibility’: Senior scientists attack Chinese researchers for creating new strains of influenza virus in veterinary laboratory,” *The Independent*, May 2, 2013, <http://www.independent.co.uk/news/science/appalling-irresponsibility-senior-scientists-attack-chinese-researchers-for-creating-new-strains-of-influenza-virus-in-veterinary-laboratory-8601658.html>.

exploited by terrorist groups in the past; Ramzi Yusuf drew on his training as an electrical engineer to construct complex and highly lethal bombs, while Aum Shinrikyo actively recruited members whose expertise derived from a scientific or technical education.<sup>300</sup>

The academic research environment offers students pursuing advanced scientific degrees substantial freedom, and indeed encouragement, to spend large amounts of time in laboratories, often with minimal oversight. Such students, and lab personnel, possess keys, permission, and 24-hour access to highly sensitive areas in order to conduct research as it suits their schedule. Deviations from the typical 9-5 schedule are more the rule than the exception, potentially allowing scientists or students with undiscovered associations with terrorist organizations to operate without arousing suspicion.<sup>301</sup> A clear indication that the danger from insiders is not considered in the same league as those posed by outsiders is that laboratory orders of supplies and specimens “often happen with only minor oversight” by supervisors.<sup>302</sup> Indeed, as Hellmich and Redig note, “The unrecognized challenge facing the counterterrorist community is that there is no good reason [in an academic setting] to build a pipe bomb, but there are thousands of good reasons to create genetically modified organisms, clone a gene, extract a protein, or culture microorganisms.”<sup>303</sup> It should additionally be noted that a scientific career allows an individual to cross international borders for legitimate professional functions such as conferences and collaboration with colleagues in other nations without arousing suspicion, providing increased opportunities for potential radicalization.<sup>304</sup>

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<sup>300</sup> Jeffrey M. Bale and Gary A. Ackerman, “How Serious is the ‘WMD Terrorism Threat?: Terrorist Motivations and Capabilities for Using Chemical Biological, Radiological, and Nuclear (CBRN) Weapons,” (Report for Center for Nonproliferation Studies, 2007).

<sup>301</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>302</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>303</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

<sup>304</sup> Christina Hellmich and Amanda J. Redig, “The Question is When: The Ideology of Al Qaeda and The Reality of Bioterrorism,” *Studies in Conflict and Terrorism* 30, no. 5 (2007): 375-396. Doi: 10.1080/10576100701258593.

## Chapter 3: Qualitative Analysis<sup>305</sup>

As the first pillar in the tripartite analytical framework employed, the qualitative analysis was designed to leverage the literature review and the qualitative expertise of the project research team in order to develop a ranking which would largely reflect “conventional wisdom” regarding chemical and biological non-state actor threats.<sup>306</sup> As the first step in this analytical process, a preliminary set of CB threat indicators was developed, which could serve as the basis for future operational usage.

### DERIVATION OF QUALITATIVE INDICATORS

In order to develop an initial set of indicators, the wider research team, including START analysts and graduate students working collectively, employed the following procedure<sup>307</sup>:

1. Close consultation of the literature review occurred, followed by group discussion, in a structured brainstorming format, as to relevant CB threat indicators that emerge therefrom. These included attributes, behaviors and events that might indicate possible chemical and/or biological activity on the part of a non-state adversary.
2. Chemical and biological threats were considered separately.
3. Indicators were broadly grouped into those pertaining to an adversary’s motivation and those pertaining to its capability (with certain indicators being applicable to both).<sup>308</sup> The capability component in this instance was taken to include both factors relating to the actor itself (such as its amount of available funding or technical expertise), as well as those in the actor’s broader sociopolitical environment that might increase its opportunities to acquire CB agents, such as the availability of raw materials. This was done partly for purposes of parsimony and partly because it was recognized that these aspects are inextricably linked and interdependent in practice. Motivation- and capability-related indicators were clustered under the following sub-categories
  - a. Motivation
    - i. Doctrines
    - ii. Prior Behavior and Historical Context
    - iii. Expressive Factors
    - iv. Ideology

<sup>305</sup> This chapter was written by Gary A. Ackerman.

<sup>306</sup> The expert elicitation would be structured, in part, to challenge conventional wisdom and incorporate outlier threat possibilities.

<sup>307</sup> This process is similar, but not precisely the same, as that employed in Gary A. Ackerman, Charles P. Blair, Jeffrey M. Bale, Victor Asal and R. Karl Rethemeyer, *Anatomizing Radiological and Nuclear Non-State Adversaries: Identifying the Adversary*. (College Park, MD.: National Consortium for the Study of Terrorism and Responses to Terrorism, 2009).

<sup>308</sup> The analysis was guided by an analytical framework based on the standard threat equation (THREAT = MOTIVATION \* CAPABILITY).



- v. Desire to Increase Operational Capabilities
  - vi. Organizational Dynamics
  - vii. Relations with External Actors
  - viii. Perceived Ease of Acquisition
  - ix. Strategic/Tactical Operational Objectives
- b. Capability
- i. Access to Relevant Facilities
  - ii. Prior Behavior and Historical Context
  - iii. International Climate
  - iv. Operational Capabilities/Dynamics
  - v. Organizational Resources
  - vi. Production/Weaponization/Delivery Equipment
  - vii. Relations with External Actors
4. In order to allow for a comprehensive threat assessment, both positive and negative indicators were considered, i.e., those attributes, behaviors and events that might indicate an increased CB threat (positive indicators), but also those, if observed, that would lessen concern regarding a potential CB threat (negative indicators).
5. The initially large list of potential indicators was parsed and consolidated to yield 199 separate indicators.
6. Once the final form of each indicator had been decided upon, the group appended an intensity score that represented an estimation of the general strength of that indicator in pointing toward an increased or decreased threat. The strength of the indicator reflects assessments of: 1) how likely an adversary pursuing chemical or biological weapons is to exhibit the attribute or behavior; and 2) how differentially diagnostic the indicator is (in terms of distinguishing between potential CB activity and other violent behaviors). It was recognized, however, that the importance of any particular indicator might vary according to the specific actor and context under consideration and thus that these intensity scores should not be taken as absolute.

The initial set of indicators was then utilized in the application described below. After the quantitative and elicitation portions of the study were completed, additional indicators were added and some of the initial indicators were slightly amended based on the results of these elements of the study. The final set of indicators is presented in Appendix I in the form of eight separate segments (positive and negative indicators for both motivation and capability, covering both chemical and biological threats). The indicators are broad-ranging and include many factors that experienced analysts might regard as being somewhat obvious; their inclusion reflects the procedure's goal of being as thorough as possible. The inclusion of such factors also helps to make the set of indicators something of a checklist, which, while seemingly straightforward, are increasingly seen as powerful tools.<sup>309</sup> Indeed, it has been noted by one former intelligence analyst that in over two decades working in the intelligence arena he has found it

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<sup>309</sup> Atul Gawande, *The Checklist Manifesto* (New York: Picador, 2011).

“astonishing how often the checkables are ignored.”<sup>310</sup> At the same, it is acknowledged that not all imaginable indicators are presented – the focus in this analytical stream was on what can be derived from the open-source literature, with speculation about more esoteric indicators reserved for other phases of this project.

**APPLICATION TO ADVERSARY RANKINGS**

In order to derive a threat ranking of potential CB adversaries that could target the United States or its overseas facilities through 2022, project researchers adopted a straightforward procedure to assess extant and emerging adversaries. It should be noted at the outset that, notwithstanding superficial similarities, this process was not intended to constitute a formal computational risk assessment incorporating uncertainty (which is undertaken during a later phase of this study using a Bayesian model), but merely to assist in dealing with a multitude of indicators. In so doing, this procedure also provides an illustration of one way that the derived indicators might be operationalized, although there are many other approaches that could be taken in this regard.

1. Based on discussions in the literature and brainstorming current and emerging non-state adversaries, the research team produced a set of 44 potential adversaries that could conceivably present a CB threat in the period to 2022. Thirty-one of these represent extant organizations, whereas 12 represent generic categories. Table 1 below lists the adversaries considered.<sup>311</sup>

**Table 3.1: Adversaries Considered for Qualitative Ranking**

Extant Adversaries	Generic Adversaries
Abu Sayyaf; Aleph (Aum Shinrikyo); al-Nusra Front; al-Qa’ida Central; al-Shaabab; al-Qa’ida in the Arabian Peninsula (AQAP); Islamic State of Iraq and the Levant (ISIS); al-Qa’ida in the Islamic Maghreb (AQIM); Boko Haram; Caucasus Emirate (CE); D-Company; Earth Liberation Front (ELF)/Animal Liberation Front (ALF); ETA; Revolutionary Armed Forces of Colombia (FARC); Hamas; Haqqani network; Hizballah; Indian Mujahideen (IM); Islamic Movement of Uzbekistan (IMU); Jemaat Islamiyah (JI); La Familia Michoacan/Knights Templar; Laskere-Jhangvi (LeJ); Lashkar-e-Taiba (LeT); Mojahedin-e-Khalq (MEK); Palestinian Islamic Jihad (PIJ); PLO/Palestine Liberation Organization (PLO)/al-Aqsa Martyrs’ Brigades; Kurdistan Workers Party (PKK);	Anarchists; Anti-Abortion Extremists; Apocalyptic Millenarian Cult; Buddhist Extremists; Christian Identity Groups; Hindu Extremists; Jewish Extremists; Right-Wing Militias; Sikh Extremists; Domestic U.S. Tax Protesters; Ethnic Chinese Triads; White Supremacists.

<sup>310</sup> Michael Scheuer, *Imperial Hubris: Why the West Is Losing the War on Terrorism* (Washington, D.C.: Potomac Books, Inc. (2005), p. 21-2.

<sup>311</sup> Additional adversaries could of course be considered, based on the most current classified or unclassified information, especially as particular incarnations of some of the generic adversaries manifest. Certain adversaries were selected as representative organizations within a specific milieu, e.g., Mexican drug trafficking organizations.

National Liberation Front of Corsica (FLNC);  
 Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/Óglaigh na hÉireann; Salafia Jihadia; Tehrik-e-Taliban Pakistan (TTP); Los Zetas.

2. Project researchers then considered each adversary in turn to determine which of the indicators (if any) were present or likely to be present within the project time horizon with respect to that adversary.<sup>312</sup>
3. Each indicator was then assigned a score based on the intensity designation previously associated with that indicator.<sup>313</sup> For the aforementioned rudimentary nature of this analysis, the simplest scoring method was adopted, i.e.:

<u>Intensity Level</u>	<u>Score</u>
<i>Weak</i>	1
<i>Weak to Medium</i>	1.5
<i>Medium</i>	2
<i>Medium to Strong</i>	2.5
<i>Strong</i>	3
<i>Very Strong</i>	5

Negative indicators were assigned negative scores. The scores for the motivation- and capability-related for each weapon type were then simply summed algebraically to yield a motivation and capability score for each group.

4. Since the motivational indicators for chemical and biological weapons overlapped considerably, the motivational indicators for CB were analyzed together (i.e., a single motivation score was calculated for CB pursuit by each adversary). However, researchers noted if there were any “disqualifying” factors that might make the adversary far less likely to adopt one type of weapon over the other (for example, the Earth Liberation Front is far less likely to embrace chemical weapons – which they regard as pollutants – than biological agents). Such an approach was deemed sufficient for the preliminary nature of the current analysis, although a more formal use of the indicators would generally necessitate a separate calculation for chemical and biological motivation. Owing to the far more substantial differences in chemical and biological capability indicators, these were calculated separately for each adversary. A sample of the application of this procedure to three of the aforementioned adversaries is depicted in Appendix II.

<sup>312</sup> The inclusion of generic adversaries somewhat complicated this procedure in that it remains indeterminate which precise characteristics would present themselves in any particular manifestation of these adversaries that might emerge. Nonetheless, as a first approximation, researchers based their estimations on past behavior and attributes exhibited by these types of actor.

<sup>313</sup> Scores were only assigned if the researcher positively identified the indicator as being present with a substantial likelihood over the period to 2022; no scores were assigned if the indicator was positively identified as being absent or if it was unknown whether it was present or absent. Other approaches that deal with unknowns differently are possible. See, for example, Amy Pate, Mila Johns, Gary Ackerman, and McKenzie O’Brien. *The Threat of Pakistani Criminal Organizations: Assessing the Potential for Involvement in Radiological/Nuclear Smuggling, Collaboration with Terrorist Groups and the Potential to Destabilize the Pakistani State* (College Park, MD: START, 2012). Report Prepared for the United States Department of Defense.

5. In order to allow for an exploration of the sensitivity of the results, several methods were utilized for combining motivation and capability scores to yield a final ranking, as follows:
  - a. *Combining Rankings*: for this method, the organizations were ranked separately by CB motivation, chemical capability and biological capability according to their scores. Thereafter, the scores were not considered, only the adversary's rank.<sup>314</sup> The ranks were combined in two ways, first by adding the ranks (an arithmetic combination) and then by multiplying the ranks. So, for example, if an adversary was ranked 6<sup>th</sup> for motivation and 12<sup>th</sup> for chemical capability, then its combined chemical threat scores would be '18' additively and '72' multiplicatively. Two ranked lists were thus obtained, one based on an ordinal ranking of additive scores and one based on an ordinal ranking of multiplicative scores.
  - b. *Combining Scores*: for this method, the raw component scores for each adversary were combined, both additively and multiplicatively. So, for example, if a particular adversary received a CB motivation score of '29' and a biological capability score of '9', this would be combined additively to give a biological threat score of '38' and multiplicatively to give a score of '261'. The resulting additive and multiplicative combined scores for each adversary, respectively, were then placed in ranked order, resulting in a similar two ordinal combined rankings.
6. Researchers then met as a group to discuss the four ranked lists that had been obtained. The lists were similar overall, with some exceptions (e.g., La Familia Michoacan was ranked in the top ten for both raw score lists, but only 19<sup>th</sup> and 20<sup>th</sup> in the combined ranking lists).<sup>315</sup> While the ranked lists served as a starting point for discussions, various members of the project team were able to offer arguments, based on their subject matter expertise for why a particular adversary should be promoted or demoted in the final list. It was at this stage that several members of the research team argued strongly for inclusion of disgruntled scientists as a distinct adversary. Disgruntled scientists had not been included in the previous indicator assessment because it was felt that their motivations were too varied and nebulous (usually not following any specific ideology) to allow for estimates of whether particular indicators would or would not be present. However, at the stage of the final qualitative discussion, it was felt that this set of actors constituted a major, if not the predominant, CB threat over the next ten years. The team therefore decided to include this set of actors in order to draw attention to the qualitatively different threat believed to be posed by those with specialized CB knowledge and access to materials. The inclusion of disgruntled scientists emphasizes the ultimately qualitative nature of the analysis, with the final analysis merely utilizing the ranking procedure as a baseline for further subject matter input. Thus analysis should always take into account the contextual particularities of each actor and weigh the strength, reliability and relevance of any observed indicators accordingly.

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<sup>314</sup> One advantage of this method is that it normalizes across the motivation and capability scores, while a potential disadvantage is that it does not account for the absolute difference between the scores of the different adversaries.

<sup>315</sup> The four ranked lists for C and B, respectively, are presented in Appendix III.

The final agreed-upon list of the top twenty ranked CB threats that emerged from the qualitative analysis is presented below in Table 2. The significance of this ranking will be discussed later, in conjunction with the other analytical streams.

**Table 3.2: Qualitative Ranking of CB Adversary Threats to 2022**

<b>Chemical Weapon Attack</b>	
1	Disgruntled Scientist(s) / Technician(s)
2	al-Nusra Front
3	al-Qa'ida Central
4	Hizballah
5	Islamic State of Iraq and the Levant (ISIS)
6	Apocalyptic Millenarian Cult
7	al-Qa'ida in the Arabian Peninsula (AQAP)
8	al-Qa'ida in the Islamic Maghreb (AQIM)
9	Revolutionary Armed Forces of Colombia (FARC)
10	Lashkar-e Jhangvi (LeJ)
11	Jemaah Islamiyah (JI)
12	Los Zetas
13	La Familia Michoacan/Knight Templar
14	Right-Wing Militias
15	Christian Identity Groups
16	Lashkar-e Taiba (LeT)
17	Tehrik-e-Taliban Pakistan (TTP)
18	D-Company
19	White Supremacists
20	Caucasus Emirate (CE)

<b>Biological Weapon Attack</b>	
1	Disgruntled Scientist(s) / Technician(s)
2	Hizballah
3	al-Qa'ida in the Arabian Peninsula (AQAP)
4	Apocalyptic Millenarian Cult
5	al-Nusra Front
6	Lashkar-e Taiba (LeT)
7	Earth Liberation Front (ELF)/Animal Liberation Front (ALF)
8	al-Qa'ida in the Islamic Maghreb (AQIM)
9	Islamic State of Iraq and the Levant (ISIS)
10	al-Qa'ida Central
11	Revolutionary Armed Forces of Colombia (FARC)
12	Right-Wing Militias
13	Lashkar-e Jhangvi (LeJ)
14	Jemaah Islamiyah (JI)
15	Christian Identity Groups
16	Caucasus Emirate (CE)
17	Haqqani Network
18	Hindu Extremists
19	Tehrik-e-Taliban Pakistan (TTP)

## Chapter 4: Analysis of the Empirical Record<sup>316</sup>

### THE CHEMICAL AND BIOLOGICAL NON-STATE ADVERSARIES DATABASE (CABNSAD)

#### Introduction

The Chemical and Biological Non-State Adversaries Database (CABNSAD) — presently available as an alpha version— is a perpetrator level dataset that seeks to bring together available open-source data on all *previous* non-state users and attempted users of CB weapons or devices. The conception and development of CABNSAD was inspired by a previous, though smaller scale, START effort to build a perpetrator level dataset which compiled data about all non-state users and attempted users of radiological or nuclear weapons, devices or materials, the Radiological and Nuclear Non-State Adversaries Database (RANNSAD).<sup>317</sup> Before proceeding to an examination of the results of an analysis derived from CABNSAD data it is first necessary to describe the sources consulted in the compilation of CABNSAD, identify the inclusion criteria employed with regard to data selection and, finally, outline the structure of the database itself.

#### Background

One of the key framing questions which guided the larger effort was perpetrator identification; specifically: *Who are the most likely chemical or biological non-state threat actors?*<sup>318</sup> This framing mandate required the development of a systematic method of recording detailed information about all *previous* non-state users and attempted users of CB weapons. Once identified, the perpetrators were systematically entered into a coded dataset—CABNSAD. This database was then used to inform the analytical portions of the broader study. As with any data collection, this effort presented numerous decisions of inclusion and coding, which are explained below.

#### Sources

The initial source for establishing a list of chemical and biological non-state actors was the START Profiles of Incidents involving CBRN-use by Non-State Actors (POICN) Database. This database

<sup>316</sup> This chapter was written by Gary Ackerman.

<sup>317</sup> Gary A. Ackerman, Charles P. Blair, Jeffrey M. Bale, Victor Asal and R. Karl Rethemeyer, *Anatomizing Radiological and Nuclear Non-State Adversaries: Identifying the Adversary*. Report prepared for the Science and Technology Directorate, Department of Homeland Security, grant number N00140510629 (College Park, MD.: National Consortium for the Study of Terrorism and Responses to Terrorism, 2009). RANNSAD can be accessed at [http://www.start.umd.edu/start/data\\_collections/#RANNSAD](http://www.start.umd.edu/start/data_collections/#RANNSAD)

<sup>318</sup> For a full description of the framing questions, see the introduction of, Ackerman et al., *Anatomizing Chemical and Biological Non-State Adversaries*.

represents the most comprehensive open-source, unclassified dataset of ideologically motivated non-state actors and CBRN incidents available. POICN is, however, an *event-level* database, meaning that while it does record information on perpetrators, most of the information is focused on details surrounding individual CB incidents. As the same actor might be involved in *several* discrete events, it was necessary to consolidate events to identify a set of actors. In addition, POICN only covers the period from 1990 to 2012, whereas CABNSAD's designers sought to include a wider time range. Moreover, as POICN is limited to ideologically motivated events, it was necessary to utilize additional sources in order to capture the potentially much larger set of events represented by non-ideological activity. Non-ideologically (i.e., "purely" criminally) motivated CB incidents were identified through a combination of the Monterey Institute of International Studies' now defunct Weapons of Mass Destruction Terrorism database (WMDT), and focused searches of open-sources.

### Inclusion Process & Criteria

POICN and the other sources were scrutinized for all CB incidents (including proto-plots,<sup>319</sup> plots, attempted acquisitions, possessions of materials, threats with possession, attempted uses, and use of CB materials as a weapon) dating back to the start of the 20<sup>th</sup> Century. All ideologically motivated perpetrators were included in the database and non-ideologically motivated ("purely" criminal) cases were included within certain bounds determined by resource and time constraints, as well as considering the overall purpose of the dataset.

Perpetrators of the following events were excluded from CABNSAD:

- Events in which the perpetrator made threats without actually possessing or actively seeking to possess or obtain any harmful agent were not included.
- Events in which an individual poisoned, or attempted to poison an *individual* spouse, other relative, or close associate, for personal reasons such as vengeance or retribution (so-called "one-on-one" criminal events) were excluded unless the perpetrator utilized a sophisticated (e.g., organophosphate pesticide delivered as an aerosol) or high-end ("warfare") CB agent capable of causing significant harm to individuals or groups.
- While those events involving attempts to force changes in a company's policies or practices, or to extort money from a company were included when there was evidence of the use or possession of an agent, cases where no evidence of an actual agent was present were defined as a hoax and the perpetrator excluded.

Scrutinizing the sources for all CB incidents (including plots, attempted acquisitions, possession of materials, threats with possession and use of CB materials as a weapon) more substantial than a mere threat or hoax yielded an initial set of incidents that were subsequently consolidated into a collection of

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<sup>319</sup> Protoplot: refers to incidences when the sources do not present any evidence of an actual plot but rather mention events that may lay the groundwork for an actual plot. For instance, the discovery of a chemical weapons manual or knowledge of a terrorist group hiring a scientist with a weapons' specialty would be coded a protoplot.



430 potential perpetrators.<sup>320</sup> Since in many of the incidents—150 out of 430—the perpetrator was unknown or only generically specified, such as “Criminal Organization” or “Chechen militants,” researchers conducted a preliminary analysis of each of these incidents. When researchers believed that there was a high probability that multiple incidents with unknown or generic perpetrators were committed by the same actor or actors—based on an assessment of material, location, date, and other factors—these incidents were consolidated under a single profile.

Furthermore, upon initial inspection, several of the CB incidents were found to be clear cases of one-on-one murder, or attempted murder, typically involving spousal relationships, with no broader ideological or criminal motivations or effects, or the use of chemical or biological agents of particular interest. These incidents and the associated actors were excluded from the dataset. In a number of one-on-one cases the perpetrator used sufficiently dangerous agents that their inclusion within the dataset was considered warranted. In another set of cases, there was a high degree of uncertainty whether the incident involved the use of a CB agent, or even whether it took place. These cases were retained, but coded to specify them as entailing high uncertainty factors; consequently, they could be included or excluded from analyses depending on requirements. In addition, although attacks on CB facilities were a focus of the broader study only where the release of agent was intended to be immediate (rather than, say, theft for later use), researchers believed that perpetrators of these types of attacks in general were relevant, if only for their motivational influences, which might in turn drive other types of CB behavior.

After elimination and consolidation, a total of 373 distinct actors remained. These were then divided between project staff for research and compilation. In addition to utilizing the POICN and WMDT case material, this research included surveying open-source news collections (through such repositories as Lexis-Nexis, ProQuest, and the Open Source Center), consulting other secondary materials and contacting other researchers familiar with the cases in question. Given the large number of cases requiring investigation, and the time and resource constraints of the overall project (of which this effort was only one component), the amount of time devoted to researching each profile was limited and obviated, for example, travel to the location of an incident or requisitioning of court records. Therefore, there were a number of cases (60% – 65%) that researchers felt would benefit from additional research (including in-the-field investigations) and these were designated as such in order to guide future research efforts. Integrating data from classified sources has the potential to significantly expand the comprehensiveness, and by extension the value, of this dataset. However, doing so was outside of the project’s overall scope.

Research for CABNSAD was conducted between September 2012 and November 2013.

### **Systemization of Profiles**

After all known events were distilled into the 373 discrete perpetrator entities, CABNSAD was still one

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<sup>320</sup> Perpetrators are defined by CABNSAD as an individual or a group (made up of individuals acting in concert) that have either pursued or used CB materials to cause harm.

step away from construction. Researchers systematically reviewed the dataset and developed a structure that could capture all relevant perpetrator data. In order to enable systematic comparison across perpetrators, each entry, to the extent possible, collected information on the following elements:

1. *Name and organizational affiliation(s) of the perpetrator*, if known. If the identity was suspected or alleged but not certain, the moniker “alleged” or “suspected” was appended to the name or organization.
2. *Demographics*: Any available demographic details about individuals within the perpetrator entity were recorded (especially gender, age, socio-economic level, education, and residence).
3. *CB Materials*: the type(s) and amount(s) of chemical / biological material(s) collectively sought / acquired / used.
4. *CB Activity*: This included, where available, the date, intended target and intended delivery method for each attack / plot; each attack / plot is listed separately.
5. *Results*: Degree to which the perpetrators were successful, e.g., how far did the plot proceed (and why did it not proceed further)? If the plot was launched successfully, were there casualties, economic damage, etc.? Were the perpetrators apprehended / charged / sentenced?
6. *Why CB*: Based on available data, were any specific reasons given or discovered for selecting CB weapons, or for the particular agent in question? What was the perpetrator’s broader motivation for action? (This included grievances, ideology, etc.)
7. *Capability level*: What were the (rough order of magnitude) levels of technical knowledge, financing, logistical backbone, etc. of the perpetrators when they embarked on their plan? What other capabilities, if any, were needed / sought? Where were these capabilities sought / obtained?
8. *How*: How did the perpetrator(s) acquire / intend to acquire the perceived requisite materials for their plot?
9. *Uncertainty*: For perpetrators; the inherent uncertainty as to whether the individual was directly involved in the CB pursuit or use in any way. For events; whether there is any inherent uncertainty that the event actually involved a chemical or biological agent?
10. *Reference*: This records the sources used for each perpetrator and provides the analyst with the capacity to assess the sources for objectivity (a measure of whether the provided information shows bias), and competence (the level of capability for accurate recording and reporting of information that an author/publisher brings to the event subject).

In total, CABNSAD contains 80 separate data fields, only 52 of which consist of variables that can be directly quantified. Therefore, although only the latter variables can be easily summarized and presented here, there is a wealth of qualitative information that can be gleaned by consulting individual perpetrator records. For a more detailed description of the CABNSAD variables the interested reader should refer to the CABNSAD codebook contained in the appendix III of this report.

## SCOPE OF ANALYSIS

Prior to examining the empirical record, it is necessary to define the scope of the analysis. First, since the current study aims to gain a greater understanding of adversaries, it makes most sense to focus on the historical record of perpetrators about which some information is available. Therefore, the current analysis of CABNSAD will utilize only those chemical/biological (CB) adversaries that have been identified.<sup>321</sup> The CB incidents identified in in the POICN Database and other sources generated a total of 373 total perpetrators involved (groups, autonomous cells or lone actors),<sup>322</sup> with several perpetrators associated with multiple incidents. Of these perpetrators, 158 remain unidentified, leaving a set of 215 identified perpetrators, which forms the basis for the current analysis. Although this analysis is based on the quantitative variables the current analysis is not intended to detract from the use of the database's qualitative variables to explore individual perpetrators in depth.

Second, in a domain such as terrorism involving unconventional weapons, which is characterized by a high degree of political and public concern, as well as the desire by many of the actors involved to manipulate perceptions to further their own strategic goals, there is naturally a high degree of uncertainty associated with many cases, especially when being forced to rely exclusively on open-source materials. While not wishing to exclude such cases entirely, analysis should take this uncertainty into account. This was achieved in the current study by performing all analyses on two distinct sets of data:

- a. The full dataset of 215 identified perpetrator entities (including any uncertain incidents, allegations, and so forth).
- b. A restricted "high-certainty" subset of the perpetrator entities, which *excluded* the following perpetrators:
  - i. Any cases where the identified perpetrator entity was only alleged / suspected of involvement in CB activities without any corroborating evidence (e.g., when a government blames an apparent poisoning on its main insurgent opponents without any claim of

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<sup>321</sup> CABNSAD does collect and code data for unidentified perpetrators, generally described as "Unknown Perpetrator" with a numerical designation. This is done to keep track of the number of unidentified perpetrators, as well as to serve as a platform for addition of new data should the perpetrator of a particular case be identified. However, as is to be expected, the amount of actual substantive data for these cases is extremely sparse, with many of the variables being coded as unknown.

<sup>322</sup> This figure is approximate because it is unknown how many of the unidentified perpetrators coincide, i.e., how many of the events where the perpetrator has not been identified perpetrator were carried out by the same perpetrator. Where it was reasonably clear, based on the context of cases (e.g. multiple letters contaminated by the same agent sent to similar targets) that the incidents were likely carried out by the same perpetrator, these were clustered under a single perpetrator, although there is a high degree of uncertainty involved in this process.

- responsibility or additional evidence linking the insurgent to the incident) [N=33 perpetrators].
- ii. Any perpetrator entity linked only to CB incidents that were possible cases of smuggling, i.e., where there was uncertainty over whether the non-state actor actually intended to be an end-user of the materials<sup>323</sup> [N=13 perpetrators].
  - iii. Perpetrators only involved in planned or actual attacks on CB facilities for the purpose of immediate release of the agent [N=1 perpetrator].<sup>324</sup>
  - iv. Perpetrators where there was uncertainty linking them to *all* of the CB events with which they had been associated [N=2 perpetrators for CB combined; N=21 perpetrators for chemical incidents only; and N=4 perpetrators for biological incidents only].
  - v. Perpetrators where there was uncertainty regarding whether all of the CB events with which they were associated actually occurred, or were merely apocryphal [N=2 perpetrators for CB combined; N=9 perpetrators for chemical incidents only; and N=5 incidents for biological events only].
  - vi. Perpetrators who, for various reasons, coders believed that there was a high degree of doubt whether they should be included in the dataset [N=18 perpetrators].

Since several of the categories of high uncertainty overlapped with one another, ultimately 52 perpetrator entities were excluded based on the above criteria (49 when considering perpetrators only involved in chemical incidents and 16 when considering perpetrators only involved in biological incidents). The resulting restricted dataset thus contained 163 distinct perpetrator entities. Performing analysis on both sets of perpetrators allows for some evaluation of the degree of robustness of the results to the vagaries of open source reporting and intentional distortion by interested parties.

Finally, while chemical and biological terrorism differ significantly (especially with respect to the technical issues and hence capability requirements involved), these two types of unconventional threats share many other similarities - for example, motivational impetus. Therefore, analysis was performed separately on those perpetrators involved with chemical agents and those involved with biological agents, as well as the combined dataset of perpetrators.<sup>325</sup>

With respect to agent type, Figure 4.1 below indicates that the vast majority of CB perpetrators (~70%) engaged in activities involving chemical agents only, with ~17% involved only in biological activities and

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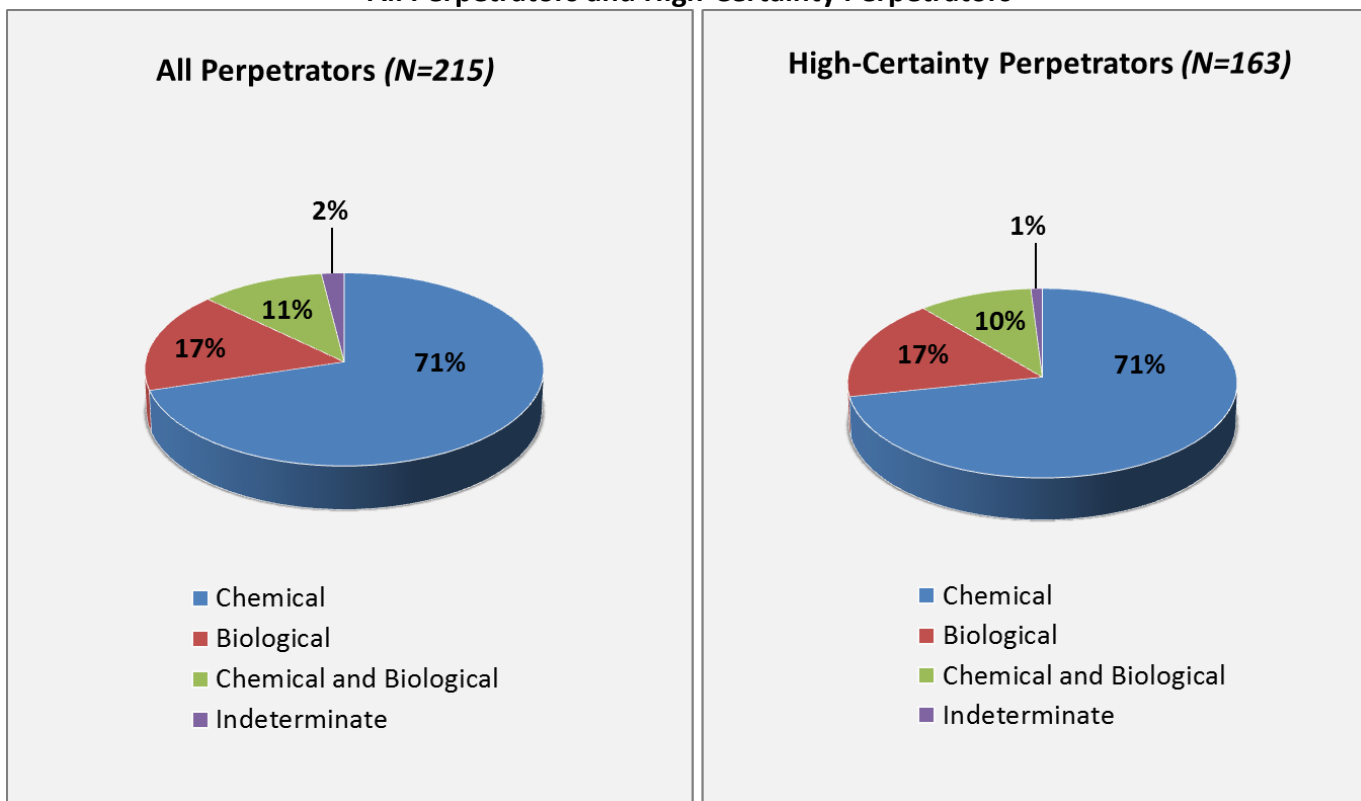
<sup>323</sup> Purely smuggling activities with no intent to utilize the agent in question do not fall within the current study's definition of a non-state CB adversary.

<sup>324</sup> This was done owing to the radically different set of skills and attributes associated with this type of attack, which does not require prior weapon acquisition or production activities and, in essence, constitutes little more than a sophisticated conventional attack. In any event, there was only a single perpetrator that fell into this category, the right-wing extremists affiliated with the Ku Klux Klan who plotted to attack a facility storing hydrogen sulfide in the so-called "Sourgas Plot." "The FBI Versus the Klan Part 5: Trouble in Texas," *Federal Bureau of Investigation*, December 16, 2010, available at [http://www.fbi.gov/news/stories/2010/december/klan\\_121610](http://www.fbi.gov/news/stories/2010/december/klan_121610)

<sup>325</sup> The combined dataset results do not merely reflect the addition of the results for each agent type, since many perpetrators were involved with both chemical and biological agents, or the type of agent they were involved with was not able to be determined (e.g., in cases where a perpetrator was reported as having engaged in "poisoning" activities without further specification of agent).

a further ~10% involved with both agent types, proportions that are constant across the datasets. This confirms the assertion in much of the literature that chemical agents are far more likely to be pursued or used than biological agents, with only a relatively small proportion of adversaries interested in or capable of pursuing both types of agents. When considering the overall number of perpetrator entities involved with each agent type, we see that in the full dataset, there are 175 “chemical perpetrators” and 60 “biological perpetrators”, while in the high-certainty dataset, the figures are 126 and 44, respectively.

**Figure 4.1: Types of Agents Engaged in by Chemical/Biological Perpetrators, All Perpetrators and High-Certainty Perpetrators**



The analysis that follows is admittedly preliminary and entirely descriptive. Nonetheless, with the relatively large numbers of cases, some initial insight can be gleaned even from a rudimentary look at relative frequencies. Future research will apply more sophisticated statistical techniques and tests of robustness, including ANOVA and correlation matrices.<sup>326</sup>

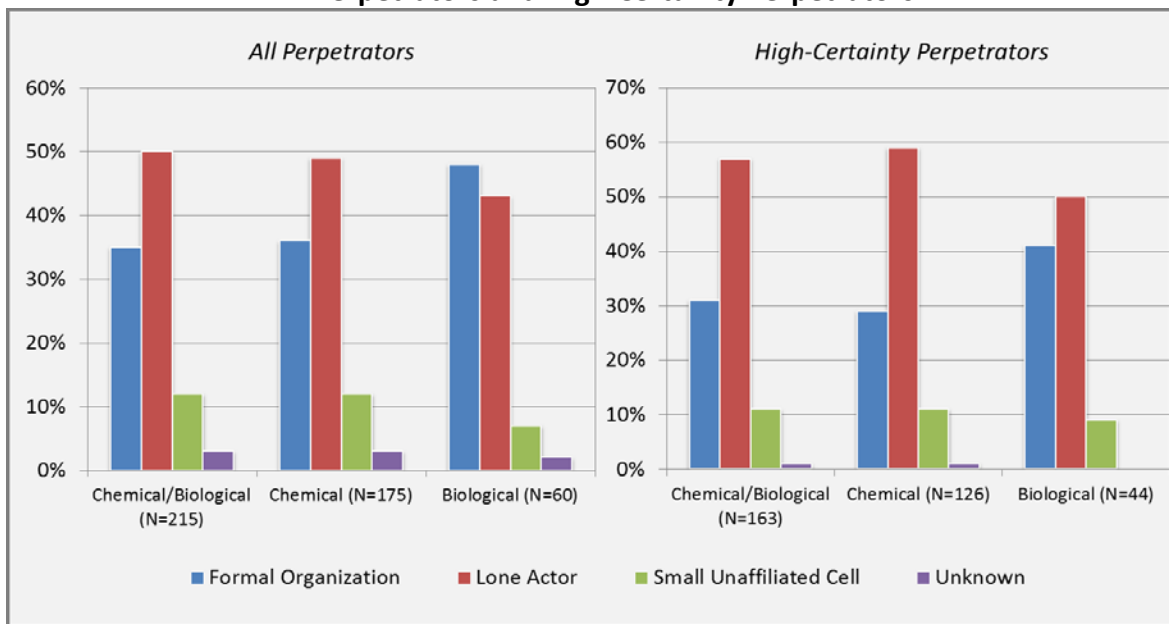
**PERPETRATOR TYPE**

With respect to the type of non-state actors which have become involved in plotting or carrying out a CB attack, the data (see Figure 4.2 below) shows that over half of all CB perpetrators have been lone actors

<sup>326</sup> It should be remembered that this initial look at the empirical record forms part of the qualitative pillar of this study. The quantitative pillar combines CABNSAD with other, longitudinal, actor-level datasets and generates sophisticated statistical models.

(57% in the high-certainty dataset and 50% in the full dataset), with formal organizations next most likely with approximately a third of total attacks, and autonomous cells constituting around one tenth of CB perpetrators overall. There is, however, some variance between chemical and biological perpetrators: while lone actors predominate in pursuing both types of weapon (except in the more inclusive biological set), chemical events are more likely to involve lone actors than biological events (with an attendant rise in the proportion of biological activity pursued by formal organizations). These differences are mitigated somewhat in the more restrictive datasets, but are still present. This again tends to support the overall contention in the literature that it is more difficult to acquire and weaponize biological than chemical agents, implying a relatively greater appearance by formal organizations in the former category. Given that the vast majority of literature on CB use by non-state actors focuses on terrorist organizations (and less so on terrorist cells), the empirical distribution of actor type implies that more attention should be paid to lone actors than has hitherto been the case.<sup>327</sup>

**Figure 4.2: Type of Non-State Actors Involved in Chemical/Biological Attacks, All Perpetrators and High-Certainty Perpetrators**



When it comes to the different species of formal organization, the vast majority under all specifications were recognized terrorist groups, with only two criminal organizations present overall (and none in the high-certainty dataset) and three hybrid criminal-terrorist organizations (such as the FARC in Colombia) listed. Looking more closely at the type of unaffiliated cells, the situation is less clear-cut. Those cells that have become involved in CB activities are more varied in type, with approximately 50% (depending on which dataset is used) of cells overall having ideological or political motivations as their primary *raison d'être*, while “purely” criminal cells make up a third of the total and hybrid or other types of cell comprise the remainder. In the case of chemical weapons only, the criminal and terrorist cell categories are even

<sup>327</sup> Gary A. Ackerman & Lauren E. Pinson (2014), An Army of One: Assessing CBRN Pursuit and Use by Lone Wolves and Autonomous Cells, *Terrorism and Political Violence*, 26:1, 226-245

closer, with the higher certainty dataset showing them equally prominent at 43% each of all unaffiliated cell activity.<sup>328</sup> So, while almost all formal organizations that become involved in CB events are terrorist in nature, when it comes to small cells, there are a number who act out of more pecuniary or idiosyncratic impulses.

## HIGHEST LEVEL OF SUCCESS REACHED AND REASONS FOR FAILURE

Table 4.1 below depicts the highest level of CB activity reached by the perpetrators in all their efforts related to CB weapons. There are no major differences between the relative frequencies within the full and the high-certainty datasets in this regard, which implies that the results are not sensitive to the level of certainty in the information. Thus, only the high-certainty results are shown. Perhaps somewhat surprisingly, for CB perpetrators overall, successful<sup>329</sup> use of a CB agent as a weapon is the most frequent outcome. This phenomenon is even more acute when looking at perpetrators of chemical events, where 69% of all perpetrators who pursued chemical weapons proceeded through all eight stages of activity and reached the endpoint of actual use. This finding requires some discussion, since it appears to contradict the conventional wisdom in the literature on the topic. First, there is no doubt some degree of selection bias operative here, with the cases that actually ended up in the use of an agent being most likely to be reported in the open sources; thus there may be numerous plots and attempted acquisitions that never come to light (at least not in the public sphere). In addition, the CABNSAD database, not being an incident-level dataset, does not capture the level of sophistication present in the actual uses; therefore many cases may in fact represent relatively crude attacks using low-toxicity agents. This does not seem to be the case, however, since when one looks at the POICN incident database and looks at only those incidents classified as “heightened interest”, one finds that use of an agent still accounts for 46% of all incidents.<sup>330</sup> In any event, the sheer number of perpetrators who were able to bring their CB plans to some type of fruition (not to mention that over 80% of them managed to acquire an actual CB weapon of some type) is concerning.

When looking at perpetrators associated with biological events, the situation is somewhat different, with only one quarter of biological perpetrators actually delivering an agent to a target. Yet, even here, almost 70% of perpetrators proceeded at least as far as possessing some type of weaponized agent. While these figures do not reflect how many failures an adversary experienced either before or after initial success, these highly skewed distributions might prompt a reconsideration of the literature’s estimations for the degree of difficulty in acquiring and using CB weapons.

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<sup>328</sup> While the number of unaffiliated cells involved in biological activity is too small to draw any conclusions (n=10 for the more inclusive and 8 for the more restricted set), “terrorist” cells appear almost three times as likely as purely “criminal” cells to become involved.

<sup>329</sup> Success here is an objective measure that reflects the actual dissemination of the agent with measurable consequences, as opposed to whether the attack fulfilled the perpetrator’s tactical or strategic motives for attacking.

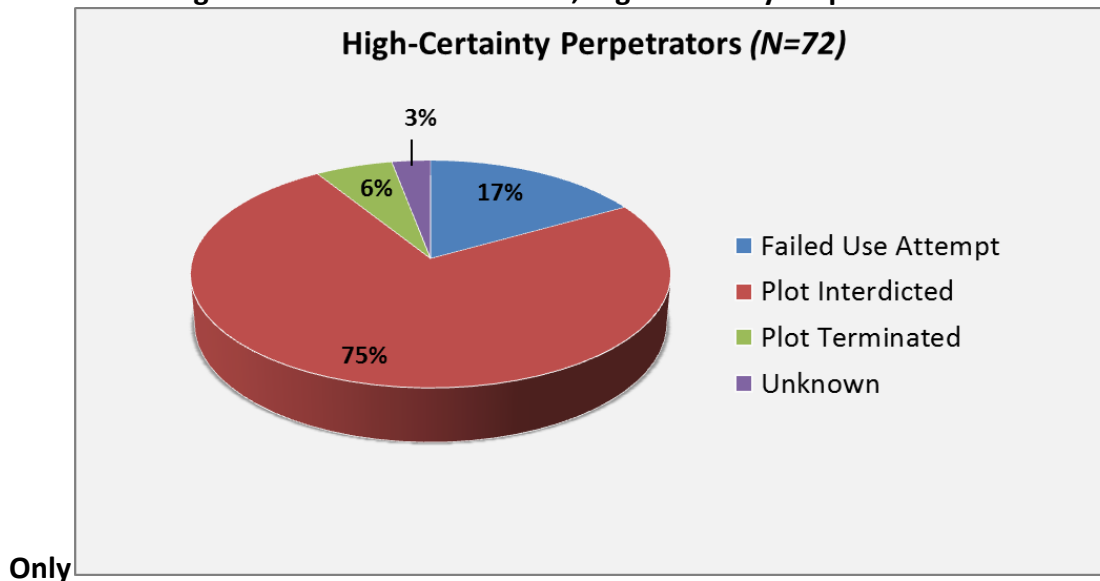
<sup>330</sup> POICN defines a “heightened interest event” as one that meets any of the following three conditions: a) The event resulted in at least five total casualties (injuries and/or fatalities); b) the event involved a CBRN agent that is classed as a warfare agent; or c) the event involved either the use of or a plot to create a weaponization of the agent in at least a moderately sophisticated manner.

**Table 4.1: Highest Level of Chemical/Biological Weapons Activity Reached by High-Certainty Perpetrators**

Highest Activity Type	Chemical/Biological (N=163)		Chemical (N=126)		Biological (N=44)	
	Cases	Percentage	Cases	Percentage	Cases	Percentage
Protoplot	8	5%	3	2%	5	11%
Plot Only	9	6%	6	5%	2	5%
Attempted Acquisition	3	2%	2	2%	1	2%
Acquisition of Material/Possession of a Non-Weaponized Agent	11	7%	5	4%	6	14%
Possession of a Weapon	18	11%	11	9%	11	25%
Threat with Possession	10	6%	6	5%	6	14%
Attempted Use of Material	7	4%	6	5%	2	5%
Use of Agent	97	60%	87	69%	11	25%
Unknown	0	0%	0	0%	0	0%

When looking at those perpetrators who did not ultimately succeed in any of their CB endeavors, Figure 4.3 suggests that the primary reason is that their plots were interdicted,<sup>331</sup> although again, this may be an artifact of the selection process in that plots that were voluntarily abandoned may not come to light.

**Figure 4.3: Reasons for Failure, High-Certainty Perpetrators**



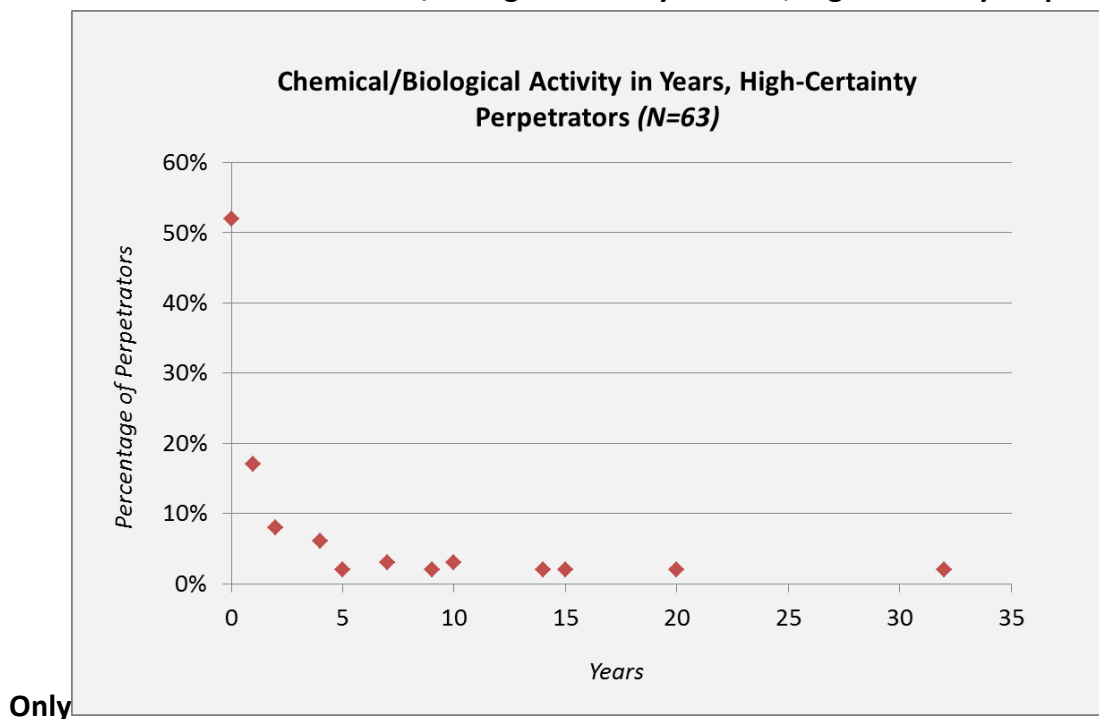
Another interesting aspect to consider is the duration of a perpetrator’s CB activity, since it gives an

<sup>331</sup> Similar results are obtained for C and B separately, as well as for both the inclusive and high-certainty datasets.



indication of how long the perpetrator entity was able to pursue CB weapons before it was interdicted or gave up and turned to other activities. Considering the high-certainty dataset (although the results are similar for the full dataset), Figure 4.4 shows a frequency distribution of the 63 perpetrators where a definite CB start and end date are available in the data. More than half of the sample had CB careers that lasted less than a year, with more than 75% of perpetrators being involved with CB for two years or less. There are, however, a handful of cases where the CB activity extended over a longer period, up to a span of three decades for one lone actor poisoner.

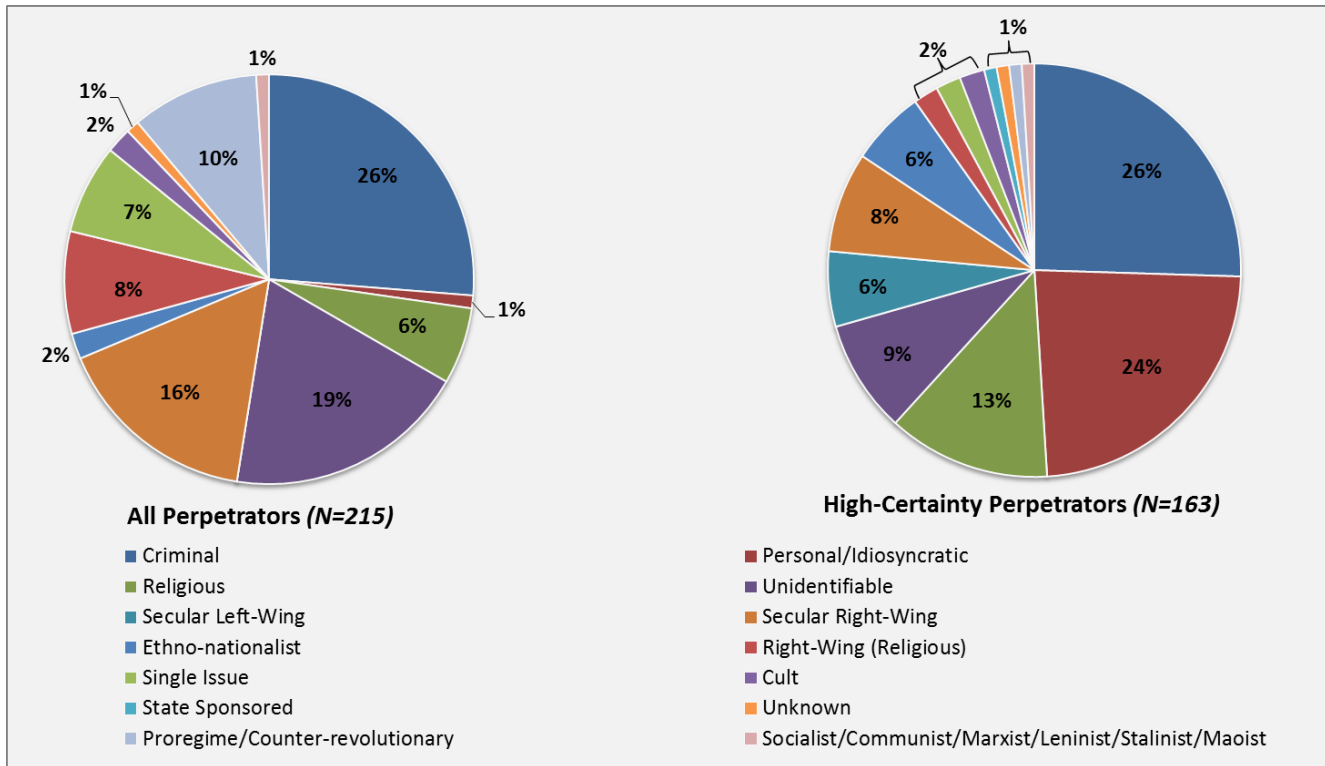
**Figure 4.4: Distribution of Chemical/Biological Activity in Years, High-Certainty Perpetrators**



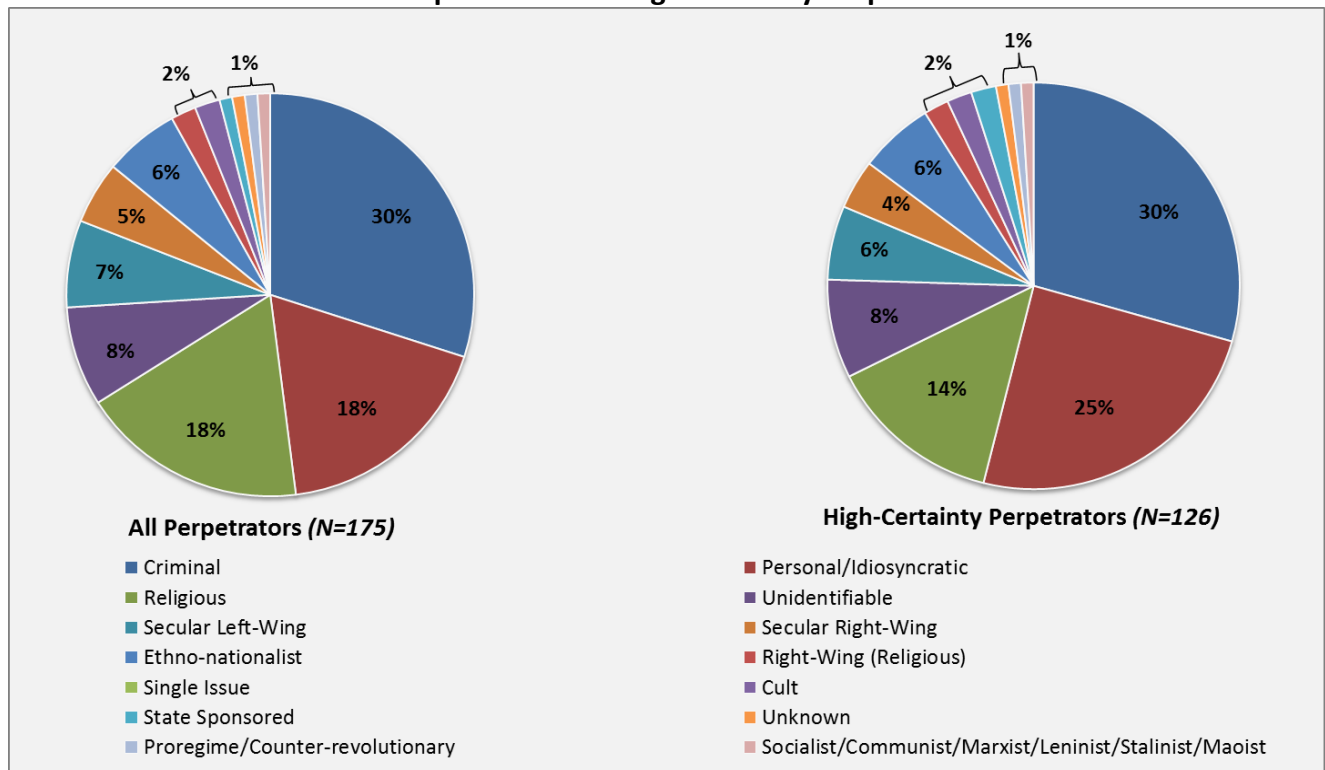
**MOTIVES**

Figures 4.5 – 4.7 below display the distribution of the dominant ideology or motive held by CB perpetrators across the cases. The first element to note in the figures is that there is a relatively broad range of ideologies, covering much of the ideological spectrum. Particularly noteworthy is the clear evidence that the largest group of CB perpetrators overall, and especially chemical perpetrators, are those driven by a range of criminal motivations. This contradicts the often-held belief that the threat is limited to religious extremists and mentally unbalanced individuals. However, the data does make clear that, of those with non-criminal motives for employing CB, the two leading motivations across the samples were personal/idiosyncratic motives and religious ideologies. The predominance of criminal motives for action is not the case for biological adversaries, where the proportion of criminal motivations is well below that for personal/idiosyncratic motives and on a par with right- and left-wing ideologies. If one unpacks the religious category further, one finds that Sunni Islamists dominate in every category and dataset (e.g., with 28 of the 34 religiously motivated extremists under the full, overall CB category.)

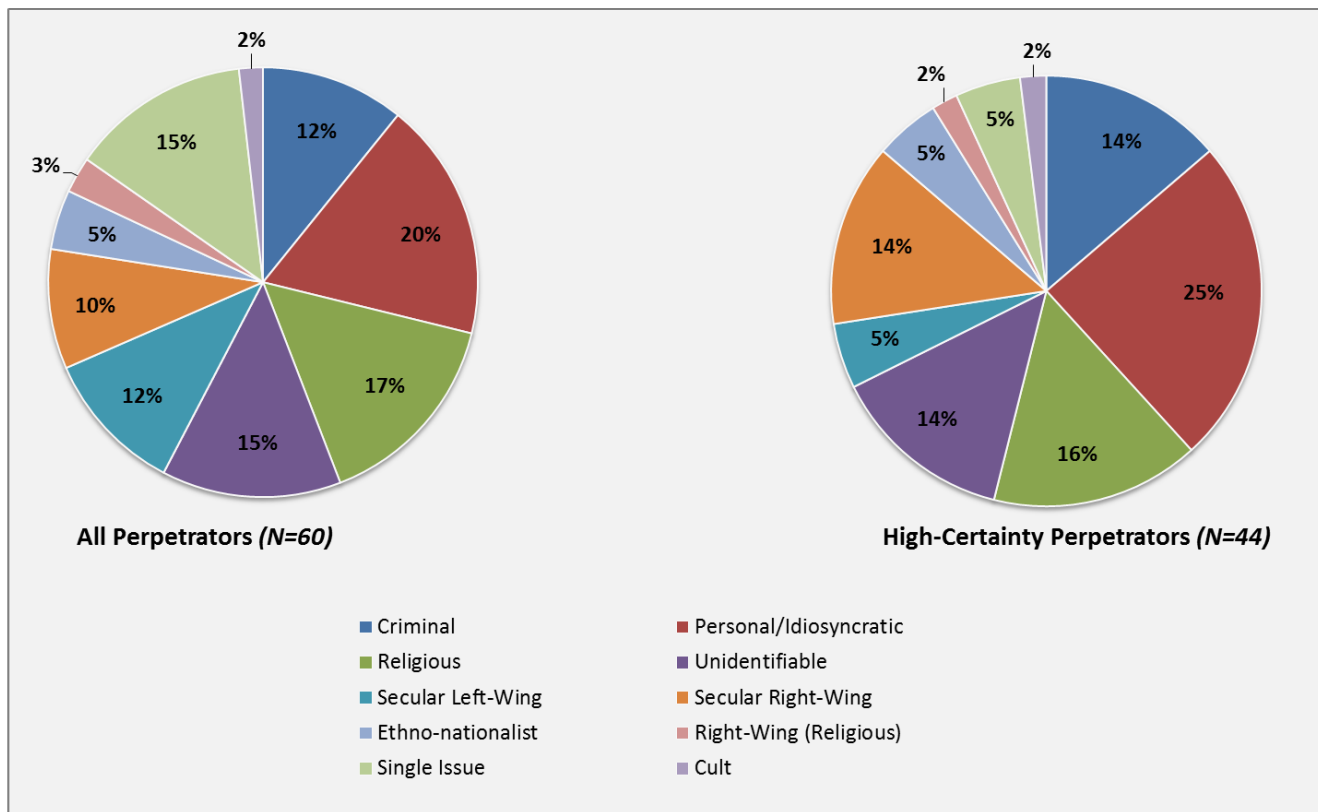
**Figure 4.5: Ideologies and Motives of Perpetrators for Employing Chemical/Biological Material, All Perpetrators and High-Certainty Perpetrators**



**Figure 4.6: Ideologies and Motives of Perpetrators for Employing Chemical Materials Only, All Perpetrators and High-Certainty Perpetrators**



**Figure 4.7: Ideologies and Motives of Perpetrators for Biological Materials Only, All Perpetrators and High-Certainty Perpetrators**



## OPERATIONAL MODES

### Intended or Actual Mode of Weapon Acquisition

Table 4.2 below shows the frequency distribution for the modes of acquisition either employed or intended by CB perpetrators, with around 7% of perpetrators pursuing multiple avenues. The first point to note is that in many cases the mode of intended or actual acquisition was not able to be identified. For those where the mode of acquisition is known, although perpetrators have historically utilized several means of acquiring a CB capability, there are some avenues of acquisition that have never been recorded as having been used by non-state actors, namely barter, bribery or coercion, purchase or theft from a recognized criminal organization, and theft from another terrorist group. The most common means by which perpetrators have pursued chemical weapons are through purchase (from either legitimate or illegitimate third parties, other than criminal organizations) and through their own production of agent via acquiring less-controlled raw reactants. Those who have pursued biological weapons, on the other hand, seem to prefer production of the agents from seed stocks over any other single method. This supports current efforts to control or track the legitimate use of chemical and biological agents and to formulate methods of detecting, through observable indicators or technical means, clandestine and illicit production of CW and BW. It should be noted, however, that there are several cases where perpetrators

have either stolen the agents they need or been given them by states or other terrorist organizations. This draws attention to the importance of tracing and understanding the social networks of nefarious non-state actors, a conclusion that has been reached in other research in this area.<sup>332</sup>

**Table 4.2: Distribution for the Methods of Acquisition Employed or Intended by Chemical/Biological Perpetrators, All Perpetrators and High-Certainty Perpetrators**

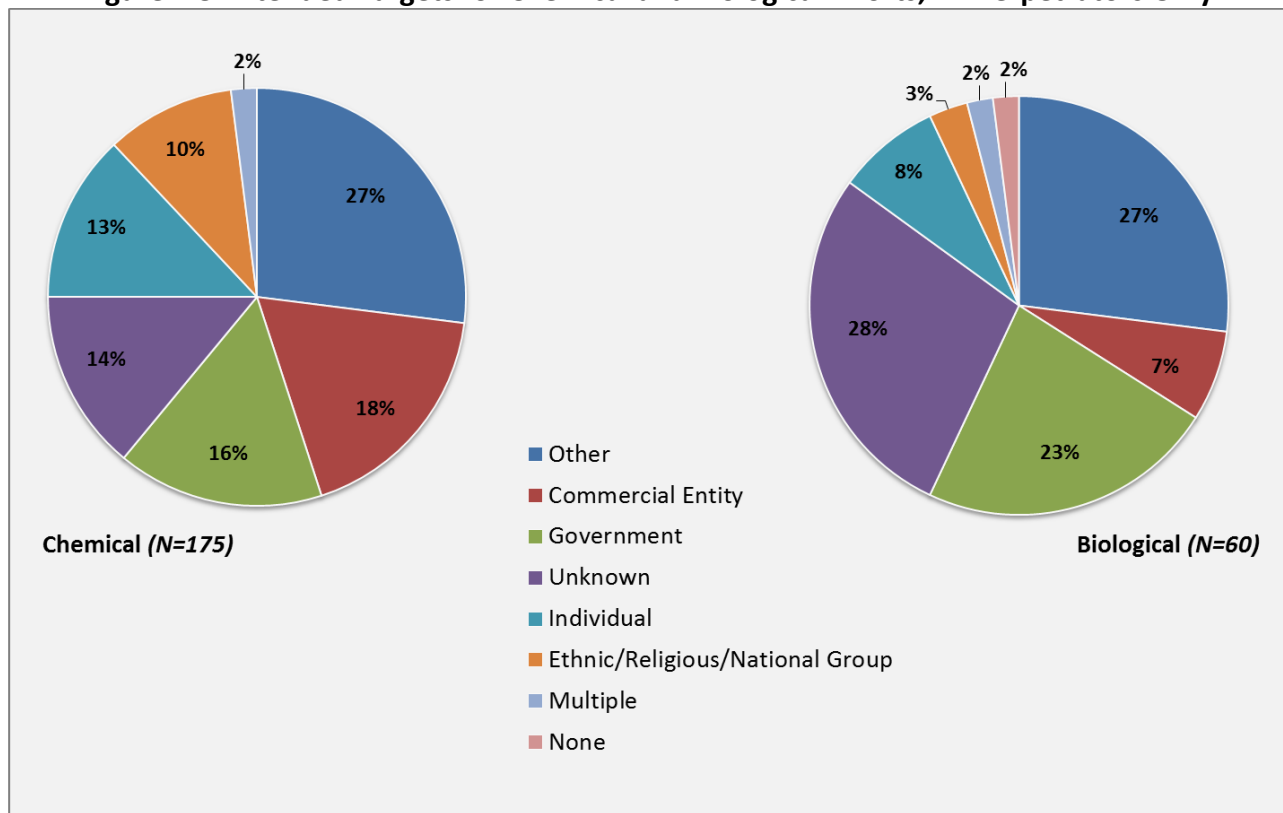
Intended Acquisition Method	Chemical/Biological		Chemical		Biological	
	All Perpetrators (N=228)	High-Certainty Perpetrators (N=172)	All Perpetrators (N=187)	High-Certainty Perpetrators (N=134)	All Perpetrators (N=68)	High-Certainty Perpetrators (N=47)
<i>Gift from</i>						
State	2%	1%	2%	1%	3%	0%
Terrorist Group	2%	2%	2%	2%	1%	2%
Criminal Organization	0%	1%	1%	1%	0%	0%
Other	1%	1%	1%	1%	0%	0%
<i>Purchase from</i>						
State	0%	0%	1%	0%	1%	0%
Terrorist Group	1%	0%	1%	0%	1%	0%
Criminal Organization	0%	0%	0%	0%	0%	0%
Other	14%	16%	15%	18%	9%	13%
<i>Theft from</i>						
State	1%	1%	1%	1%	1%	2%
Terrorist Group	0%	0%	0%	0%	0%	0%
Criminal Organization	0%	0%	0%	0%	0%	0%
Other	7%	9%	7%	10%	6%	9%
<i>Miscellaneous</i>						
Production	16%	17%	11%	10%	40%	45%
Serendipity	1%	2%	1%	1%	3%	4%
Barter	0%	0%	0%	0%	0%	0%
Bribery/Coercion	0%	0%	0%	0%	0%	0%
Unknown	54%	50%	59%	54%	34%	26%

**Intended Target**

Figure 4.8 below lists the predominant type of target against which each perpetrator directed its CB efforts. There was a lot of variety in targets (highlighted by the prominence of the “Other” category). Perpetrators employing or seeking to employ chemical weapons did not seem to overwhelmingly favor a single target type, while those seeking to use biological weapons, to the extent that it was possible to discern a type, directed them mainly towards government targets. In any event, no single target type was entirely excluded from have a CB attack directed against it.

<sup>332</sup> Victor Asal, R. Karl Rethemeyer, and Gary A. Ackerman, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism*, 35:3 (February 2012), 229-254.

**Figure 4.8: Intended Targets for Chemical and Biological Efforts, All Perpetrators Only**

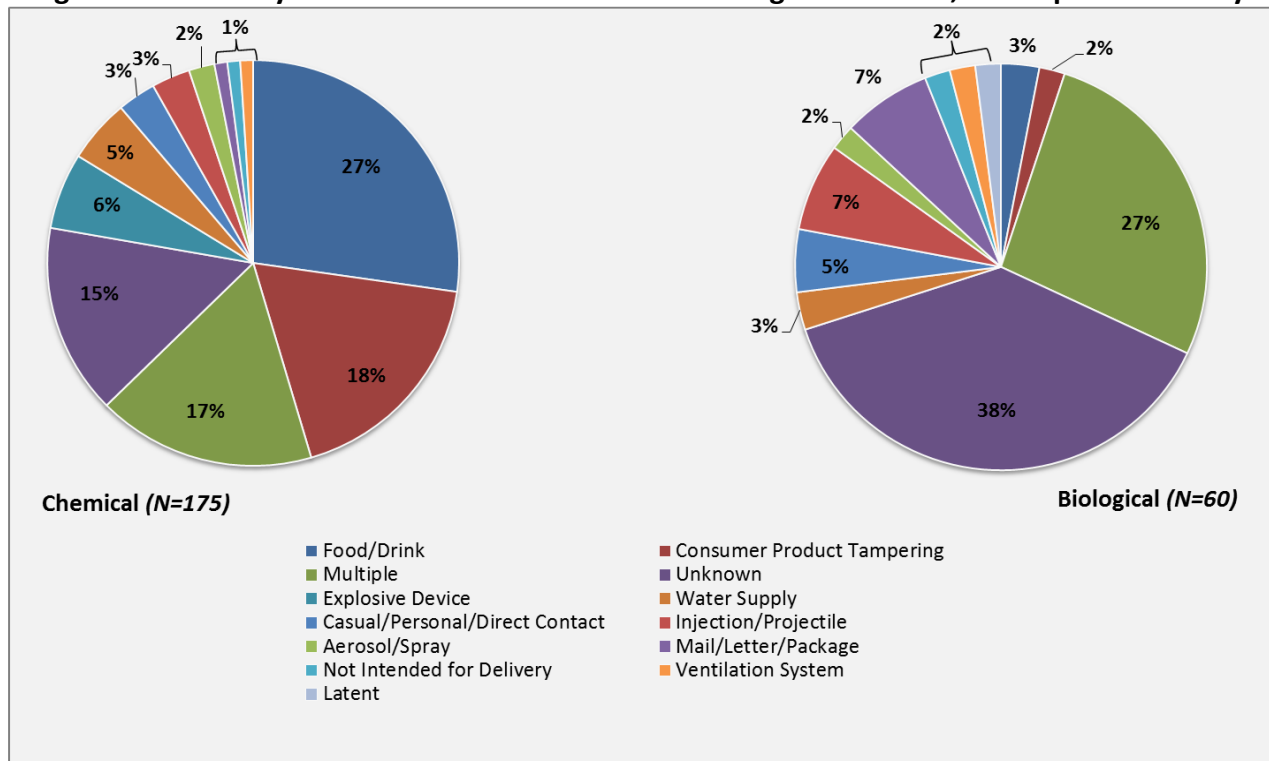


**Intended or Actual Delivery Method**

Figure 4.9 below shows the delivery mechanism by which the CB material was utilized or, in the case of interdicted or abandoned plots, was intended to be utilized by the perpetrator.<sup>333</sup> For perpetrators of chemical attacks, the relatively lower-sophistication dissemination methods of food, drink or consumer product tampering predominate, although almost every other delivery method (including more sophisticated aerosol and explosive dispersal) has at least been attempted. On the biological side, the distribution (where known) of the delivery mechanisms planned or used by perpetrators is more uniform, with a handful of cases of almost every mechanism. However, the data also indicates that perpetrators do not always put all of their delivery eggs in one basket, so to speak, as a sizeable proportion of perpetrators of both chemical and biological attacks pursued multiple delivery mechanisms.

<sup>333</sup> There are no appreciable differences in the relative frequencies between the more inclusive and the “high-certainty” datasets for this variable.

**Figure 4.9: Delivery Mechanisms for Chemical and Biological Material, All Perpetrators Only**



### Knowledge of Explosives

Since most of the perpetrators in the dataset did not select explosive dispersion, it was not necessary for most perpetrators to have in-depth knowledge of explosives. Nevertheless, 25-32% of chemical perpetrators and 45-48% of biological perpetrators counted within their skill sets (either as an individual, cell or organization) knowledge of explosives. This is not a sufficient number, however, to discern any correlation between explosives knowledge and CB behavior, especially since most non-CB pursuing extremist groups possess this knowledge.

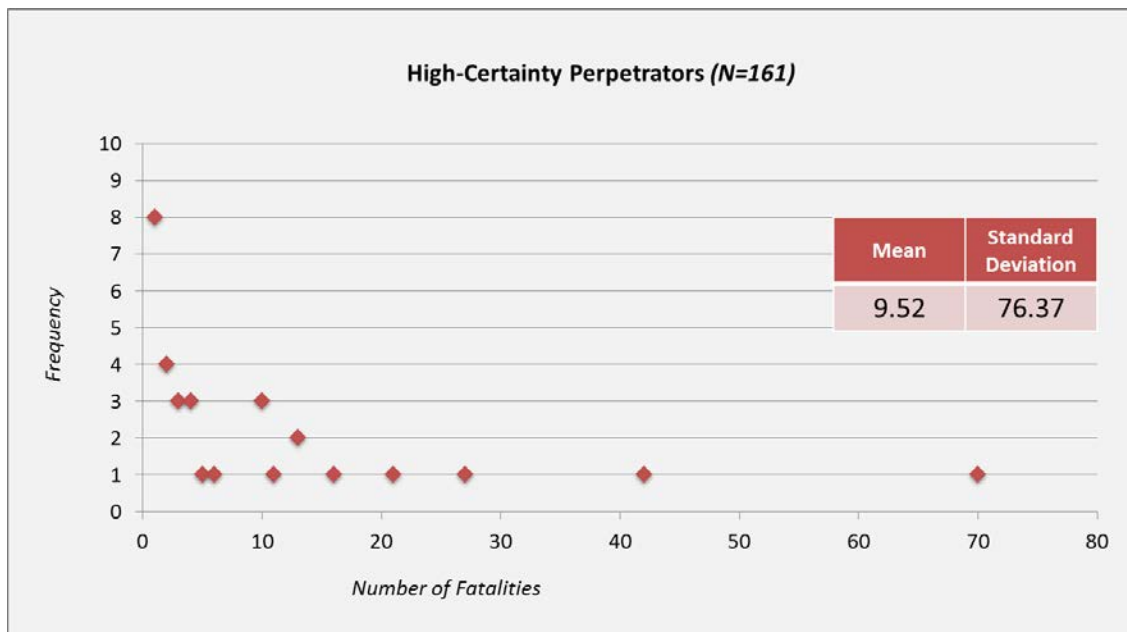
**Table 4.3: Perpetrators’ Knowledge of Explosives, All Perpetrators and High-Certainty Perpetrators**

Knowledge of Explosives	Chemical		Biological	
	All Perpetrators	High-Certainty Perpetrators	All Perpetrators	High-Certainty Perpetrators
No	39%	44%	28%	34%
Yes	32%	25%	48%	45%
Unknown	29%	30%	23%	20%

## CONSEQUENCES

Based on past experience with similar datasets, casualty figures are among those that are the most susceptible to bias and misreporting and it is thus prudent to take a conservative approach when analyzing this class of variable. For that reason, only the high-certainty dataset was used when assessing casualties, as well as adopting, in most cases, the lower bound when sources provided a range of casualty figures.<sup>334</sup> Figure 4.10 represents the total number of CB fatalities caused by each perpetrator, where known, over the extent of their CB activities. As is evident from the standard deviation, this is a decidedly one-tailed distribution, something that has been observed with respect to terrorism more generally.<sup>335</sup> Over 90% of would-be CB perpetrators actually cause fewer than five fatalities through their efforts, while only a handful of perpetrators have succeeded in causing what could be termed a mass-fatality incident. The two highest-fatality incidents were both the result of actions by cults (the People’s Temple of Jim Jones and the Movement for the Restoration of the Ten Commandments), where a large proportion of the victims were cult members.

**Figure 4.10: Chemical/Biological Fatalities, High-Certainty Perpetrators Only**



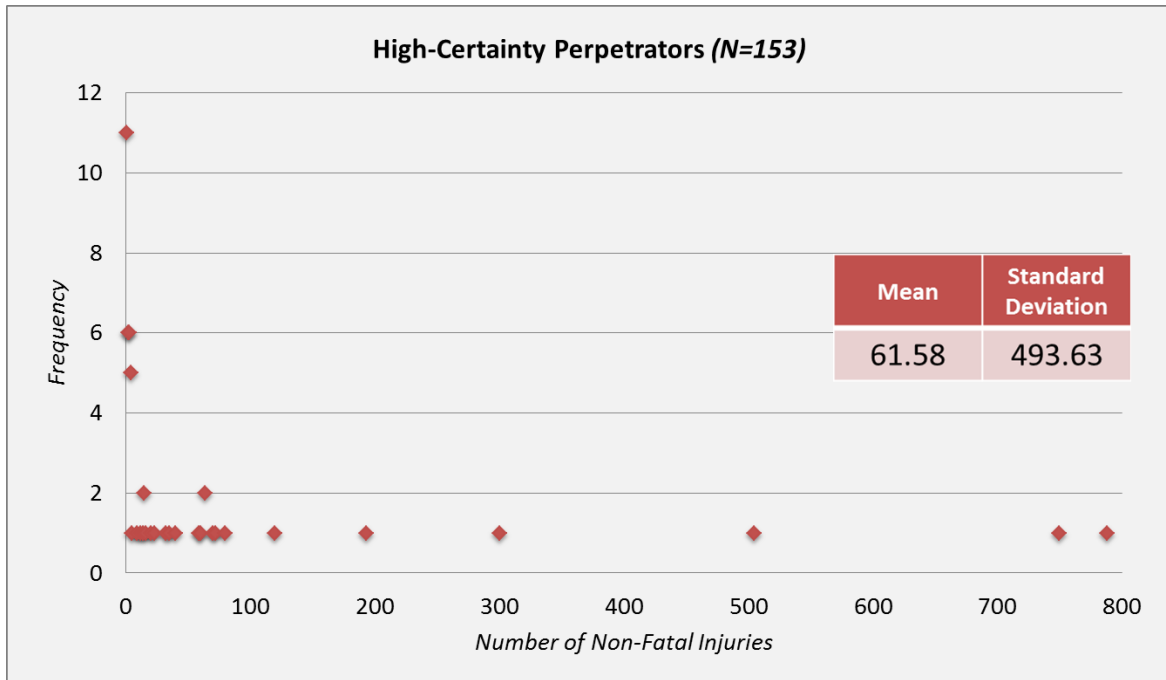
Note: The data points for the 0, 330, and 911 fatality incidents were removed from the graphic for legibility and aesthetic purposes.

Looking at non-fatal injuries, the pattern is similar, albeit even more stark. Figure 4.11 shows the number of injuries inflicted by each of the 153 perpetrators where such figures are known. Again, despite a mean of over 60 injuries per actor, more than 80% of CB perpetrators succeed in causing fewer than five CB injuries over their CB careers, with only seven cases with more than 100 injuries. These perpetrators, in particular Aum Shinrikyo, which caused over 6,000 casualties, skew the distribution far to the right.

<sup>334</sup> The more inclusive dataset did not reveal appreciably more casualties, however.

<sup>335</sup> A. Cluset, M. Young and K. S. Gledistch, “On the Frequency of Severe Terrorist Attacks,” *Journal of Conflict Resolution*, 51: 1 (February 2007). 58 – 88.

**Figure 4.11: Chemical/Biological Non-Fatal Injuries, High-Certainty Perpetrators Only**



Note: The data points for the 0 and 6,000 non-fatal injury incidents were removed from the graphic for legibility and aesthetic purposes.

Turning to the cumulative level of economic, social and infrastructural disruption caused by each perpetrator, Figure 4.12 shows that the vast majority of perpetrators cause no or mild disruption. Future research will explore whether there are any identifiable attributes of perpetrators who cause severe disruption, or whether this is more a function of the direct tactical contingencies (such as meteorological conditions or density of the target).

**Figure 4.12: Disruption Levels of Chemical/Biological Perpetrators, High-Certainty Perpetrators Only**



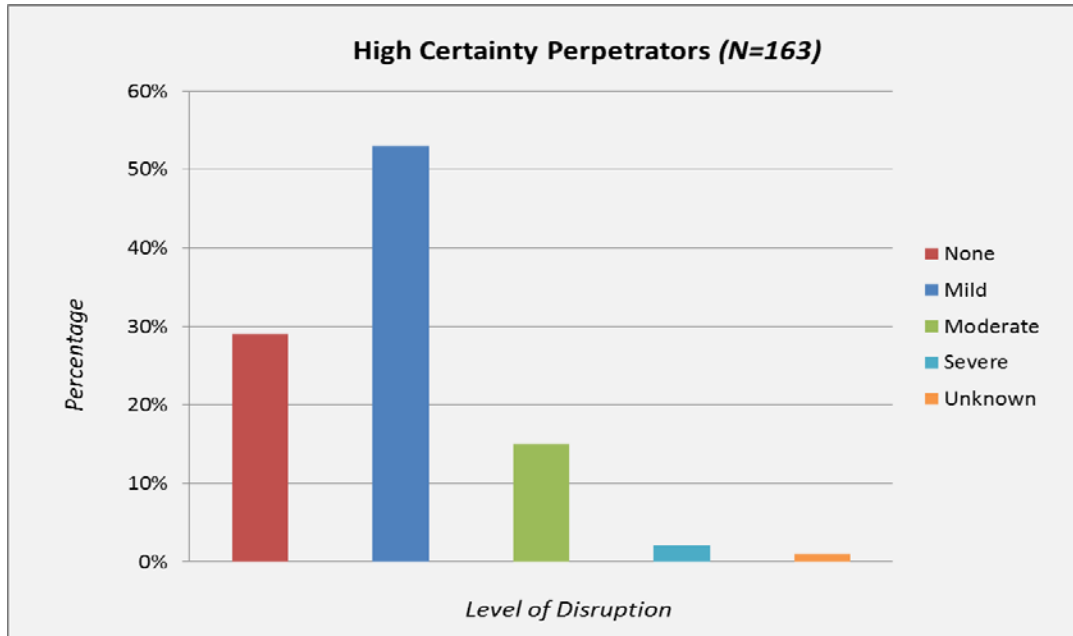
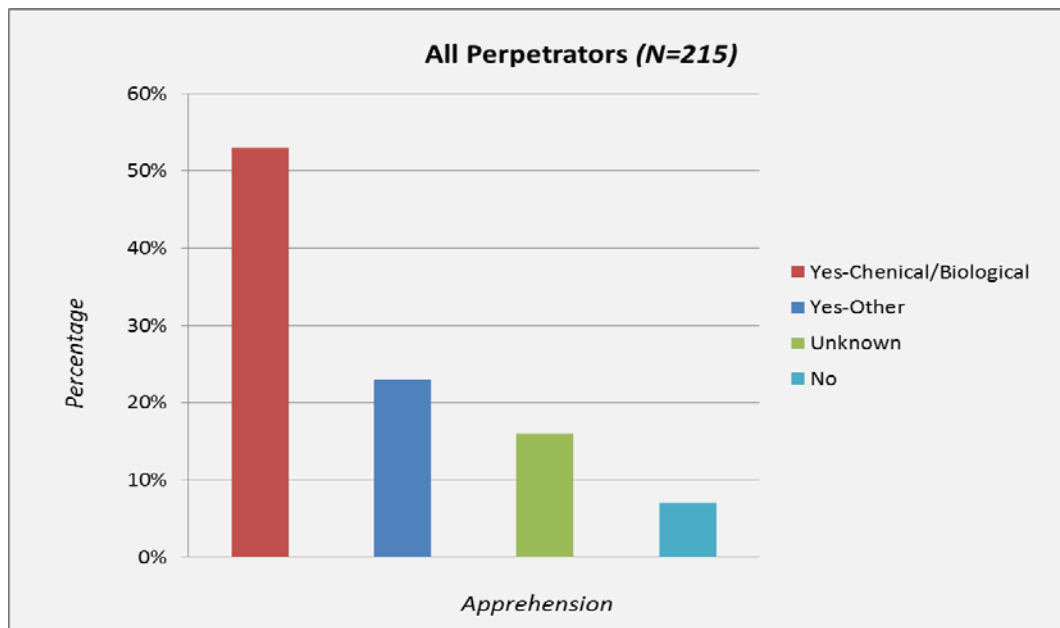


Figure 4.13 indicates that over 75% of identified CB perpetrators were eventually apprehended, although this is likely correlated closely with the fact that they have been identified, so may not provide much insight.

**Figure 4.13: Apprehension of Chemical/Biological Perpetrators, All Perpetrators Only**



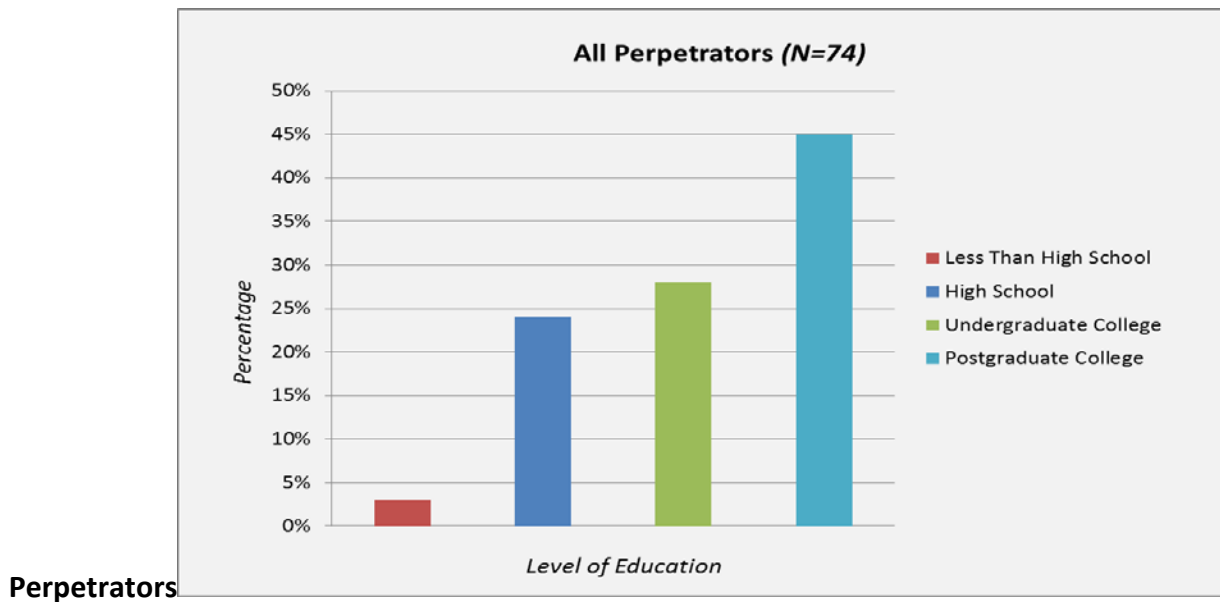
## INDIVIDUAL DEMOGRAPHICS

Thus far, the analysis has been directed towards the attributes of perpetrator entities, which included lone actors, small cells of like-minded individuals and large, formal organizations. While this can shed

light on the motives and behavior of perpetrators writ large, it does little to explain whether any traits at the individual level are associated with CB activity. Since CABNSAD records information on individuals, even when these are members of a larger entity, it is possible to create a dataset of all individuals who have been linked to CB activity. This was achieved by extracting all named individuals in the database, to yield a set of 426 people.<sup>336</sup> Within cells and organizations, there is sometimes considerable uncertainty whether a particular individual (say, a field commander within an insurgent group) directly participated in CB activities. Where this was the case, coders marked that individual as being an uncertain CB participant. The 109 individuals thus coded can be excluded, to generate a “high-certainty” dataset of 317 individuals, in a manner analogous to that carried out at the level of the overall perpetrator.

Beginning with individual gender, 86% of the more inclusive sample is male, with 12% female, making nefarious CB activity an overwhelmingly male affair.<sup>337</sup> As for the level of education reached, Figure 4.14 below<sup>338</sup> shows that for the 74 individuals for which information was available, 73% possessed at least some tertiary education and 45% had at least entered a postgraduate program. With respect to the age at which individuals became involved in CB activities, there is a wide range from 14 years of age to 75 years of age, with an average age of 38 years and a standard deviation of approximately 13 years.<sup>339</sup>

**Figure 4.14: Education Level of Chemical/Biological Perpetrators, All**



CB-involved individuals also hailed from more than 50 different countries, with Figure 4.15 below indicating the five most represented countries of origin for the high-certainty dataset.

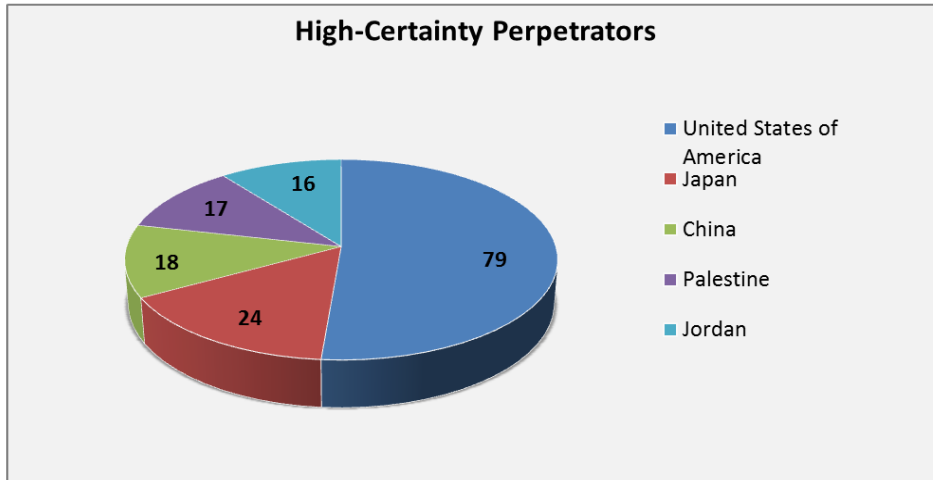
<sup>336</sup> The database also includes 41 unnamed individuals that are part of a larger entity and generic individual descriptors, such as “unidentified truck driver”, but since almost nothing is known about these people, they are not included in this analysis. Even when excluding these, the sample is quite robust.

<sup>337</sup> There is no substantive difference in the proportions for the higher-certainty dataset. Also, there are 6 individuals identified only by a sobriquet, where coders were not able to determine gender.

<sup>338</sup> Results for the high-certainty dataset are proportionally equivalent.

<sup>339</sup> Both the high-certainty and the inclusive dataset show essentially the same results.

**Figure 4.15: Five Most-Represented Countries of Origin for Chemical/Biological Perpetrators**



When it comes to the different roles that individuals play within CB plots, CABNSAD can give some guidance. Table 4.4 below shows the percentage of individuals who performed each function, although it should be recognized that an individual can perform more than one role. In this instance, the high-certainty dataset differs somewhat from the more inclusive dataset, so both are shown. Half of the individuals (57% in the high-certainty set) participated in some way in the decision making surrounding the CB activity, with a similar proportion acting as operatives in carrying out the attack. An even higher proportion (59% in the inclusive dataset and 71% in the high-certainty dataset) performed a logistical function in the plot / attack, but a much lower proportion of individuals (20% in the inclusive dataset and 24% in the high-certainty dataset) participated in the actual production process in developing the weapon. The latter finding no doubt reflects the need for some level of technical skill and knowledge in the production phase, which fewer of the individuals in a group or cell are likely to possess.

**Table 4.4: Percentage of Chemical/Biological Perpetrators that Performed Each Function, All Perpetrators and High-Certainty Perpetrators**

Functional Role	All Perpetrators (N=426)			High-Certainty Perpetrators (N=317)		
	Yes	No	Unknown	Yes	No	Unknown
Decision Maker	50%	48%	2%	57%	40%	3%
Logistics	59%	39%	3%	71%	26%	3%
Producer	20%	77%	3%	24%	72%	3%
Operative	50%	47%	3%	60%	37%	3%

## Chapter 5: Organizational Determinants of CB Weapon Pursuit and Use – A Quantitative Analysis<sup>340</sup>

### INTRODUCTION

While understanding the organizational determinants of the pursuit and effective use of chemical and biological weapons by non-state actors is seen as vitally important, unfortunately the provision of useful quantitative analysis of the determinants of acquisition, usage, or plots related to CB by VNSAs has been very challenging, for several reasons. First and foremost, there has been a lack of useful empirical data; both for events and efforts related to CB, and also for the characteristics of VNSAs themselves. Much research has been focused either at the event level or at the country level of analysis.<sup>341</sup> The challenge posed by the lack of data is compounded by the (so far) very rare nature of this kind of behavior on the part of VNSAs, which raises a whole host of analytical issues when dealing with the data that does exist. Recent data collection efforts have created an opportunity to examine empirically the pursuit and use of CB by VNSAs in a new way by looking at this behavior using organizational variables. Specifically this effort draws on data collection efforts undertaken as part of this study, which are discussed in the data section below and in other portions of this study.

We should note though that, even with this new data, the paucity of these kinds of attacks when aggregated at the yearly level is still quite high. So, for example, we only have one biological use or attempted use year in the entire dataset during the time period 1998-2007 (though the only organization that did this also attempted to use chemical weapons so there are possible extensions that can be made from the chemical usage analysis). Even for chemical weapons use the data is sparse with actual use or attempted use being a rare event (0.44% of the total organizational years in the data set).

We use a variety a variety of analytical approaches to attempt to quantitatively examine the determinants of the use or attempted use of these weapons. First, we focus on the likelihood of an attempt or use of these weapons, using both a logit regression and a rare event logistic regression where the dependent variable is the presence or absence of such an attack or attempt in any given year. Running analyses using both a regular logistic regression and a rare event logistic regression allows for a robustness check. The results for both the logistic regression and rare event logistic regression are substantively the same and thus we only report the probability results for the logistic regression. Logistic regression though only gets at the likelihood that an organization will or will not use or pursue CB weapons. Logistic regress will not address factors that help to explain why an organizations may wait (or not wait) to begin pursuit or use.

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<sup>340</sup> This chapter was written by Victor Asal, R. Karl Rethemeyer, and Amanda Murdie.

<sup>341</sup> Victor Asal, R. Karl Rethemeyer, and Gary A. Ackerman, "Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons," *Studies in Conflict and Terrorism*, 35:3 (February 2012), 229-254.

To address the question of how long it takes for an organization to transition to using or attempting to use these weapons, we use an event history statistical framework. This framework allows our focus to center on the time until an organization transitions to the use or attempted use of such weapons. While we would expect these two perspectives (likelihood of use and time until use) to have related results, they are analyzing fundamentally different questions. It is possible that the analyses will produce different predictors for proclivity vs likely time to use. In our analysis we find that while some variables are robust predictors across these two perspectives there are other factors that are having a significant impact in one analysis but not in the other.

In terms of identifying which factors we should use as independent variables for either model we turned to the existing relevant literature and drew on our previous work on this topic, which had used a single time period and a much smaller dataset.<sup>342</sup> Our previous analysis focused on capabilities, connections, ideology and country level constraints. One factor that was missing from our previous analysis was the lethality of the organization serving as a predictor of CB pursuit or use. Because it is clearly an important indicator of organizational capability, as well as of the willingness to kill and kill prolifically, we have added lethality measures into this new analysis. Another key difference between this and the previous analysis is the adoption of selection criteria that capture a wider array of VNSAs including insurgent groups rather than restricting the analysis solely to terrorist organizations. In the sections below we first discuss the data we are using in more depth and then turn to our logistic regression and hazard modeling results.

## Key Findings

We believe both analyses contain important, policy-relevant findings. The results of the logit models help to identify factors that seem to increase the probability that terrorist organizations will seek chemical or biological weapons. There are three important general findings from our research. First, the role of ideology as a factor driving pursuit and use of chemical or biological weapons capability is more modest and limited than much of the literature suggests. Religious and Islamist ideology seem to play a role in explaining why organizations pursue a chemical weapons capability but much less of a role in explaining which organizations actually use chemical or biological weapons. Second, a far larger motivator of chemical and biological weapons pursuit and use is the presence of alliance and rivalry connections. Alliance connections have been known for some time to play a role in facilitating pursuit and use of weapons of mass destruction but this analysis also examines the role of rivalry.<sup>343</sup> In harmony with the research on “outbidding” we find that having more rivalries increases the chances an organization will pursue or use a chemical weapon. Third, we find that organizations that engage in more killing are more likely to pursue, attempt to use, or use a chemical or biological weapon. Finally, while we find only

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<sup>342</sup> Victor Asal, R. Karl Rethemeyer, and Gary A. Ackerman, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism*, 35:3 (February 2012), 229-254.

<sup>343</sup> Victor Asal, R. Karl Rethemeyer, and Gary A. Ackerman, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism*, 35:3 (February 2012), 229-254.

marginal evidence that state sponsors play any role in terrorist organizations' choice to pursue or use chemical or biological weapons, if we do find an effect it tends to be negative. That is, our results suggest that state sponsorship reduces the likelihood a terrorist organization will use a chemical or biological weapon.

The results of event history models provide strong insights into the factors that influence the rate at which organizations adopt chemical/biological weapons. Organizations that have greater fatality counts are likely to make efforts to adopt chemical/biological weapons sooner. Organizations from wealthy countries are also likely to make efforts to adopt chemical/biological weapons quickly. We also find some evidence that leftist organizations, religious organizations, those organizations with more alliances to others, and those not located in democracies are likely to transition to putting forth efforts to acquire chemical/biological weapons quickly. Actual weapons usage attempts are also likely to be sooner as the organization's number of rival groups increases.

Clearly when it comes to CB behavior, the organizational lethality and network connections of the organization play a dominant role but there are other factors that need to be taken into account when building a profile of likely organizational behavior. It is also clear that while similar, the proclivity of such behavior and the rate of likely use are related but not exactly the same. We should note too that the same could be said of pursuit vs actual use.

## Data<sup>344</sup>

The data for this study was drawn from four sources: the Big Allied and Dangerous Version 2.0 (BAAD2) data system, the Global Terrorism Database (GTD), the Profiles of Incidents involving CBRN by Non-state Actors (POICN), and the Quality of Government Dataset (QoG).<sup>345</sup> The core organizational variables are drawn from BAAD2. BAAD2 was designed to remedy a central problem in the study of terrorist organizations: lack of comprehensive, time-series data on terrorist organizations. The BAAD2 data system is built around three components. First, in order to disentangle the myriad of names and alias related to terrorist entities, the BAAD2 data system includes the Terrorist Organizational ID system (TORG). The TORG system covers nearly 2,600 primary entities and slightly more than 2,900 aliases. For each primary entity the TORG system contains information on the organization's founding or "first known" year, the organization's primary country of residence or "home base" (rendered in text, as a COW code, and as ISO 3166-1 numeric and 3-letter country codes), and identifiers that match the primary entity to the same entity in data drawn from the GTD, the Uppsala Conflict Data Program (UCDP) data system, the Minorities at Risk (MAR) dataset, and the POICN dataset. Using the home base identifier, it is possible to link country-level data from the QoG dataset to organizations.

<sup>344</sup> Parts of this section are drawn from the data description found in the following conference paper: Victor H. Asal and R. Karl Rethemeyer, "Dark Choices: The Determinants of Terrorist Organizational Lethality," Refereed conference paper, Association for Public Policy Analysis and Management, 35<sup>th</sup> Annual APPAM Research Conference, Washington, DC. November 9, 2013.

<sup>345</sup> "The Quality of Government Dataset Codebook," The Quality of Government Institute (2013). Available at: [http://www.qogdata.pol.gu.se/codebook/codebook\\_standard\\_15may13.pdf](http://www.qogdata.pol.gu.se/codebook/codebook_standard_15may13.pdf).

For the purposes of this study, we used a subset of the entities found in the TORG system. Our unit of analysis was defined as any organization that (1) had perpetrated at least one act of terrorism as recorded by the Global Terrorism Database between 1998 and 2007 or (2) had appeared in the UCDP Battle-Related Deaths Dataset for the period 1998-2007. Implicitly, then, our operational definition of terrorism is the one used for the GTD: “the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation”.<sup>346</sup>

Inclusion in the UCDP Battle-Related Deaths Dataset is driven by a different set of criteria:

The Uppsala Conflict Data Program (UCDP) defines an armed conflict as a contested incompatibility that concerns government and/or territory over which the use of armed force between the military forces of two parties, of which at least one is the government of a state, has resulted in at least 25 battle-related deaths each year (Uppsala Conflict Data Program (UCDP) 2013, 5).<sup>347</sup>

The period 1998-2007 was selected because the BAAD dataset has only been coded for that period, thus organizational variables are only available for that period.<sup>348</sup> Coding for later organizational-years is ongoing but not complete. Within the POICN dataset there are 116 chemical events and 12 biological events that occurred between 1990 and 1998 that we cannot model because they precede the data range in the BAAD2 dataset. Additionally, there are another 28 chemical events and 14 biological events that occurred between 2008 and 2011 that are also unmodeled because they fall after the end date of the BAAD dataset. Because we cannot include all possible events in our models, there is the potential for bias – one that we cannot quantify currently.

Collectively, these inclusion criteria created a universe of 580 organizations.

## VARIABLES

### Dependent Variables and Lagged Control Variables

The dependent variables used for this study, i.e., the *pursuit* or *use* of chemical or biological weapons,

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<sup>346</sup> “Global Terrorism Database,” National Consortium for the Study of Terrorism and Responses to Terrorism. Available at: <http://www.start-dev.umd.edu/gtd/using-gtd/>.

<sup>347</sup> UCDP Battle-Related Deaths Dataset Codebook: Definitions, sources and methods for the UCDP Battle-related death estimates - Version 5.0, Uppsala Conflict Data Program (UCDP) (July 2013), 5. Available at [http://www.pcr.uu.se/digitalAssets/167/167154\\_codebook-ucdp-battle-related-deaths-dataset-v.5-2013.pdf](http://www.pcr.uu.se/digitalAssets/167/167154_codebook-ucdp-battle-related-deaths-dataset-v.5-2013.pdf)

<sup>348</sup> The start year was selected due to limits on the availability of data sources before 1998. Coding for the BAAD data system relies on textual sources, most of which are online. Reporting on terrorism before 1998 is much less extensive and thus less trustworthy. The end year was selected due to constraints on resources for coding.

were taken from POICN and married to the BAAD II data at the yearly level. Drawing from POICN we generated the following variables to use as dependent variables:

- *Chemical weapons use or attempted use*: Coded as a one if the organization used or attempted to use chemical weapons in that year.
- *Any chemical weapons activity* (pursuit and/or use): Coded as a one if the organization was involved in any kind of chemical activity in that year.
- *Any biological weapons activity*: Coded as a one if the organization was involved in any kind of biological activity in that year.<sup>349</sup>

We also created a lagged variable to use in the regressions to control for potential use or pursuit in the year previous since we are using time series data in this analysis.

## Independent Variables

### *Country Context*

Regime type in the “home base” of the country: We used the Freedom House Imputed POLITY2 (fh\_ipolity2) measure of regime type found in the Quality of Government (QOG) dataset.<sup>350</sup> A substantial body of research suggests that VNSA activity is likely to be affected by the nature of the regime in the homebase country, so we include this variable as a control.<sup>351</sup> This variable ranges from 0 for countries that are least democratic in nature to 10 for those that are most democratic in nature.

We also included a control variable from QOG for GDP per capita of the organization’s home country (that is, the country from which it primarily operates) because the literature suggests that states with more resources (which GDP per capita is often used to capture) may be better able to prevent activities by VNSAs.<sup>352</sup> Conversely, wealthier countries may be a better platform from which to develop and/or acquire chemical or biological weapons because wealthier countries often have multiple suppliers for precursors.

### *Organizational Variables*

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<sup>349</sup> Owing to there being only a single biological use in the time span of our data, we could not model this separately.

<sup>350</sup> The Quality of Government Institute 2013, 83. The Quality of Government dataset is a “dataset of datasets.” That is, the Quality of Government Institute at the University of Gothenburg has rationalized and harmonized more than 70 datasets that contain country-level information.

<sup>351</sup> Erica Chenoweth, “Terrorism and Democracy,” *Annual Review of Political Science* 16 (2013), 355-378. However, some research has questioned the use of POLITYIV variables in the context of political violence. For an alternate perspective, see James Raymond Vreeland, “The Effect of Political Regime on Civil War: Unpacking Anocracy,” *Journal of Conflict Resolution*, 52:3 (June 2008), 401-425.

<sup>352</sup> David B. Carter, “A Blessing or a Curse? State Support for Terrorist Groups,” *International Organization*, 66:1 (2012).



The organizational data is constructed as an unbalanced panel. The unit of analysis is the organizational-year. The first year of data available for each organization in the dataset is either 1998 or on the first year the organization was known to exist if the organization came into existence after 1998. Organizations were retained in the dataset until either the panel expired or the organization was known to have been disbanded, destroyed, or otherwise ceased operation. For each organization, we coded a range of variables that describe the nature of the organization, including its size, ideological commitments, internal structure, leadership, sources of material support, territorial control, political activity, social support activity, and degree of attention from counterterrorism agencies domestic and international. Coding was done by hand from a wide variety of primary sources, including (but not limited to) organizational websites, newspapers, magazines, academic books and articles, web reports, blog reports, and government documents. After initial training, each coder prepared an initial assessment of the variables for each year for the organizations to which they were assigned. The preliminary coding was then passed to a coding editor who reviewed the work for consistency and conducted “spot-checks” on the initial coding. When primary coding was completed, the research team then conducted multiple rounds of quality control checks. One of the primary authors reviewed every variable for consistency across panels; any inconsistencies were returned to the editor for re-coding. This process was repeated four times. Additionally, the 100 most active organizations were all subject to thorough analysis by the coding editor and most experienced coder to assure that active organizations were properly represented in the data. Randomly selected “spot-checks” were also conducted on smaller organizations. Finally, for some variables where there was reason to believe the value should be consistent over time (for instance, there is little change in ideology over time for organizations) if the coders were unable to definitively assign a value for a given year we interpolated the value from confirmed values in years before and after the focal year. In the paragraphs below we discuss the specific variables used.

### *Ideology*

For ideology variables, the BAAD2 coding allows each organization to be coded into one or more of 11 categories: left, right, religious, ethnonationalist, separatist, environmentalist, supremacist, anarchist, anti-globalizationist, vigilante, and criminal. Thus an organization may be coded as having complex ideological compounds: right-religious, left-anti-globalization, religious-ethnonationalist, etc. For the purposes of this project we created a set of qualitative variables coded “1” if the organization was religious, leftist, or ethnonationalist. Much of the literature focuses on religious ideology or specifically Islamist ideology.<sup>353</sup> To capture this later point, we created a sub-categorization of the “religious” variable that captures only those organizations that are Islamically-inspired. For our propensity modeling we estimated two variants of the same model: one that included the general religious ideology control and a second model that included the Islamic control.<sup>354</sup> We also included variables for ethnonationalist ideology (which can also act as an othering factor), as well as a variable that combined the possible impact of a combined ideology of ethnonationalism with either religious ideology generally

<sup>353</sup> Victor Asal, R. Karl Rethemeyer, and Gary A. Ackerman, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Weapons,” *Studies in Conflict and Terrorism*, 35:3 (February 2012), 229-254.

<sup>354</sup> Peter Henne, “The Ancient Fire: Religion and Suicide Terrorism,” *Terrorism and Political Science*, 24:1 (2012), 28-60.

or with Islam.<sup>355</sup> As a control we also included a variable for if an organization is leftist given the frequency of this ideology in many areas.

### Capabilities

One key capability of organizations is *Size*. Data on organizational size was also modified from the original coding in BAAD2. For this study, organizations were coded as falling into four orders of magnitude: 0-99, 100-999, 1,000 – 9,999, and greater than or equal to 10,000. In instances where no data was available in the original coding on size, we assumed that those organizations were small and recoded their value from “missing” to 0-99 members. Groups with more members have more human capital upon which to draw. That is, there is a greater probability that a needed skill or knowledge base related to chemical or biological weapons will be found in a large organization than a small one.<sup>356</sup>

*Territorial control* is directly captured in BAAD2’s basic coding. The standard for finding that an organization controls territory is that an organization must be able to (a) control movement into, out of, or with a given territory, (b) perform functions or provide services that are similar to legitimate governments, and (c) enforce control through the threat or actual use of force. Territorial control may be granted by a government to an organization (that is, grants of control would still be coded “1” in the data). The effective area of control must be substantial (subareas in large cities, cities, regions, etc.) and *not* just occupation of a building or land area that would be indistinguishable from ownership under the aegis of a legitimate government. The data was coded yearly; organizations could switch statuses from year to year. Exercising control over land can theoretically be highly beneficial to terrorist groups, allowing them to train, store weapons, and set up communications facilities without state interference.<sup>357</sup> This may also allow organizations to construct CB weapons relatively undisturbed.

*Age* should potentially matter because groups learn and evolve over time.<sup>358</sup> Terrorist organizations frequently fail in their attempts and adjust their behavior in response. Kenney details how groups as diverse as the Irish Republican Army and al Qaeda developed handbooks as they “matured” to pass along collected wisdom to their members.<sup>359</sup> As groups age, they are not only increasingly likely to stay alive, but increasingly equipped to carry out violence. This variable comes from the BAAD 2 dataset and is coded yearly from the year for which the organization was founded.

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<sup>355</sup> Victor Asal and R. Karl Rethemeyer, “The Nature of the Beast: Organizational Structures and the Lethality of Terrorist Attacks,” *Journal of Politics*, 70:2 (March 2008), 437-449.

<sup>356</sup> Victor Asal and R. Karl Rethemeyer, “The Nature of the Beast: Organizational Structures and the Lethality of Terrorist Attacks,” *Journal of Politics*, 70:2 (March 2008), 437-449.

<sup>357</sup> Ray Takeyh and Nikolas K. Gvosdev, “Do Terrorist Networks Need a Home?” *The Washington Quarterly*, 25:3 (Summer 2002), 97-108.

<sup>358</sup> Michael Kenney, *From Pablo to Osama: Trafficking and Terrorist Networks, Government Bureaucracies, and Competitive Adaptation* (University Park, PA: Penn State University Press, 2007).

<sup>359</sup> Michael Kenney, *From Pablo to Osama: Trafficking and Terrorist Networks, Government Bureaucracies, and Competitive Adaptation* (University Park, PA: Penn State University Press, 2007), 140-143.

*Drug smuggling* is a dichotomous variable coded 1 for groups engaged in trafficking illicit drugs such as cocaine, heroin, etc. Smuggling might serve as a conduit for materials that can be used to smuggle CB weapons components or might allow for the smuggling of CB weapons themselves. In addition, smuggling is lucrative and may enable organizations to use money to purchase materials from third parties.

*State sponsorship* was also created as a dichotomous variable that takes a “1” in the years in which the organization received support (financial, material, human, informational, etc.). State sponsorship can provide substantial funds for terrorist groups, but it comes with drawbacks that are not as apparent with other funding sources. Sponsorship can restrict recipient organizations’ actions if these actions may have blowback for state sponsors. CB weapon use is likely to be such an activity. Byman notes that when Syria has sponsored a terrorist group, it tries to not only foster and exploit them, but at the same time limit them.<sup>360</sup>

As another measure of capabilities we used *a count of fatalities perpetrated by the organization* in a given year, which we integrated from the GTD. Specifically we integrated the number of individuals killed by an organization in a given year, which was calculated from the GTD using the TORG ID mapping noted above. The June 2012 release of the GTD identified 538 organizations that perpetrated at least one terrorist incident between 1998 and 2007.<sup>361</sup> The BAAD2 dataset includes data on all 538 of these organizations. We believe this variable is likely to have a large impact given that it is a good indication of organizational capability as well as an organization’s disregard of certain taboos on the use of violence, making it more likely to use CB weapons.

### *Relational Capabilities*

Given our past work, we would expect that *network connections* would play a significant role in CB weapon pursuit and use. BAAD2 includes two types of network connections: positive/supportive and negative/conflictual. The positive/supportive connections are referred to as “alliances” and the negative/conflictual connections as “rivalries.” Organizations may be coded as having both alliances and rivalries. However, the two types of relationships are coded distinct from one another and constitute two separate sociomatrices. That is, one may consider organizational alliances completely independently of their organizational rivalries. It is even possible for an organization to have both alliance ties and rivalry ties at the same time, as organizations sometimes have relationships of both cooperation and conflict at the same time.

The original network coding scheme included 23 types of relationships which allowed us to capture multiplex relationships. That is, organizations could be simultaneously coded as “ally”, “shared members”, and “supported cause.” For the purposes of this study, we recoded our network data into two

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<sup>360</sup> Daniel Byman, *The Changing Nature of State Sponsorship of Terrorism* (Washington, D.C.: The Saban Center for Middle East Policy and the Brookings Institution, 2008), 18.

<sup>361</sup> The December 2013 GTD release was too late to be included in the analysis.

relationships: alliance and rivalry – see Table 5.1 for the types of relationships included in the two categories.

**Table 5.1: Types of relationships counted as Alliances or Rivalries**

Alliances	Rivalries
Ally	Rival
Suspected ally	Target
Shared members	Enemy
Faction	Competing faction
Supported cause	
Umbrella organization	
Suspected umbrella	
Organization	
Terrorist for hire	
Armed wing	
Joint claim of responsibility	
Other affiliation	

The network data is organized yearly, as was the organizational characteristics data. The membership of a given social network depends on which organizations were known to exist in that time period. Thus the size of a given year’s network will vary. Both the alliance and rivalry networks are “complete networks” in that the nodes are all other terrorist organizations known to exist in a given year. Network data was coded from the same set of textual sources and using the same procedures used to secure the organizational data. The network coding was also subject to two rounds of quality control by one of the authors in cooperation with the editor and coders. Our coding stance was conservative: without clear evidence that a relationship exists our assumption is that a relationship *does not* exist. During the quality control process each yearly network was examined for year-to-year patterns of relationships appearing, disappearing, and then reappearing in the next year or two (what we came to term “strobing”). However, we found little evidence for strobing in the data and thus did not choose to interpolate network data from surrounding years as we did in some instances for the organizational data.

Across the 10 years of data, we coded a total of 4,427 dyads, with 3,702 being alliance relationships and 725 being rivalrous relationships.

In the alliance category, the most prevalent form is alliance (54%) followed by suspected alliance (14%) – the two being differentiated by the (1) number of sources, (2) quality of sources, or (3) level of certainty sources expressed. More than 85% of all alliance relationships are accounted for by six types: alliance, suspected alliance, umbrella, suspected umbrella, supported cause, and joint claims for attacks. Turning to rivalry, more than 98% of these relationships fall into two categories: (1) organizations that view each other as rivals for the affections of the group or groups that they purport to represent and (2) those that are enemies – that is, organizations that are not only rivals for the affections of the same groups but view each other as worthy of attack. For each year we constructed centrality measures for each organization.

## RESULTS OF CATEGORICAL REGRESSION ANALYSIS

In order to examine the propensity of terrorist organizations to pursue or use chemical and biological weapons, we constructed logit and rare event logit models using Stata 11.0 to discover factors that make pursuit or use more or less likely. To account for possible within-organization effects across the 10 years of data, we used a clustering correction for the calculation of standard errors (the “cluster” option in Stata). Before reporting our findings we need to note three important limitations to our analysis. First, pursuit and/or use of chemical or biological weapons is extremely rare: there are only 15 uses or attempted uses of chemical weapons and 1 use or attempted use of biological weapons in our dataset (0.468% of our organization-years) and only 20 uses, attempted uses, or threats of use of chemical and biological agents (0.585% of our organization-years). Even when the criteria is maximally relaxed to include plots, attempted acquisitions, possession of non-weaponized agents, and possession with no intent to use, there are only 60 chemical and biological “events” (1.75% of our organization years).

Second, use or attempted use of biological agents is so rare over the period 1998-2007 that we cannot provide an analysis of the phenomenon. There was only one event, which makes statistical analysis impossible. The lone organization that attempted to use a biological agent also attempted to use a chemical agent in the same year, thus there is also no reason to analyze the factors that influence chemical *and/or* biological agent use or attempted use either.

Third, while we provide both logit and rare event logit outputs, in many cases there is no substantive difference between the results. We will note the one analysis where the differences are substantial and thus worth noting.

Finally, in all cases below we will focus on the change in probability that occurs for a change in the factors rather than the logit or rare event logit coefficients.

### Use or Attempted Use of Chemical Agents

As noted, our analysis of use or attempted use can only focus on chemical agents. Our findings (shown below in Table 5.2), contrary to much of the literature, suggest that ideology is not a substantial factor in explaining use or attempted use of chemical agents. We constructed two regressions: one that treats religion as a general concept and another that focuses solely on Islamically-inspired organizations. As a general concept, religious organizations are no more or less likely to pursue or use chemical agents. In fact, in this regression none of the ideological variables are significant. However, of the 1,248 organization-years for religious organizations, 952 of those organization-years are accounted for by Islamically-inspired organizations. When we control just for Islamically-inspired organizations we find both that there is a slight tendency for leftist organizations to use chemical weapons and a somewhat greater tendency for Islamic organizations to use chemical weapons, but the change in probability is

quite small – less than 1 percentage point in both cases.

**Table 5.2: Change in Probability for Selected Variables  
 Chemical Agent Use or Attempted Use  
 Logit Model with Control for Islamic Ideology**

<b>Variable</b>	<b>Change in probability, factor min to max</b>
Use in year before ( <i>qualitative</i> )	NS
Fatalities ( <i>count</i> )	0.0191
Organizational membership ( <i>ordinal</i> )	NS
Leftist organization ( <i>qualitative</i> )	0.0054 <sup>†</sup>
Islamist ideology ( <i>qualitative</i> )	NS
Ethnonationalist ideology ( <i>qualitative</i> )	NS
Combination of Islam and ethnonationalist ideology ( <i>qualitative</i> )	0.0094
Age of the organization ( <i>years</i> )	NS
Freedom House iPolity democracy score (0-10)	NS
Alliance ( <i>count</i> )	0.0435
Rivalry ( <i>count</i> )	0.0338
State sponsorship ( <i>qualitative</i> )	NS
Drug smuggling ( <i>qualitative</i> )	NS
Territorial control ( <i>qualitative</i> )	NS
Real GDP per capita ( <i>Penn World Table</i> )	NS
Number of observations	2,828

NS: Not significant; <sup>†</sup> Variable significant at the 10% level.  
 All other variables significant at the 5% level

Our second finding focuses on the influence of terrorist fatalities on use of chemical weapons. When the value of the variable increases from the minimum value of zero to the maximum value of 2,996, the probability of chemical pursuit or use increase by 1.91 percentage points. However, it should be emphasized that the effect for organizations near the average number of fatalities across the dataset – 8.47 – is very small (0.13 percentage points). Even at 1,500 fatalities the effect is still only about a 0.50 percentage point increase.

Third, we find that both alliances and rivalries influence the use of chemical weapons. The change in probability from the minimum to the maximum value is by the far the largest for these two variables: 4.35 percentage points for alliances and 3.38 percentage points for rivalries – though the change in probability near the mean number of connections (about 1.0 for both alliances and rivalries) is substantially below one percentage point. The influence of rivalries is much greater: each additional rivalry increases the probability of chemical use or attempted use by between 0.50 and 1.50 percentage points. The increase in probability from alliance connections is substantially smaller by comparison – between 0.04 and 0.08 percentage points.

Finally, we would note several factors that did not play a significant role in explaining chemical use or attempted use. First, there is no indication that previous year use or attempted use of a chemical agent

predicted use or attempted use in the next year. Use or attempted use does not appear to be a behavior that “turns on and stays on.” Instead, use or attempted use of chemical agents occurs for reasons that are idiosyncratic to the situation the organization faces in a given period of time. Second, there is no effect from size or age, which suggests that use or attempted use may not be prompted by greater overall experience as a terrorist entity or larger membership. (The finding regarding membership is somewhat surprising in that organizations with larger memberships may provide a greater base of adherents from which to find the requisite skills for such attacks.) Wealthier host countries do not seem to promote use or attempted use. The nature of funding also does not seem to matter – state sponsorship and drug smuggling are not significant factors. Finally, organizational control of territory is also not significant.

As with many terrorist organizational behaviors, it is the intersection of several factors that seems to matter most. An organization that has 4 rivalries, has 15 alliance connections, has committed 100 fatalities, and is Islamic and ethnonationalist in its ideology has nearly a 27% chance of using or attempting to use a chemical agent.

### **Use or Attempted Use of Chemical Agents If an Organization Seeks a Chemical Weapons Capability**

Another way to consider the question of chemical agent use or attempted use is to focus instead solely on the subset of actors that have sought chemical agents at any level of seriousness – from simple plots to actual use. There are 59 actors who have made at least a minimal (but sustained) effort to acquire and/or use a chemical weapon. Is there anything that distinguishes the users/attempted users from those that seek a capability but have not tried to use it?

Table 5.3 contains the probability change statements from our logit analysis (there are 15 “positive” events in this data, so the event is not rare enough to warrant rare event logit). We must caveat these findings as “provisional” at best given the very small number of organization-years involved. We estimated this model using both our general religious ideology control and our Islamically-inspired ideology control. Because of the small number of observations, we also omitted country-level controls for home-country regime type and wealth (real GDP per capita). As Table 5.3 demonstrates, choosing to include the general religious ideology variable or the more specific Islamic ideology variable does not change the results in a meaningful way.

As in our earlier analysis, the organizations that seek a chemical weapons capability that are most likely to use that capability are those that have many alliance connections and many rivalry connections. However, the effect of rivalry is even more pronounced here. First, the alliance count coefficient is only marginally statistically significant (at the 10% level). Second, the change in probability from the minimum to maximum value for rivalry connections is even greater – at least 91 percentage points.



**Table 5.3: Change in Probability for Selected Variables  
 Chemical Agent Use or Attempted Use Among Those Seeking a Chemical Weapon  
 Change in Probability from Minimum to Maximum Value**

Variables	Religious ideology	Islamic ideology
Fatalities ( <i>count</i> )	NS	NS
Organizational membership ( <i>ordinal</i> )	NS	NS
Leftist organization ( <i>qualitative</i> )	NS	NS
Religious or Islamist ideology ( <i>qualitative</i> )	NS	NS
Ethnonationalist ideology ( <i>qualitative</i> )	NS	NS
Combination of religious or Islamic and ethnonationalist ideology ( <i>qualitative</i> )	NS	NS
Age of the organization ( <i>years</i> )	NS	NS
Alliance ( <i>count</i> )	0.7160†	0.7400†
Rivalry ( <i>count</i> )	0.9116	0.918
State sponsorship ( <i>qualitative</i> )	-0.4464	-0.4644
Drug smuggling ( <i>qualitative</i> )	NS	NS
Territorial control ( <i>qualitative</i> )	NS	NS
Number of observations	59	

NS: Not significant; † Variable significant at the 10% level.  
 All other variables significant at the 5% level

Unlike our earlier analysis, the state sponsorship variable is strongly significant and *negative*. Organizations supported by a state sponsor are about 45 percentage points less likely to use or attempt to use a chemical weapon compared to organizations without state support. While striking, this finding is in accord with previous work that we have done on organizational lethality using both a cross-sectional version of the Big Allied and Dangerous dataset and the dataset used for this analysis (BAAD2).<sup>362</sup> In those studies, organizations with state sponsors are *more likely to kill* (which is not a given: more than 50% of the organizations in BAAD2 have killed no one) but *less likely to kill prolifically*. State sponsorship seems to depress total body count. As we have written elsewhere, we believe this is traceable to a fear by state sponsors that the sponsoring state will be held accountable by other states for the actions of their proxies. Thus prolific killing or taboo killing (given the broad international agreement that chemical and biological weapons are illegitimate) could result in state-on-state violence, with the US attacks on Afghanistan after the September 11<sup>th</sup> event serving as the reference example. As we will outline below in greater detail, it appears that states may be less able to restrain early stages of chemical weapons seeking (for instance, starting plots, seeking precursors, etc.) but much better positioned to influence how any realized capability is actually used.

**Seeking Chemical Weapons Capability**

<sup>362</sup> Victor Asal and R. Karl Rethemeyer, “The Nature of the Beast: Organizational Structures and the Lethality of Terrorist Attacks,” *Journal of Politics*, 70:2 (March 2008), 437-449.

To get a better sense of why terrorist organizations ever begin to seek chemical weapons capability, we estimated logit and rare event logit models where the dependent variable was set to “1” if an organization made any effort to acquire a chemical weapons capability (from “protoplot” to actual use). As noted earlier, there are 59 such cases in our dataset. The rare event logit and standard logit models are in excellent agreement with one another, so we will report only the logit models. As before, we modeled this dependent variable with both our general religion indicator and with the Islamically-inspired alternate variables. The differences between the models are relatively small but sufficient to warrant reporting both variants of our analysis – see Table 5.4. Table 5.4 reports changes in probability from minimum to maximum values of the independent variables.

**Table 5.4: Any Seeking of Chemical Weapons Capability  
 Religious and Islamically-inspired Ideologies  
 Change in Probability from Minimum to Maximum Value**

Variables	Religious ideology	Islamic ideology
Use in year before ( <i>qualitative</i> )	0.0169	0.0113
Fatalities ( <i>count</i> )	0.9926	0.9937
Organizational membership ( <i>ordinal</i> )	NS	NS
Leftist organization ( <i>qualitative</i> )	0.0243	0.0231
Religious or Islamist ideology ( <i>qualitative</i> )	0.0195	0.0304
Ethnonationalist ideology ( <i>qualitative</i> )	NS	NS
Combination of religious or Islamic and ethnonationalist ideology ( <i>qualitative</i> )	0.0174	0.0325
Age of the organization ( <i>years</i> )	NS	NS
Freedom House iPolity democracy score ( <i>0-10</i> )	NS	NS
Alliance ( <i>count</i> )	0.3191	0.2566
Rivalry ( <i>count</i> )	0.0396 <sup>†</sup>	0.0267 <sup>†</sup>
State sponsorship ( <i>qualitative</i> )	NS	NS
Drug smuggling ( <i>qualitative</i> )	NS	NS
Territorial control ( <i>qualitative</i> )	NS	NS
Real GDP per capita ( <i>Penn World Table</i> )	0.0244 <sup>†</sup>	0.0325 <sup>†</sup>

NS: Not significant; † Variable significant at the 10% level.

All other variables significant at the 5% level

The factors influencing the general propensity to seek chemical weapons has a more complex pattern than does use or attempted use. First, ideology has a more significant impact on general pursuit of chemical weapons. Leftists, religious organizations, and organizations that adhere to a combined religious and ethnonationalist ideology are all more likely to pursue a chemical capability. Unlike the earlier analysis, leftists are the most likely to pursue a chemical capability. However, when the focus is narrowed from all religious organizations to just Islamically-inspired organizations, the results shift. Islamically-inspired organizations (both those that are just Islamically-inspired and those that compound Islam with ethnonationalism) are more likely than leftists and any other ideological adherents to seek a chemical capability. As noted before, more than three quarters of all religious organizations are Islamically inspired.

Second, fatalities are an important predictor of pursuit of chemical weapons capability. When the value of the variable increases from the minimum value of zero to the maximum value of 2,996, the probability of chemical weapons pursuit approaches unity. However, it should be emphasized that the effect for organizations near the average number of fatalities across the dataset – 8.47 – is very small (0.66 percentage points in the Islamic ideology regression). However, the influence of fatalities increases much faster than for use or attempted use. Referencing the Islamic ideology regression again, 100 fatalities increases the probability by 1 percentage point; 500 fatalities increases the probability by 10 percentage points, 1000 fatalities increased the probability by 65 percentage points, and 1500 fatalities by nearly 97 percentage points.

Third, both alliance and rivalry connections are important, but unlike the use or attempted use models, any seeking activity seems to be driven more by alliances. In fact, the rivalry coefficient is only marginally significant (10% level). The marginal effect from rivalry connections is larger, but the alliance effect is still substantial and more thoroughly established as significant. It should be noted, however, that 15 alliance connections – a number well above the mean of 1.11 – increases the probability of pursuing chemical weapons by only 2.89 percentage points.

Fourth, there is evidence that organizations develop chemical weapons “programs” in that the probability of seeking in one year is greater if there was seeking in the previous year, although the effect is relatively small.

Finally, while there is no evidence that political regime drives pursuit of chemical weapons, there is evidence that pursuit is more likely in wealthy countries. Our interpretation of this finding is that country context makes pursuit of chemical weapons more or less difficult. Wealthier countries are more likely to have multiple suppliers of chemical weapons precursors thereby reducing the difficulty of finding precursors and making detection more difficult.

As with chemical weapons use or attempted use, the intersection of a package of factors makes an organization far more likely to seek this capability. Returning to the earlier example, an organization that has 4 rivalries, has 15 alliance connections, has committed 100 fatalities, is Islamically-inspired and ethnonationalist in ideology, and has sought a chemical weapon last year has nearly a 70% change of seeking a chemical weapon.

### **Seeking Biological Weapons Capability**

To get a better sense of why terrorist organizations ever begin to seek biological weapons capability, we estimated logit and rare event logit models where the dependent variable was set to “1” if an organization made any effort to acquire a biological weapons capability (from “protoplot” to actual use). As noted earlier, there are 13 such cases in our dataset, so this analysis is provisional at best. For this analysis, there are differences between the logit and rare event logit results. Moreover, the data did not

conform to the assumptions necessary to produce predicted probabilities from the rare events logit. Table 5.5 contains our results. For the logit model we have reported the changes in probability from minimum to maximum values of the independent variables. For the rare event logit model we report the sign of coefficients that are statistically significant. Because there are no organizations purely ethnonationalist in inspiration that pursued biological weapons, we were unable to test ethnonationalism as a factor.

In general, the logit results are similar to the logit results for pursuit of a chemical capability; the rare event logit results are not. We will focus on the logit results below.

Turning to Table 5.5, with respect to ideology, leftists, religious organizations, and religious and ethnonationalist organizations are more likely to seek biological weapons than organizations inspired by other beliefs. However, the effect size is quite small, with the largest being about 1.1 percentage point for religious organizations.

**Table 5.5: Any Seeking of Chemical Weapons Capability  
 Logit: Change in Probability from Maximum to Minimum Value  
 Rare Event Logit: Coefficient sign and Significance**

<b>Variables</b>	<b>Logit</b>	<b>Rare event logit</b>
Use in year before ( <i>qualitative</i> )	-0.0003	+
Fatalities ( <i>count</i> )	0.9998	NS
Organizational membership ( <i>ordinal</i> )	NS	NS
Leftist organization ( <i>qualitative</i> )	0.003	NS
Religious ideology ( <i>qualitative</i> )	0.0107	NS
Combination of religious and ethnonationalist ideology ( <i>qualitative</i> )	0.0055	NS
Age of the organization ( <i>years</i> )	NS	NS
Freedom House iPolity democracy score (0-10)	NS	NS
Alliance ( <i>count</i> )	0.0609	+†
Rivalry ( <i>count</i> )	NS	NS
State sponsorship ( <i>qualitative</i> )	-0.0003	NS
Drug smuggling ( <i>qualitative</i> )	NS	NS
Territorial control ( <i>qualitative</i> )	NS	+
Real GDP per capita ( <i>Penn World Table</i> )	NS	NS

NS: Not significant; † Variable significant at the 10% level.  
 All other variables significant at the 5% level

Second, only alliance connections play a role in biological weapons seeking.

Third, there is some evidence that seeking of biological weapons capabilities is idiosyncratic to a set of in-year circumstances, as there is a very slight tendency for seeking in one year to make seeking in the next year *less* likely.

Finally, state sponsorship has a significant and negative effect on biological weapons seeking, though the effect is exceedingly small. Like with chemical weapons, when terrorists that serve as proxies for states seek biological weapons they put their sponsors at risk for state-on-state violence, so there is some tendency for states to discourage seeking of biological weapons.

As Table 5.5 demonstrates, there is substantial disagreement between the logit and rare event logit models. The only factor that we can say with relative certainty influences the seeking of biological weapons is the number of alliances. However, the similarity between the logit results for the chemical and biological seeking models suggests that (1) the logit model of biological capabilities seeking has some face validity and (2) there may be a single underlying model of biological and chemical weapons seeking.<sup>363</sup>

## ASSESSING MODEL ACCURACY

In order to assess the accuracy of the models created, we calculated predicted probabilities for each of the organizational years in our dataset that were included in the estimations. To calculate the probabilities, we used Stata's "predict" command, which uses the estimated coefficients from our final model for each of the behaviors (chemical weapons use/attempted use, chemical weapons seeking, and biological weapons seeking) to generate a predicted probability of the behavior for a given organization in a given year. So for instance, using this technique we generated the probability of chemical weapons use for Al Qaeda for each year between 1998 and 2007 inclusive. We then evaluated how well our model did by comparing the probability the model generated for the behavior with the actual behavior. We created probabilities for each of the 2,828 organization-years in our dataset. The goal is to assess the rate of false positive and false negatives for each of our three primary models.

One of the issues with this form of analysis is deciding when a predicted probability is sufficiently high to be thought of as having "predicted" a particular behavior. This is particularly difficult when the event being modeled is rare. There are no hard and fast rules. However, since this is an exceedingly rare event, we set the threshold probability for a prediction of an actual chemical use/attempted use, chemical seeking, or biological seeking event at 10 times the probability of use/attempted use or seeking when the probability is evaluated at the mean values for the independent variables. To use a concrete example, we used our estimated model of chemical use or attempted use to calculate the probability of an "average" organization using or attempting to use chemical weapons. "Average organization" is defined by calculating the means of each independent variable. The calculated probability for an "average" organization is 0.0013. Using our "10 times average" criteria, we set the criteria at  $10 * 0.0013 = 0.013$ . We then evaluated all 2,828<sup>364</sup> predicted probabilities of chemical use/attempted use generated by Stata

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<sup>363</sup> A combined biological and chemical seeking model was not possible because all but 1 of the 13 biological weapons "seekers" were also chemical weapons "seekers."

<sup>364</sup> Because several of our models include controls for previous year use/attempted use or seeking, 591 organizational years are excluded from models and the predicted probabilities. That is, the first year of the organizations in our dataset are excluded from the estimations and assessment of accuracy.

for the organizational years in the dataset. If the predicted probability was greater than or equal to 0.013, we said the model “predicted” chemical use or attempted use for that organizational year. If the predicted probability was below 0.013 we said the model “predicted” no chemical use or attempted use. We then compared our prediction of use/no use with the actual outcome for every year.

It is important to note that the performance of any of the models we estimated depends heavily on the threshold that is selected. As we will discuss with respect to the third model – biological weapons seeking – setting a more stringent standard (100 times the probability of an “average” organization seeking a biological weapon) – improved our accuracy but at the cost of more false negatives. Given the difficult nature of this data and the tremendous consequences of ignoring potential threats, we have opted for a threshold that generates more false positives. Our models are best used as a means to reduce the pool of organizations that deserve scrutiny but not as a tool to pinpoint precisely which organizations will absolutely seek and/or use chemical or biological weapons.

**Chemical Weapons Use or Attempted Use**

For this analysis of the model we included the control for Islamic ideology rather than the more general religious ideology variable because the model fit was superior (pseudo R<sup>2</sup>: 0.1960 versus 0.1798). The threshold for predicted use was 0.013, given that the probability of use at the means of the independent variables was 0.0013.

**Table 5.6: Actual Users of Chemical Weapons Versus Prediction**

<b>Organizations</b>	<b>Year</b>	<b>Model outcome</b>
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	2007	Correct
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	2002	Correct
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	2001	Correct
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	2004	Correct
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	2001	Correct
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	1999	Correct
AL-AQSA MARTYRS BRIGADE	2004	Correct
BASQUE FATHERLAND AND FREEDOM (ETA)	2005	Incorrect
POPULAR LIBERATION ARMY (EPL)	2005	Incorrect
SCOTTISH NATIONAL LIBERATION ARMY	2002	Incorrect
JAISH AL-TA'IFA AL-MANSURA	2005	Incorrect
ODUA PEOPLES' CONGRESS (OPC)	2000	Incorrect
EAST TURKISTAN LIBERATION ORGANIZATION	1998	Unmodeled
OROMO LIBERATION FRONT	1998	Unmodeled
THE JUSTICE DEPARTMENT	1999	Unmodeled

With respect to chemical weapons use and attempted use, the model correctly predicted 7 of 12 (58.3%) using organizations that could be included in the model.

With respect to false positives, the model predicted a 0.013 chance or higher of chemical weapons pursuit or use by a total of 179 organizational-years. Of these, 172 were false positives using our threshold standard. The model correctly predicts 93.7% of non-using organizational years.

### Chemical Weapons Pursuit

For this analysis of the model we used the control for Islamic ideology rather than the more general religious ideology model because the model fit was superior (pseudo R<sup>2</sup>: 0.2479 versus 0.2325). The threshold for predicted use was 0.067, given that the probability of use at the means of the independent variables was 0.0067.

With respect to chemical weapons seeking, the model correctly predicted 16 of 46 (34.8%) organizational years that could be modeled.

**Table 5.7: Actual Seekers of Chemical Weapons Versus Prediction**

Organizations	Year	Model outcome
AL-QA`IDA	2004	Correct
AL-QA`IDA	2003	Correct
AL-QA`IDA	2001	Correct
AL-QA`IDA	2000	Correct
AL-QA`IDA	1999	Correct
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	2007	Correct
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	2005	Correct
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	2004	Correct
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	2004	Correct
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	2002	Correct
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	2001	Correct
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	2000	Correct
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	1999	Correct
MUJAHEDIN-E KHALQ (MEK)	1999	Correct
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	2002	Correct
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	2003	Correct
SEPTEMBER 11	2003	Incorrect
AL-AQSA MARTYRS BRIGADE	2004	Incorrect
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	2002	Incorrect
AL-QA`IDA IN THE ARABIAN PENINSULA (AQAP)	2005	Incorrect
AL-QA`IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	2005	Incorrect
AL-QA`IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	2002	Incorrect
ANSAR AL-ISLAM	2004	Incorrect
BASQUE FATHERLAND AND FREEDOM (ETA)	2005	Incorrect

BASQUE FATHERLAND AND FREEDOM (ETA)	2002	Incorrect
DEVIRIMICI HALK KURTULUS CEPHESI (DHKP/C)	2004	Incorrect
DEVIRIMICI HALK KURTULUS CEPHESI (DHKP/C)	2000	Incorrect
JAISH AL-TA'IFA AL-MANSURA	2005	Incorrect
JAISH-E-MOHAMMAD (JEM)	2003	Incorrect
JEMAAH ISLAMIYA (JI)	2003	Incorrect
LASHKAR-E-JHANGVI (LEJ)	2002	Incorrect
LASHKAR-E-TAIBA (LET)	2003	Incorrect
NATIONAL LIBERATION ARMY OF COLOMBIA (ELN)	2005	Incorrect
NATIONAL LIBERATION ARMY OF COLOMBIA (ELN)	2003	Incorrect
NATIONAL UNION FOR THE TOTAL INDEPENDENCE OF ANGOLA (UNITA)	2000	Incorrect
ODUA PEOPLES' CONGRESS (OPC)	2000	Incorrect
PALESTINIAN ISLAMIC JIHAD (PIJ)	2002	Incorrect
POPULAR LIBERATION ARMY (EPL)	2005	Incorrect
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	2005	Incorrect
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	2001	Incorrect
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	1999	Incorrect
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	2002	Incorrect
SCOTTISH NATIONAL LIBERATION ARMY	2007	Incorrect
SCOTTISH NATIONAL LIBERATION ARMY	2002	Incorrect
SCOTTISH NATIONAL LIBERATION ARMY	1999	Incorrect
STUDENTS ISLAMIC MOVEMENT OF INDIA (SIMI)	2003	Incorrect
AL-QA'IDA	1998	Unmodeled
ANIMAL LIBERATION FRONT (ALF)	1998	Unmodeled
ARMED ISLAMIC GROUP (GIA)	1998	Unmodeled
EAST TURKISTAN LIBERATION ORGANIZATION	1998	Unmodeled
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	1998	Unmodeled
HARAKAT UL-MUDJAHIDIN (HUM)	1998	Unmodeled
HIZBALLAH	1998	Unmodeled
KURDISTAN WORKERS' PARTY (PKK)	1998	Unmodeled
OMAR BIN KHATTAB GROUP	2005	Unmodeled
OROMO LIBERATION FRONT	1998	Unmodeled
ROBIN FOOD	1998	Unmodeled
TALIBAN	1998	Unmodeled
THE JUSTICE DEPARTMENT	1999	Unmodeled

With respect to false positives, the model predicted a 6.7% chance or higher of chemical weapons pursuit by a total of 64 organizational-years. Of these, 48 were false positives. The model correctly predicts 98.3% of non-seeking organizational years.



**Biological Weapons Pursuit**

For this analysis of the model, we used the control for Islamic ideology rather than the more general religious ideology model because the model fit was superior (pseudo R<sup>2</sup>: 0.4420 versus 0.4138). The threshold for predicted use was 0.001, given that the probability of use at the means of the independent variables was 0.0001.

With respect to biological weapons seeking, the model correctly predicted 8 of 9 (88.9%) organizational years that could be modeled.

**Table 5.8: Actual Seekers of Biological Weapons Versus Prediction**

<b>Organizations</b>	<b>Year</b>	<b>Model outcome</b>
AL-AQSA MARTYRS BRIGADE	2004	Correct
AL-QA`IDA	1998	Unmodeled
AL-QA`IDA	2000	Correct
AL-QA`IDA	2001	Correct
ARMED ISLAMIC GROUP (GIA)	1998	Unmodeled
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	1998	Unmodeled
HIZBALLAH	1998	Unmodeled
JEMAAH ISLAMIYA (JI)	2003	Correct
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	2004	Correct
POPULAR LIBERATION ARMY (EPL)	2005	Incorrect
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	2003	Correct
TALIBAN	2007	Correct
AL-QA`IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	2002	Correct

With respect to false positives, the model predicted a 0.1% chance or higher of biological weapons pursuit by a total of 823 organizational-years. Of these, 815 were false positives. The model correctly predicts 71.2% of non-seeking organizational years.

If we adopted a stricter standard – 1.00% chance of seeking biological weapons (100-fold increase over the probability predicted at the means of the independent variables) – then the model would predict correctly 7 of 9 actual seekers of biological weapons (77.8%). The 1.00% standard would also reduce the number of predicted biological weapons seekers to 104. Of these, 96 would be false positive. With this stricter standard the model correctly predicts 96.6% of non-seeking organizations.

**ORGANIZATIONS LIKELY TO USE CB (USING THE LOGISTIC REGRESSION MODEL APPROACH)**

In the six tables below we present the predicted probabilities for each organizational year that met either one of two criteria. Either the organization actually did do the activity in question or the model predicted that it would do with a probability of higher than 3% (given the rarity of this kind of activity we felt this

was a good “red line” cut off point). For each model we used either the general religion variable or the Islam religion variable depending on which model was the best fit. For each analysis there are two tables:

- One table includes the years for which a group was coded engaging in this activity and the percent probability of the likelihood that this will happen by the best model used using a logistic regression
- The second table includes the years for which a group was coded as NOT engaging in this activity and the percent probability of the likelihood that this will happen by the best model used using a logistic regression IF THE PERCENT PROBABILITY IS ABOVE 3%

**Use or Attempted Use of Chemical Weapons 1999-2007**

Predicted probabilities of organizations that did use or attempted to use chemical weapons (note some organizations are listed more than once because analysis is yearly) using Islam because of the better model fit.

**Table 5.9: Predicted Probabilities of Chemical Weapons Users**

Name	% likelihood according to model of Attempted use or use of Chemical weapons
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	27.25493
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	15.89418
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	8.08668
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	7.65121
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	4.24446
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3.05771
BASQUE FATHERLAND AND FREEDOM (ETA)	0.7734
POPULAR LIBERATION ARMY (EPL)	0.68873
AL-AQSA MARTYRS BRIGADE	0.65186
SCOTTISH NATIONAL LIBERATION ARMY	0.10143
JAISH AL-TA'IFA AL-MANSURA	0.04919
ODUA PEOPLES' CONGRESS (OPC)	0.04144

Predicted probabilities of organizations that did NOT use or attempted to use chemical weapons whose score was above 3% (note some organizations listed more than once because analysis is yearly) using Islam because better model fit

**Table 5.10: Predicted Probabilities of Chemical Weapons Non-Users**

Name	% likelihood according to model of Attempted use or use of Chemical weapons
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	27.17718
AL-QA`IDA	24.27825
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	21.37649
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	16.48234
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	14.17355

REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	12.11701
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	8.13405
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	8.11087
ISLAMIC STATE OF IRAQ (ISI)	7.24827
AL-QA`IDA	7.13025
UNITED NATIONAL LIBERATION FRONT (UNLF)	6.7481
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	6.69329
ULSTER FREEDOM FIGHTERS (UFF)	6.65131
UNITED NATIONAL LIBERATION FRONT (UNLF)	6.62855
UNITED NATIONAL LIBERATION FRONT (UNLF)	6.51831
ULSTER FREEDOM FIGHTERS (UFF)	6.39805
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	5.79659
NATIONAL SOCIALIST COUNCIL OF NAGALAND-ISAK-MUIVAH (NSCN-IM)	4.34766
COMMUNIST PARTY OF INDIA-MAOIST (CPI-M)	4.34764
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.31744
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.22127
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	4.18224
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.13301
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.04742
UNITED NATIONAL LIBERATION FRONT (UNLF)	3.96974
ULSTER FREEDOM FIGHTERS (UFF)	3.913
UNITED NATIONAL LIBERATION FRONT (UNLF)	3.88812
AL-QA`IDA	3.87539
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3.86055
ULSTER FREEDOM FIGHTERS (UFF)	3.70513
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3.67243
RED HAND DEFENDERS (RHD)	3.49278
ULSTER VOLUNTEER FORCE (UVF)	3.48997
ULSTER FREEDOM FIGHTERS (UFF)	3.48671
REAL IRISH REPUBLICAN ARMY (RIRA)	3.46623
IRISH REPUBLICAN ARMY (IRA)	3.25614
NATIONAL SOCIALIST COUNCIL OF NAGALAND-ISAK-MUIVAH (NSCN-IM)	3.23328
UNITED LIBERATION FRONT OF ASSAM (ULFA)	3.19911
IRISH REPUBLICAN ARMY (IRA)	3.18136
AL-QA`IDA	3.18096
IRISH REPUBLICAN ARMY (IRA)	3.17302
AL-QA`IDA	3.16818
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3.0987
IRISH REPUBLICAN ARMY (IRA)	3.04534
ULSTER VOLUNTEER FORCE (UVF)	3.04131
NATIONAL SOCIALIST COUNCIL OF NAGALAND-ISAK-MUIVAH (NSCN-IM)	3.00289

**Chemical Weapons Pursuers 1999-2007**

Predicted probabilities of organizations that did pursue chemical weapons whose score was above 3% (note some organizations listed more than once because analysis is yearly) using general religion because better model fit.

**Table 5.11: Predicted Probabilities of Chemical Weapons Pursuers**

Name	% likelihood according to model of pursuit of Chemical weapons
AL-QA'IDA	99.99999
AL-QA'IDA	77.76091
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	72.4344
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	60.67234
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	60.56353
AL-QA'IDA	58.93185
AL-QA'IDA	58.88431
AL-QA'IDA	55.93886
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	55.67324
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	43.51606
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	31.2599
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	27.42219
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	23.4941
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	9.86684
MUJAHEDIN-E KHALQ (MEK)	8.94643
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	7.34077
PALESTINIAN ISLAMIC JIHAD (PIJ)	5.01544
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	4.6067
NATIONAL UNION FOR THE TOTAL INDEPENDENCE OF ANGOLA (UNITA)	3.95416
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3.90254
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3.87833
BASQUE FATHERLAND AND FREEDOM (ETA)	2.85743
AL-QA'IDA IN THE ARABIAN PENINSULA (AQAP)	2.84772
BASQUE FATHERLAND AND FREEDOM (ETA)	2.7373
LASHKAR-E-TAIBA (LET)	2.59134
NATIONAL LIBERATION ARMY OF COLOMBIA (ELN)	2.49191
AL-AQSA MARTYRS BRIGADE	2.42395
NATIONAL LIBERATION ARMY OF COLOMBIA (ELN)	2.40008
ANSAR AL-ISLAM	2.32519
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	2.10788
LASHKAR-E-JHANGVI (LEJ)	1.84033
JAISH AL-TA'IFA AL-MANSURA	1.7513
JEMAAH ISLAMIYA (JI)	1.70787
11-Sep	1.61414
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	1.5589

POPULAR LIBERATION ARMY (EPL)	1.37571
DEVRIMICI HALK KURTULUS CEPHESI (DHKP/C)	1.37059
DEVRIMICI HALK KURTULUS CEPHESI (DHKP/C)	1.28883
STUDENTS ISLAMIC MOVEMENT OF INDIA (SIMI)	1.28569
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	1.20747
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	1.13519
SCOTTISH NATIONAL LIBERATION ARMY	0.64255
SCOTTISH NATIONAL LIBERATION ARMY	0.6154
SCOTTISH NATIONAL LIBERATION ARMY	0.53659
ODUA PEOPLES' CONGRESS (OPC)	0.19083
JAISH-E-MOHAMMAD (JEM)	0.133

Predicted probabilities of organizations that did NOT pursue chemical weapons whose score was above 3% (note some organizations listed more than once because analysis is yearly) using general religion because better model fit.

**Table 5.12: Predicted Probabilities of Chemical Weapons Non-Pursuers**

Name	% likelihood according to model of pursuit of Chemical weapons
AL-QA'IDA	72.527
AL-QA'IDA	71.15989
NATIONAL UNION FOR THE TOTAL INDEPENDENCE OF ANGOLA (UNITA)	60.7995
AL-QA'IDA	57.95947
TALIBAN	52.4464
AL-QA'IDA	45.84231
LORD'S RESISTANCE ARMY (LRA)	43.19943
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	40.81034
MUJAHEDIN-E KHALQ (MEK)	24.70338
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	21.94785
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	20.95058
COMMUNIST PARTY OF NEPAL- MAOIST (CPN-M)	19.65273
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	19.45512
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	18.92632
KURDISTAN WORKERS' PARTY (PKK)	18.86343
ISLAMIC STATE OF IRAQ (ISI)	16.52034
TALIBAN	15.28883
PALESTINIAN ISLAMIC JIHAD (PIJ)	14.15472
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	13.88912
BASQUE FATHERLAND AND FREEDOM (ETA)	9.53183
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	9.33779
BASQUE FATHERLAND AND FREEDOM (ETA)	9.16157
LIBERATION TIGERS OF TAMIL EELAM (LTTE)	9.00782
ARMED ISLAMIC GROUP (GIA)	8.90842
ANSAR AL-ISLAM	8.88649

MUJAHEDIN-E KHALQ (MEK)	8.87443
MUJAHEDIN-E KHALQ (MEK)	8.77704
MUJAHEDIN-E KHALQ (MEK)	8.7533
RIYADUS-SALIKHIN RECONNAISSANCE AND SABOTAGE BATTALION OF CHECHEN MARTYRS	8.7133
LASHKAR-E-JHANGVI (LEJ)	8.6149
AL-QA'IDA IN THE ARABIAN PENINSULA (AQAP)	8.25383
TALIBAN	8.21847
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	7.88142
MUJAHEDIN-E KHALQ (MEK)	7.88012
MUJAHEDIN-E KHALQ (MEK)	7.7263
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	7.65286
LORD'S RESISTANCE ARMY (LRA)	7.57565
NATIONAL LIBERATION ARMY OF COLOMBIA (ELN)	7.57101
PALESTINIAN ISLAMIC JIHAD (PIJ)	7.40223
NATIONAL LIBERATION ARMY OF COLOMBIA (ELN)	7.37059
MUJAHEDIN-E KHALQ (MEK)	7.35537
MUJAHEDIN-E KHALQ (MEK)	7.28735
LASHKAR-E-TAIBA (LET)	7.23613
HIZBALLAH	7.21385
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	7.17971
RED HAND DEFENDERS (RHD)	6.96567
LASHKAR-E-TAIBA (LET)	6.94458
AL-AQSA MARTYRS BRIGADE	6.65267
NATIONAL UNION FOR THE TOTAL INDEPENDENCE OF ANGOLA (UNITA)	6.40849
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	6.27636
JAISH AL-TA'IFA AL-MANSURA	5.9226
UNITED NATIONAL LIBERATION FRONT (UNLF)	5.54711
UNITED NATIONAL LIBERATION FRONT (UNLF)	5.5094
UNITED NATIONAL LIBERATION FRONT (UNLF)	5.48227
TALIBAN	5.44026
LASHKAR-E-TAIBA (LET)	5.38224
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	5.36041
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	5.33638
TALIBAN	5.2888
RED HAND DEFENDERS (RHD)	5.23905
PALESTINIAN ISLAMIC JIHAD (PIJ)	5.16763
PALESTINIAN ISLAMIC JIHAD (PIJ)	5.02543
LORD'S RESISTANCE ARMY (LRA)	4.87194
ARMED ISLAMIC GROUP (GIA)	4.79667
REAL IRISH REPUBLICAN ARMY (RIRA)	4.78419
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	4.76444
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	4.72484
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	4.71588

KURDISTAN WORKERS' PARTY (PKK)	4.67373
UNITED LIBERATION FRONT OF ASSAM (ULFA)	4.47536
ARMED ISLAMIC GROUP (GIA)	4.47509
POPULAR LIBERATION ARMY (EPL)	4.45104
DEVIRIMICI HALK KURTULUS CEPHESI (DHKP/C)	4.41641
JEMAAH ISLAMIYA (JI)	4.39661
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	4.38208
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.34917
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	4.33103
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.2894
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	4.27685
UNITED LIBERATION FRONT OF ASSAM (ULFA)	4.27125
DEVIRIMICI HALK KURTULUS CEPHESI (DHKP/C)	4.24289
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.24037
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.19341
KURDISTAN WORKERS' PARTY (PKK)	4.19063
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.1894
UNITED NATIONAL LIBERATION FRONT (UNLF)	4.11286
REAL IRISH REPUBLICAN ARMY (RIRA)	4.07974
ANSAR AL-SUNNA	4.03754
BASQUE FATHERLAND AND FREEDOM (ETA)	4.03545
UNITED LIBERATION FRONT OF ASSAM (ULFA)	3.99851
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	3.99357
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	3.98208
ULSTER VOLUNTEER FORCE (UVF)	3.94758
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.94212
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.93975
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.9279
RED BRIGADES	3.88935
UNITED LIBERATION FRONT OF ASSAM (ULFA)	3.88267
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	3.87166
REAL IRISH REPUBLICAN ARMY (RIRA)	3.85175
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.84752
WORLD CHURCH OF THE CREATOR	3.84434
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.8285
JEMAAH ISLAMIYA (JI)	3.8047
WORLD CHURCH OF THE CREATOR	3.78407
PALESTINIAN ISLAMIC JIHAD (PIJ)	3.74741
RED BRIGADES	3.74572
TALIBAN	3.69398
PALESTINIAN ISLAMIC JIHAD (PIJ)	3.68859

RED BRIGADES	3.68111
REAL IRISH REPUBLICAN ARMY (RIRA)	3.67966
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.67453
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	3.66631
WORLD CHURCH OF THE CREATOR	3.66347
MACHETEROS	3.6633
UNITED LIBERATION FRONT OF ASSAM (ULFA)	3.65021
RED HAND DEFENDERS (RHD)	3.64449
PALESTINIAN ISLAMIC JIHAD (PIJ)	3.58429
RED BRIGADES	3.58007
RED BRIGADES	3.57962
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.57879
ISLAMIC ARMY IN IRAQ (AL-JAISH AL-ISLAMI FI AL-IRAQ)	3.55659
RED BRIGADES	3.55168
ARMY OF GOD	3.52322
REAL IRISH REPUBLICAN ARMY (RIRA)	3.52205
WORLD CHURCH OF THE CREATOR	3.51854
RED HAND DEFENDERS (RHD)	3.50288
RED BRIGADES	3.50004
ANSAR AL-SUNNA	3.49136
RED BRIGADES	3.48904
ARMY OF GOD	3.46779
ULSTER VOLUNTEER FORCE (UVF)	3.45803
KURDISTAN WORKERS' PARTY (PKK)	3.452
KURDISTAN WORKERS' PARTY (PKK)	3.43283
LOYALIST VOLUNTEER FORCES (LVF)	3.43185
ULSTER VOLUNTEER FORCE (UVF)	3.4155
POPULAR RESISTANCE COMMITTEES	3.40726
POPULAR RESISTANCE COMMITTEES	3.40004
HARKATUL JIHAD-E-ISLAMI	3.37353
WORLD CHURCH OF THE CREATOR	3.35849
ARMY OF GOD	3.35692
KURDISTAN WORKERS' PARTY (PKK)	3.33587
ULSTER VOLUNTEER FORCE (UVF)	3.32239
KURDISTAN WORKERS' PARTY (PKK)	3.32042
AL-QA'IDA IN THE ARABIAN PENINSULA (AQAP)	3.31712
ULSTER VOLUNTEER FORCE (UVF)	3.31475
AL-AQSA MARTYRS BRIGADE	3.29847
ORANGE VOLUNTEERS (OV)	3.29202
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	3.26441
LOYALIST VOLUNTEER FORCES (LVF)	3.25101
ULSTER VOLUNTEER FORCE (UVF)	3.23518
ARMY OF GOD	3.22371



POPULAR RESISTANCE COMMITTEES	3.18589
LOYALIST VOLUNTEER FORCES (LVF)	3.17839
NATIONAL SOCIALIST COUNCIL OF NAGALAND-ISAK-MUIVAH (NSCN-IM)	3.15999
ORGANIZATION OF SOLDIERS OF THE LEVANT	3.12738
PROLETARIAN NUCLEI FOR COMMUNISM	3.10741
KURDISTAN WORKERS' PARTY (PKK)	3.08269
ORGANIZATION OF SOLDIERS OF THE LEVANT	3.07886
RED HAND DEFENDERS (RHD)	3.07787
ARMY OF GOD	3.07665
UNITED LIBERATION FRONT OF ASSAM (ULFA)	3.07118
ANTI-IMPERIALIST TERRITORIAL NUCLEI (NTA)	3.05139
ULSTER VOLUNTEER FORCE (UVF)	3.04381
KURDISTAN WORKERS' PARTY (PKK)	3.03478
BASQUE FATHERLAND AND FREEDOM (ETA)	3.02391
STUDENTS ISLAMIC MOVEMENT OF INDIA (SIMI)	3.02365
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3.02267
ARMED ISLAMIC GROUP (GIA)	3.02257
RED HAND DEFENDERS (RHD)	3.0199
LIBERATION TIGERS OF TAMIL EELAM (LTTE)	3.0152
RED HAND DEFENDERS (RHD)	3.01148
RED HAND DEFENDERS (RHD)	3.00791
RED BRIGADES	3.00765

**Biological Weapons Pursuers 1999-2007**

Predicted probabilities of organizations that did pursue biological weapons whose score was above 3% (note some organizations listed more than once because analysis is yearly) using Islam because better model fit.

**Table 5.13: Predicted Probabilities of Biological Weapons Pursuers**

Name	% likelihood according to model of pursuit of biological weapons
AL-QA`IDA	99.99999
TALIBAN	95.88172
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	58.05529
AL-QA`IDA	10.60196
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	2.3747
AL-AQSA MARTYRS BRIGADE	1.57078
JEMAAH ISLAMIYA (JI)	1.54685
AL-QA`IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	0.65148
POPULAR LIBERATION ARMY (EPL)	0.05678

Predicted probabilities of organizations that did NOT pursue biological weapons whose score was above 3% (note some organizations listed more than once because analysis is yearly) using Islam because better model fit.

**Table 5.14: Predicted Probabilities of Biological Weapons Non-Pursuers**

Name	% likelihood according to model of pursuit of biological weapons
AL-QA`IDA	28.88959
TALIBAN	22.34376
RIYADUS-SALIKHIN RECONNAISSANCE AND SABOTAGE BATTALION OF CHECHEN MARTYRS	21.01342
AL-QA`IDA	19.56158
AL-QA`IDA	15.42821
AL-QA`IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	13.29155
JEMAAH ISLAMIYA (JI)	11.16895
ARMED ISLAMIC GROUP (GIA)	7.99164
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	7.34783
LIBERATION TIGERS OF TAMIL EELAM (LTTE)	7.2128
AL-QA`IDA	6.63928
LASHKAR-E-TAIBA (LET)	6.0873
NATIONAL UNION FOR THE TOTAL INDEPENDENCE OF ANGOLA (UNITA)	5.59943
AL-QA`IDA	5.42998
COMMUNIST PARTY OF NEPAL- MAOIST (CPN-M)	4.54331
ANSAR AL-SUNNA	4.13791
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	4.03157
HARKATUL JIHAD-E-ISLAMI	3.90673
AL-AQSA MARTYRS BRIGADE	3.80069
SECRET ORGANIZATION OF AL-QAEDA IN EUROPE	3.53845
SECRET ORGANIZATION OF AL-QAEDA IN EUROPE	3.38755
LASHKAR-E-TAIBA (LET)	3.18335

## **SURVIVAL ANALYSIS**

An alternative way to conceptualize an organization’s pursuit or use of chemical and biological weapons is to think about organizations as transitioning between two possible states-of-being: one where they are not using effort or attempting to use chemical/biological weapons to one where they are. What makes it likely that an organization will transition quickly to a world where it is attempting to use these weapons? Alternatively, what determines which organizations will take longer to transition to the pursuit or use of these weapons? In line with this conceptualization, we use an event history statistical framework as an alternative way to examine the determinants of weapon use.<sup>365</sup>

Event history models, often termed survival or hazard models, are a set of statistical models specifically designed to focus on the length of time until a transition occurs. In classic biomedical terms, these models

<sup>365</sup> Janet M. Box-Steffensmeier and Bradford S. Jones, *Event History Modeling: A Guide for Social Scientists* (Cambridge: Cambridge University Press, 2004).

were designed to focus on how long someone “survived” with a certain disease and the influence of different medical interventions on prolonging a person’s life. The event of interest in the classical event history models was the “death” of the subject.<sup>366</sup> When the focus is on duration or the time until an event, event history statistical models are preferred to a typical regression analysis for a number of reasons, including that these models do not introduce measurement error from right censoring of the data (i.e., organizations that have not yet transitioned at the end of the sample time-period).<sup>367</sup> Event history models also allow for the inclusion of time-varying covariates.

In our situation, the event of interest is the organization’s first pursuit or use of chemical or biological weapons and we are interested in modeling the determinants of the time until this event happens. The organization is considered as part of the sample from 1998 or from when the organization first enters the dataset if later than 1998. Because our focus is on how the series of independent variables discussed above impacts the likelihood of an organization transitioning at a certain time period, we run a Cox Proportional Hazard model.<sup>368</sup> This model centers our focus on the impact of covariates on the hazard of a chemical or biological weapon attempt/effort occurring and does not rest on our a priori assumptions about the shape of the hazard rate. Because multiple organizations can transition at the same time, we utilize the Efron method of ties: this method averages weights of the risk sets across tied cases. Importantly, all of the specifications run for this project meet the global test of the proportional hazard assumption using Schoenfeld residuals.<sup>369</sup> The results of this test provide some evidence that the impact of independent variables on the hazard rate does not vary with time, supporting our use of the Cox Proportional Hazard model here.

Tables 5.15 and 5.16 provide the results of various specifications of these event history models on two dependent variables: (a) the length of time until any chemical or biological attempt (*chembio\_use\_att*) and (b) the length of time until any chemical or biological effort (*any\_chembio*). The list of independent variables included here is similar to the modeling specification discussed above and include fatalities, organizational size, leftist organization, ethnic organization, religious and ethnic organization, age of organization, Freedom House/Imputed Polity, alliance centrality, rivalry centrality, state sponsorship funding, drug trafficking, territorial control, and GDP per capita. We do use these models to make several small adjustments in specification. First, in all models, we use the natural log of GDP per capita to account for possible variance non-stationarity. Second, we run models with the non-normalized alliance and rivalry centrality and models where these variables are normalized. In most models, the results are not sensitive to whether the normalized or non-normalized versions of these variables are included. We make one more model specification change here as opposed to the earlier models: in Table 5.16, we include the natural log of fatalities and organizational age instead of the raw figures. When taking the

<sup>366</sup> Paul D. Allison, ed., *Event History Analysis: Regression for Longitudinal Event Data* (Sage University Press, 1984), 12.

<sup>367</sup> Janet M. Box-Steffensmeier and Bradford S. Jones, *Event History Modeling: A Guide for Social Scientists* (Cambridge: Cambridge University Press, 2004).

<sup>368</sup> Janet M. Box-Steffensmeier and Bradford S. Jones, *Event History Modeling: A Guide for Social Scientists* (Cambridge: Cambridge University Press, 2004).

<sup>369</sup> Janet M. Box-Steffensmeier and Bradford S. Jones, *Event History Modeling: A Guide for Social Scientists* (Cambridge: Cambridge University Press, 2004).

natural log, we first add one to the raw figures.<sup>370</sup> This transformation is especially important here for both theoretical and statistical reasons: given how rare an event transitioning to weapon use is, it is important that our results are not unduly influenced by the very high fatality counts and organizational ages of a very few organizations. To aid in comparison to the earlier models, we provide the results of models where the non-transformed variables were used in Table 5.15 before showing the results of models using the transformed variables in Table 5.16. Although the results are fairly consistent across all of the various specifications, we wanted to be as transparent as possible about the sensitivity of our models.

Before outlining the substance of our results, one final thing is worth mentioning: in both Tables 5.15 and 5.16, we provide hazard ratios instead of coefficients. Hazard ratios provide an easy way to interpret event history models. A number less than one indicates that the variable is decreasing the likelihood of the transition while a number more than one indicates that the variable is increasing the likelihood of transition. The effect a one unit change in the variable is having on the rate of transition is easily calculated as:  $[100\% * (\text{Hazard Ratio} - 1)]$ .<sup>371</sup>

Given the specification justifications provided above, we focus our interpretation on Table 5.16. As can be seen, for both attempts and any efforts at chemical or biological weapons, organizations that have more fatalities and those that are in more developed countries are those that are likely to transition to weapon use quickly. When the focus is only on organizational transitions to chemical/biological weapon attempts, as shown in Model 1 of Table 5.16, a one unit increase in fatalities (ln) is expected to have almost a 99% increase in the rate of transition. A one unit increase in GDP per capita is expected to have a 111% increase in the rate of transition. The finding is similar but slightly diminished when we look at the transition to any chemical or biological efforts, as shown in Model 3 of Table 5.16.

We have also included tables that show the Top 25 Hazard Ratios in 2007 for each of these models, which can serve as a companion to the probability charts above of the probabilities of an organization engaging in this activity, although these tables provide a ranking of the organizations most likely to be involved in these activities soonest from a hazard ratio perspective.

Figures 5.1-5.4 outline these findings by focusing on how different levels of fatalities influence the survival function, easily thought about as the proportion of groups with no chemical/biological attempt/effort in a given year or the likelihood that an organization does not transition at a given time. In Figure 5.1, the blue line represents an organization with 0 fatalities. The red line represents an organization with the mean plus one standard deviation above the mean fatalities. As can be seen, as time goes on, it is unlikely that an organization with a higher level of fatalities will not transition to chemical/biological use. Figure 5.2 repeats this graph but utilizes the sample minimum and maximum

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<sup>370</sup> Mark Shadden and Christopher Zorn, "Data Transformations for Social Science Research: Theory and Best Practices," Presented at the annual meeting of the Peace Science Society (International). Fort Worth, TX. October 23, 2010.

<sup>371</sup> Janet M. Box-Steffensmeier and Bradford S. Jones, *Event History Modeling: A Guide for Social Scientists* (Cambridge: Cambridge University Press, 2004).

levels of fatalities. Figures 5.3 and 5.4 provide the same information when the dependent variable is focused on effort instead of attempt. Figures 5.5 through 5.8 focus on different levels of GDP per capita (ln).

Beyond these similarities across the models for both attempts and any efforts, we do find some slight differences in the variables that are statistically significant and will talk about these results in turn. First, for actual weapons attempts, rivalry centrality appears to increase the likelihood of weapon use. This is consistent regardless of whether we capture rivalry centrality as its raw degree (Model 1 of Table 5.16) or rather we use the normalized measure (Model 2 of Table 5.16). A one-unit change in the raw rivalry degree has a rather substantial 68% increased rate of an attempt. Figures 5.9-5.10 provide a visualization of this effect, based on the results presented in Model 2 of Table 5.16.

For weapons efforts, as shown in Models 3 and 4 of Table 5.16, a few more variables are statistically significant. First, these results indicate that leftist and religious organizations are likely to transition quickly to weapons use, although this result is just marginally significant for religious organizations. Both of these effects are large: an organization with either of these characteristics has a rate of transition that is 400% larger. Figures 5.11 and 5.12 illustrate these results by focusing on the survival function over time. Finally, being embedded in a democracy slows down the transition to weapon effort: a one-unit change in this scale decreases the rate of transition by over 20% across models. This is illustrated rather nicely by the final figures, Figures 5.13 and 5.14.

**Tables and Charts for Survival Analysis**

**Table 5.15: Determinants of Organization Chemical/Biological Weapons, Cox Proportional Hazard Model, Robust Standard Errors with Efron Method for Ties – Raw Counts for Organizational Age and Fatalities**

VARIABLES	(1) Chemical/ Biological Use/Attempt	(2) Chemical/ Biological Use/Attempt – Alternative Specification for Rivalry/Alliance Centrality	(3) Chemical/ Biological Pursuit	(4) Chemical/ Biological Pursuit – Alternative Specification for Rivalry/Alliance Centrality
Fatalities (GTD)	1.00075 (0.001)	1.00074 (0.001)	1.00547*** (0.002)	1.00551*** (0.002)
Organizational Size	1.12453 (0.395)	1.12833 (0.402)	0.99124 (0.168)	1.00807 (0.167)
Leftist Organization	3.90536 (3.575)	3.86760 (3.472)	6.13788** (5.220)	6.31272** (5.426)
Religious Organization	1.31606 (2.228)	1.34438 (2.195)	6.07393* (5.646)	6.31733* (5.950)
Ethnic Organization	1.54517 (1.967)	1.62218 (2.042)	1.76693 (1.431)	1.83454 (1.491)
Religious and Ethnic Organization	4.01540 (4.390)	4.25459 (4.532)	2.64196 (2.545)	2.86687 (2.779)
Age of Organization	1.00747 (0.017)	1.00737 (0.017)	1.00460 (0.012)	1.00302 (0.012)
Freedom House/Imputed Polity	0.92855 (0.093)	0.91372 (0.092)	0.77094*** (0.071)	0.76789*** (0.072)
Alliance Degree Centrality	1.12579*** (0.047)		1.40173*** (0.121)	
Rivalry Degree Centrality	1.74894** (0.390)		0.82824 (0.244)	
Alliance Degree Centrality (Normalized)		1.60427** (0.360)		3.83650*** (1.426)
Rivalry Degree Centrality (Normalized)		9.63465* (11.398)		0.48656 (0.602)
State Sponsorship Funding	0.91378 (0.647)	0.94066 (0.584)	0.90700 (0.500)	0.85994 (0.468)
Drug Trafficking	0.44629 (0.540)	0.41669 (0.513)	0.37446 (0.460)	0.36272 (0.431)
Territorial Control	0.99094 (0.649)	1.22851 (0.994)	1.76016 (1.166)	1.70249 (1.125)
GDP per Capita (ln)	1.94755* (0.680)	1.98651* (0.697)	1.97153*** (0.444)	1.98964*** (0.450)
Observations	2,800	2,800	2,657	2,657

Columns contain Hazard Ratios. Robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

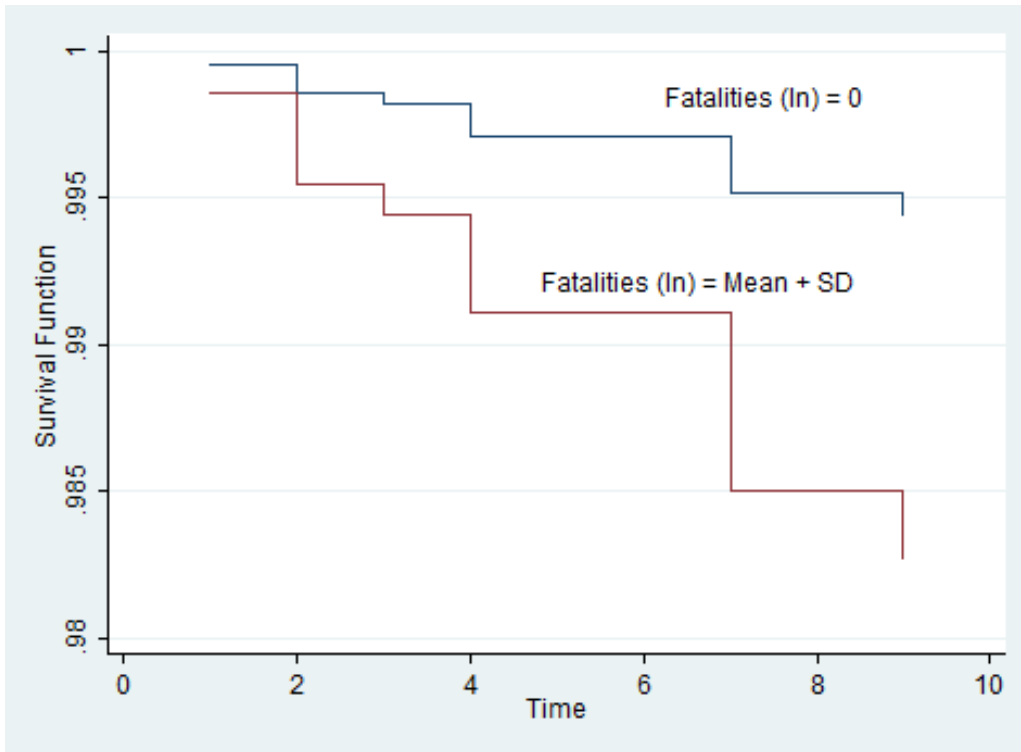
**Table 5.16: Determinants of Organization Chemical/Biological Weapons, Cox Proportional Hazard Model, Robust Standard Errors with Efron Method for Ties**

VARIABLES	(1) Chemical/ Biological Use/Attempt	(2) Chemical/ Biological Use/Attempt – Alternative Specification for Rivalry/Alliance Centrality	(3) Chemical/ Biological Pursuit	(4) Chemical/ Biological Pursuit – Alternative Specification for Rivalry/Alliance Centrality
Fatalities (ln) (GTD)	1.98888*** (0.330)	2.00424*** (0.318)	1.66032*** (0.208)	1.68814*** (0.206)
Organizational Size	0.88675 (0.272)	0.90273 (0.291)	0.88599 (0.161)	0.89327 (0.158)
Leftist Organization	3.28625 (2.890)	3.34595 (3.062)	5.38091** (4.305)	5.58742** (4.460)
Religious Organization	1.15130 (1.702)	1.13327 (1.693)	5.19815* (4.583)	5.46053* (4.829)
Ethnic Organization	1.57353 (1.783)	1.65322 (1.905)	1.73469 (1.216)	1.80907 (1.256)
Religious and Ethnic Organization	2.19295 (2.005)	2.25340 (2.093)	2.30349 (2.043)	2.44704 (2.159)
Age of Organization (ln)	1.21541 (0.449)	1.15866 (0.430)	1.17549 (0.255)	1.15800 (0.250)
Freedom House/Imputed Polity	0.99727 (0.104)	0.97898 (0.096)	0.78839*** (0.069)	0.78919*** (0.069)
Alliance Degree Centrality	1.06638 (0.050)	-	1.19164* (0.116)	-
Rivalry Degree Centrality	1.68389*** (0.311)	-	0.84124 (0.246)	-
Alliance Degree Centrality (Normalized)		1.26989 (0.260)	-	1.87769 (0.748)
Rivalry Degree Centrality (Normalized)		9.62262** (9.020)	-	0.51348 (0.638)
State Sponsorship Funding	0.77233 (0.584)	0.78934 (0.581)	1.05536 (0.518)	1.04059 (0.509)
Drug Trafficking	0.41256 (0.388)	0.38036 (0.362)	0.44621 (0.498)	0.44863 (0.485)
Territorial Control	0.48750 (0.391)	0.57444 (0.462)	1.72652 (1.168)	1.69004 (1.145)
GDP per Capita (ln)	2.11139** (0.775)	2.17347** (0.800)	1.97549*** (0.430)	1.96920*** (0.429)
Observations	2800	2,800	2,657	2,657

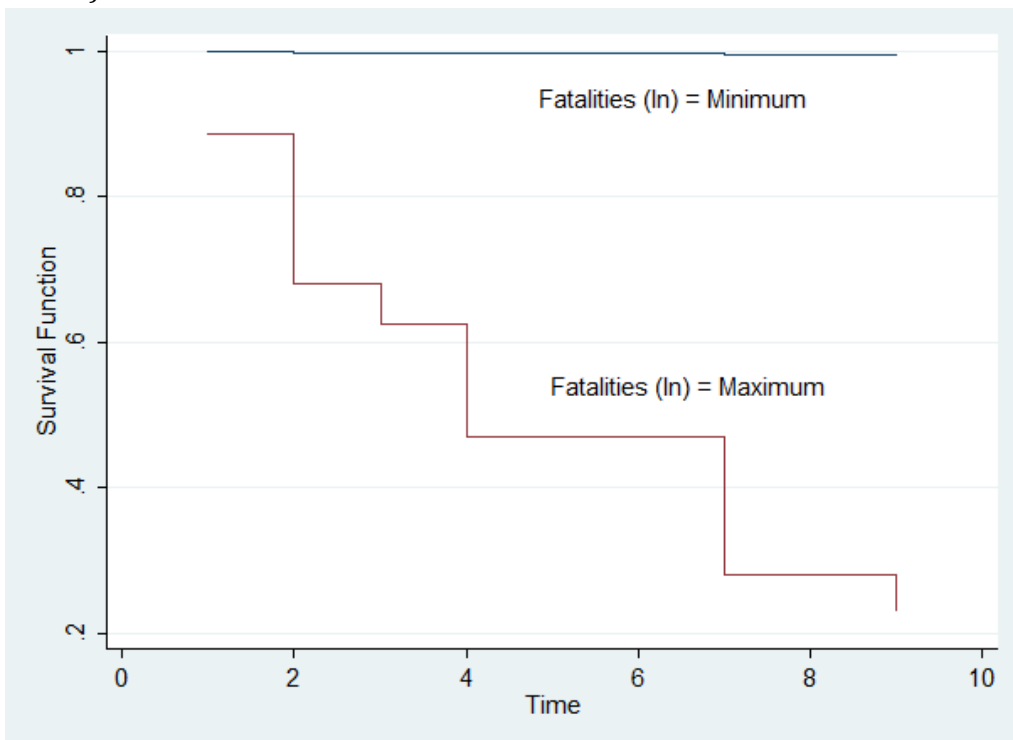
Columns contain Hazard Ratios. Robust standard errors in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Figure 5.1: Survival Function<sup>372</sup> - Chemical/ Biological Use/Attempt (Model 2 in Table 5.16) at Various Levels of Fatalities (0 and Mean + SD)**



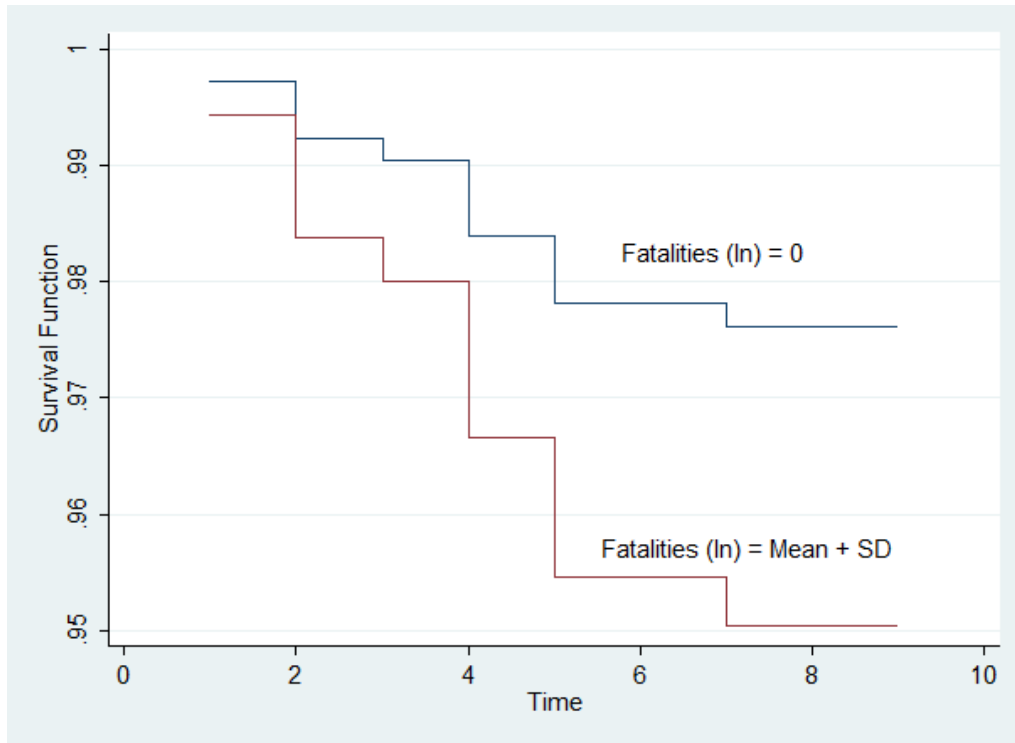
**Figure 5.2: Survival Function - Chemical/ Biological Use/Attempt (Model 2 in Table 5.16) at Various Levels of Fatalities (Min and Max)**



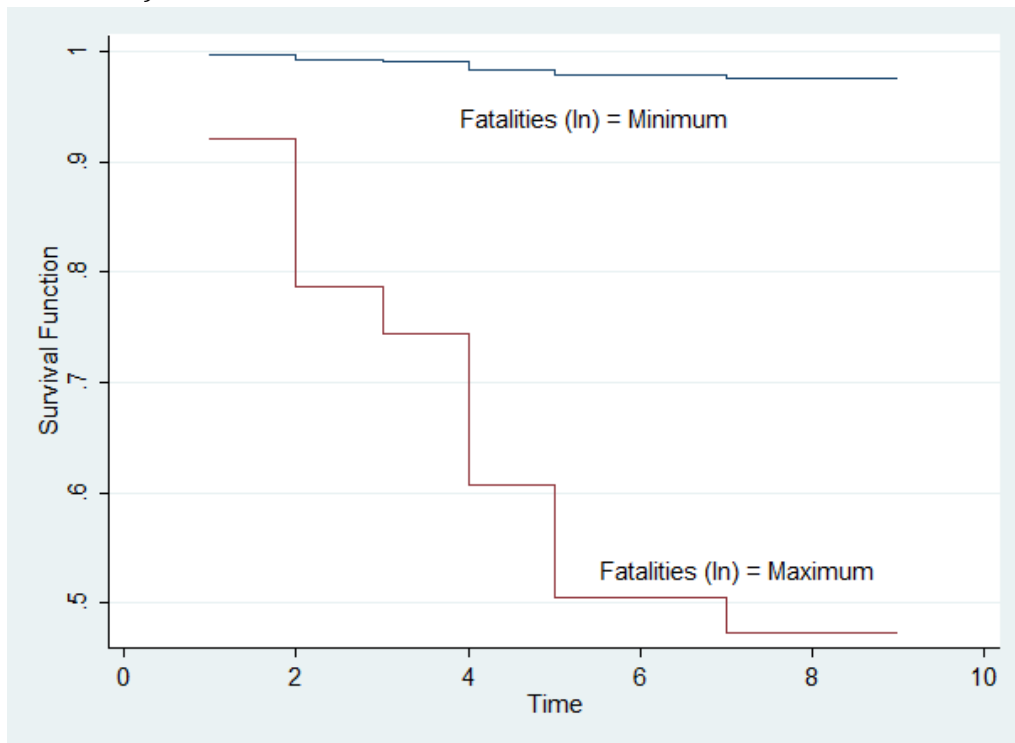
<sup>372</sup> Survival function can be understood as the proportion of groups with no chemical/biological attempt past year t.1



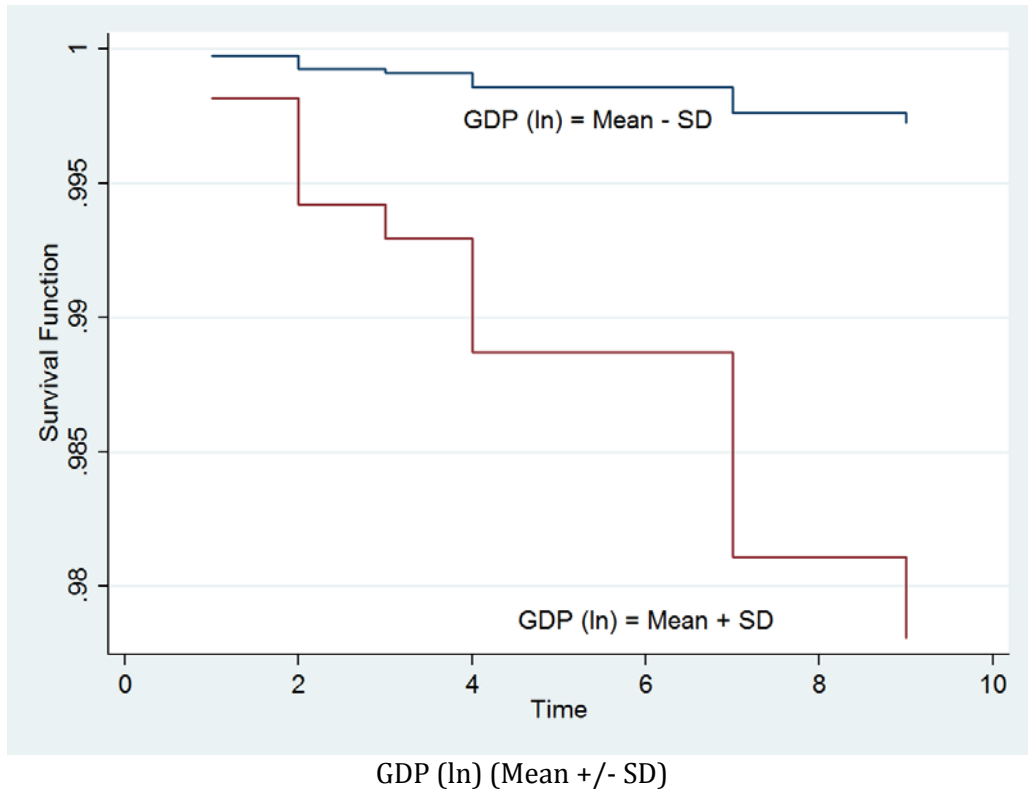
**Figure 5.3: Survival Function - Chemical/ Biological Pursuit (Model 4 in Table 5.16) at Various Levels of Fatalities (ln) (0 and Mean + SD)**



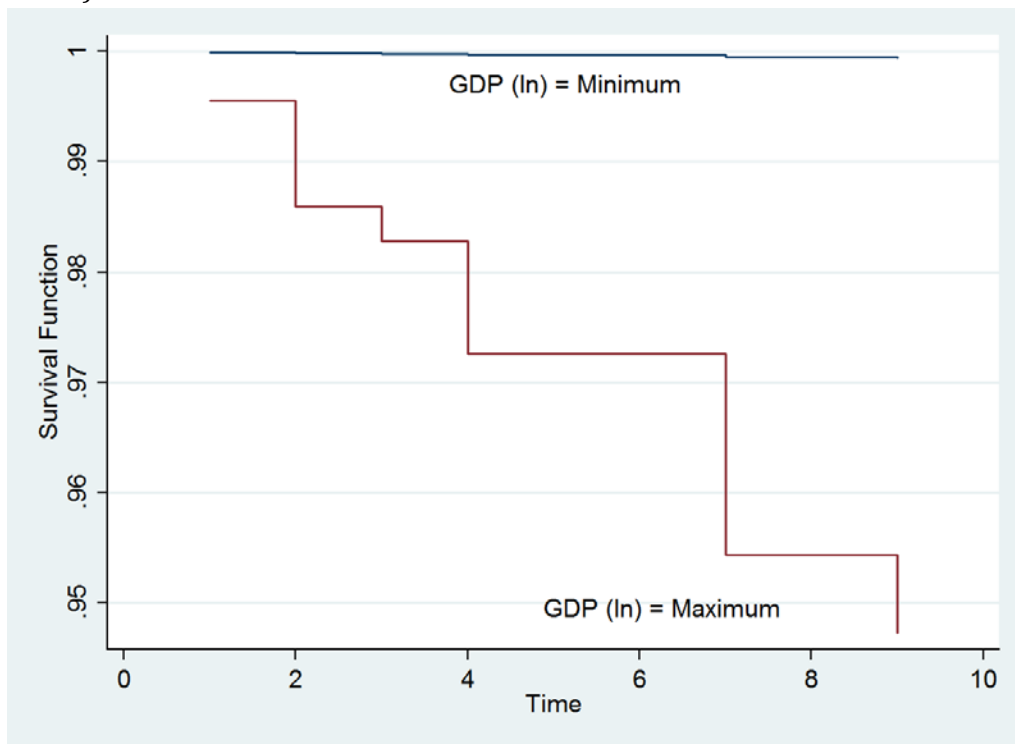
**Figure 5.4: Survival Function - Chemical/ Biological Pursuit (Model 4 in Table 5.16) at Various Levels of Fatalities (ln) (Min and Max)**



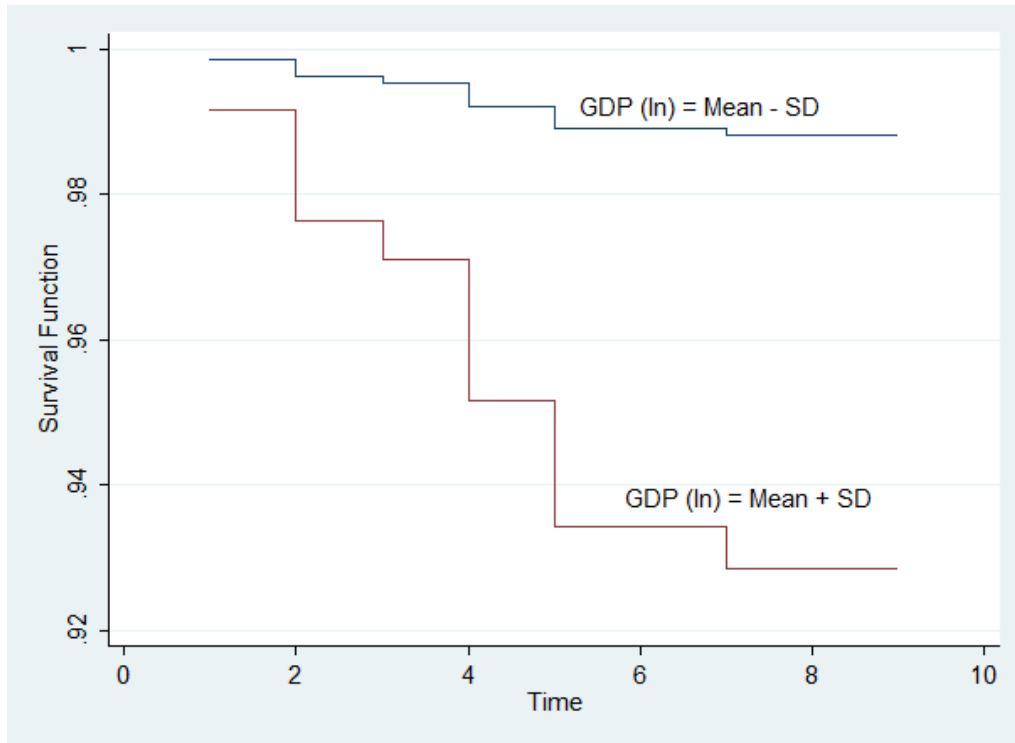
**Figure 5.5: Survival Function - Chemical/ Biological Use/Attempt (Model 1 in Table 5.16) at Various Levels of**



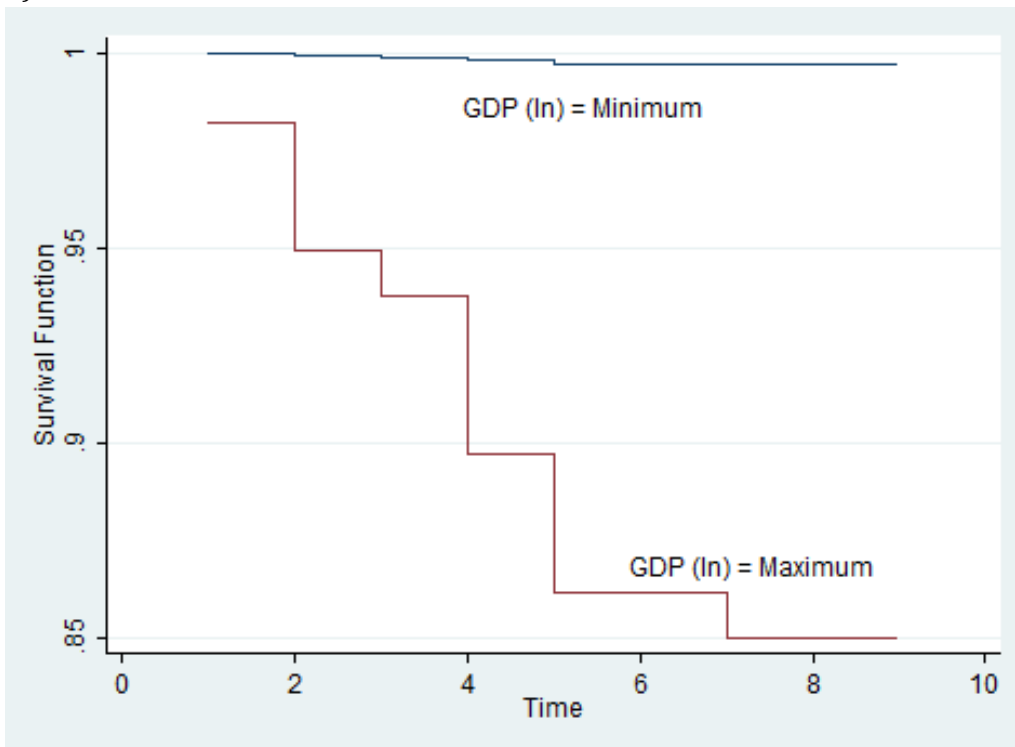
**Figure 5.6: Survival Function - Chemical/ Biological Use/Attempt (Model 1 in Table 5.16) at Various Levels of GDP (ln) (Min and Max)**



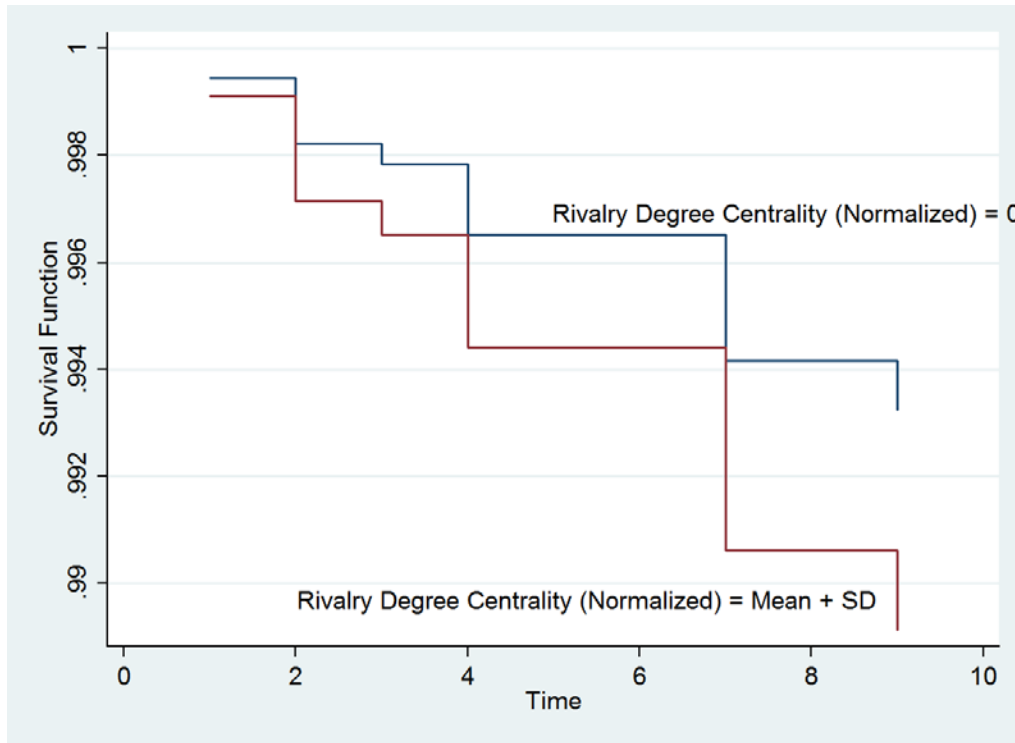
**Figure 5.7: Survival Function - Chemical/ Biological Pursuit (Model 3 in Table 5.16) for Various Levels of GDP (ln) (Mean +/- SD)**



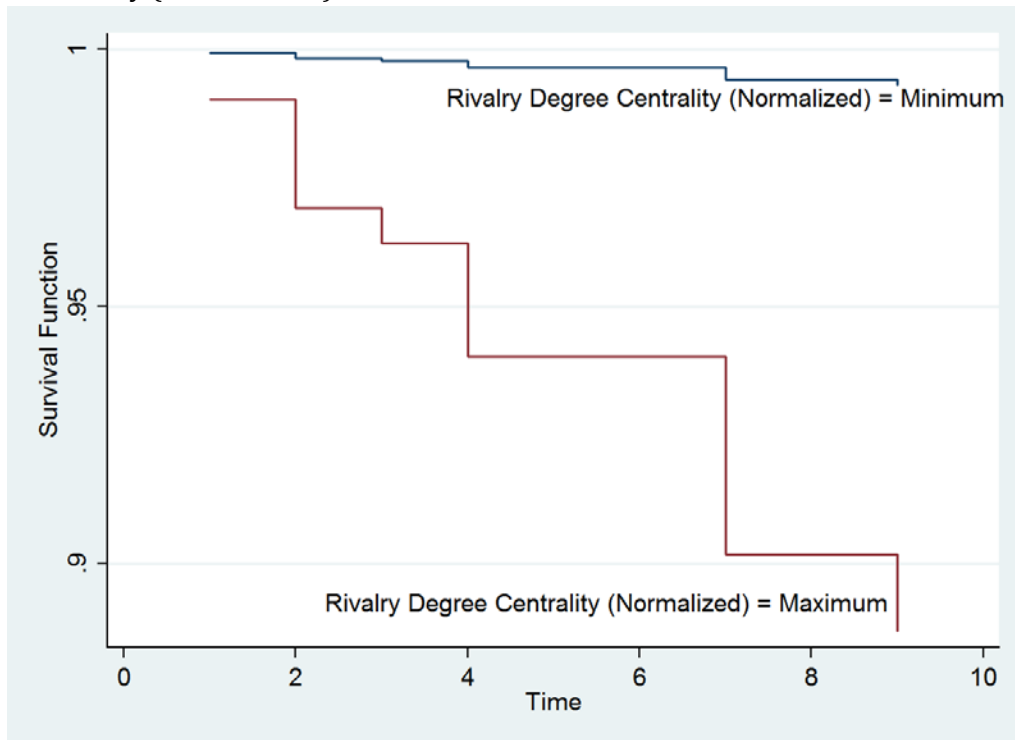
**Figure 5.8: Survival Function - Chemical/ Biological Pursuit (Model 3 in Table 5.16) for Various Levels of GDP (ln) (Min and Max)**



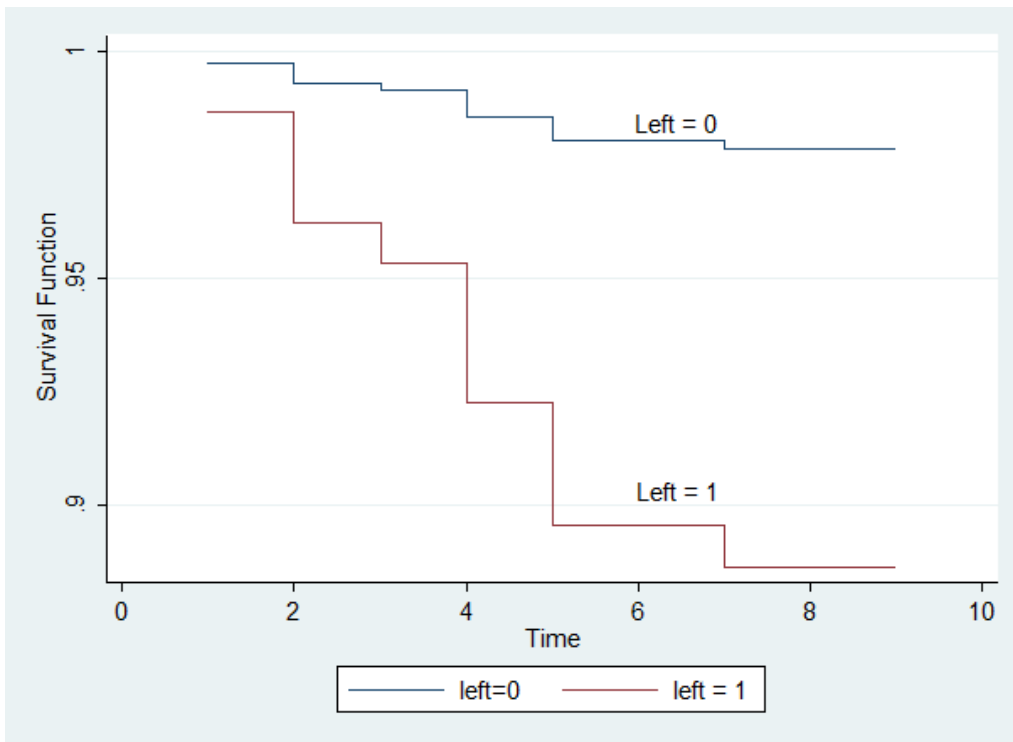
**Figure 5.9: Survival Function - Chemical/ Biological Use/Attempt (Model 2 in Table 5.16) at Various Levels of Rivalry Degree Centrality (0 and Mean + SD)**



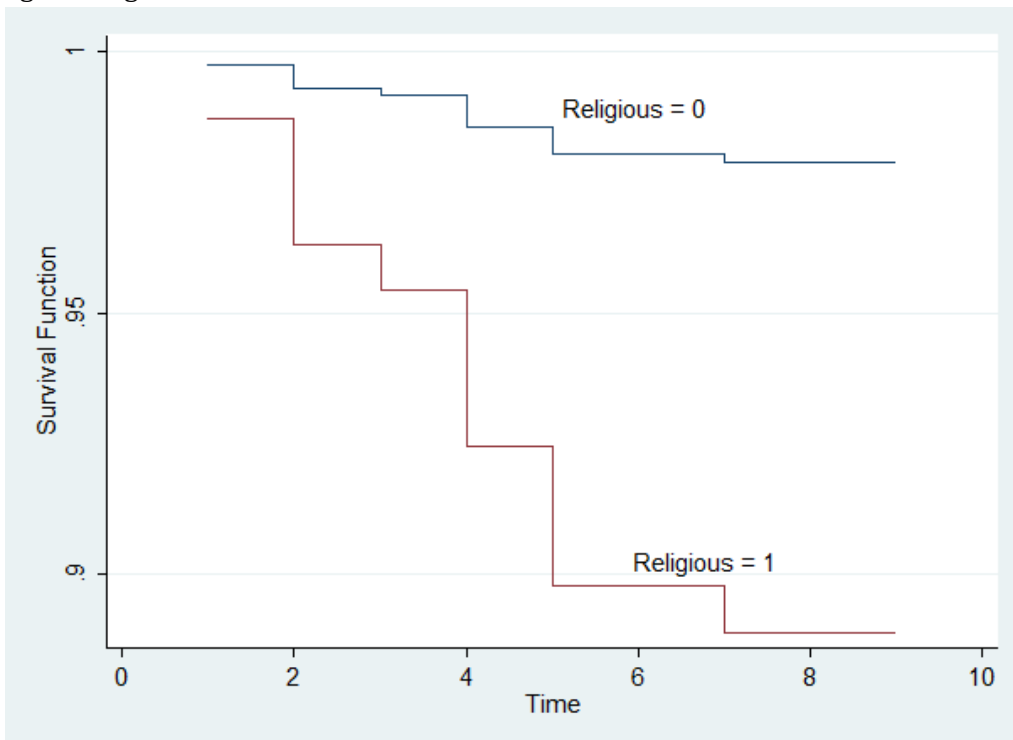
**Figure 5.10: Survival Function - Chemical/ Biological Use/Attempt (Model 2 in Table 5.16) at Various Levels of Rivalry Degree Centrality (Min and Max)**



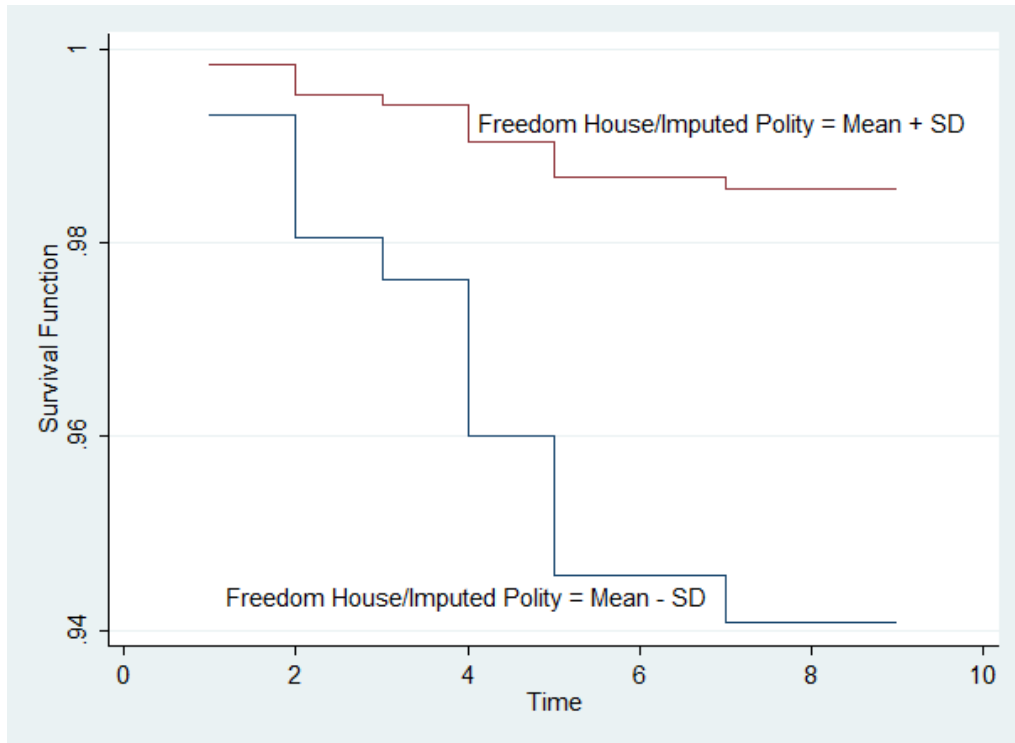
**Figure 5.11: Survival Function - Chemical/ Biological Pursuit (Model 4 in Table 5.16) for Left/Nonleft Organizations**



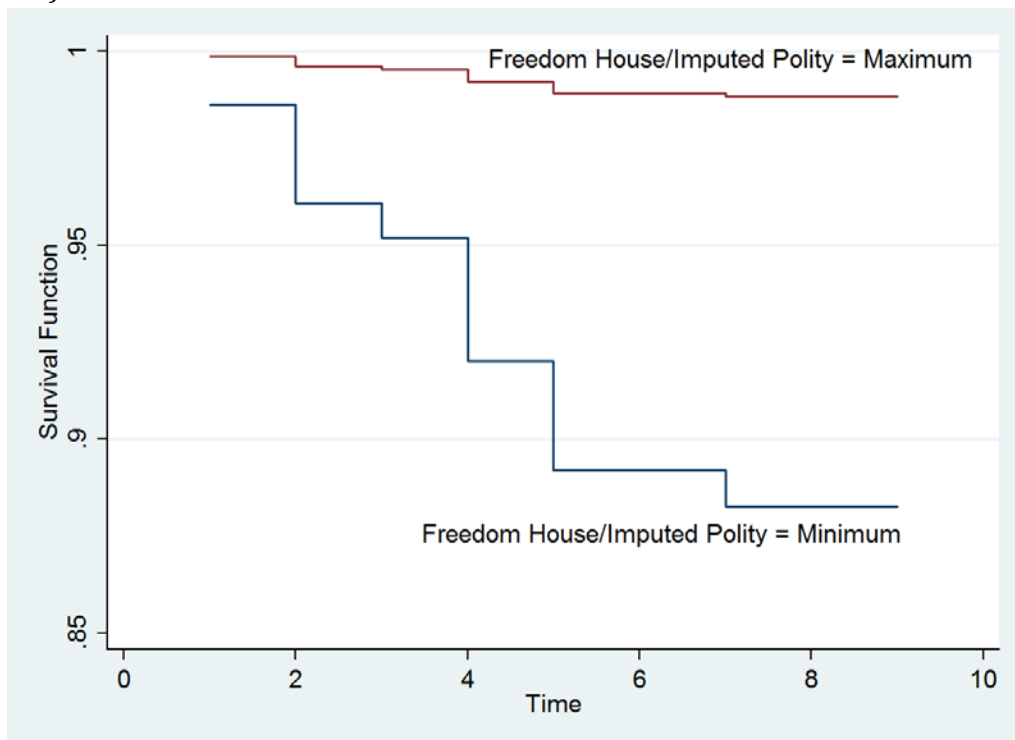
**Figure 5.12: Survival Function - Chemical/ Biological Pursuit (Model 4 in Table 5.16) for Religious/Nonreligious Organizations**



**Figure 5.13: Survival Function - Chemical/ Biological Pursuit (Model 4 in Table 5.16) for Various Levels of Polity (Mean +/- SD)**



**Figure 5.14: Survival Function - Chemical/ Biological Pursuit (Model 4 in Table 5.16) for Various Levels of Polity (Min and Max)**



**Model Illustrations for Table 5.15**

**Determinants of Organization Chemical/Biological Weapons, Cox Proportional Hazard Model, Robust Standard Errors with Efron Method for Ties – Raw Counts for Organizational Age and Fatalities**

**Table 5.17: Model 1 – Chemical/ Biological Use/Attempt - Top 25 Hazard Ratios in 2007**

Group	Predicted Hazard Ratio
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	136919.2
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	81810.9
ISLAMIC STATE OF IRAQ (ISI)	27675.91
AL-QA`IDA	22007.43
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	12490.64
IRISH REPUBLICAN ARMY (IRA)	11368.11
PALESTINIAN ISLAMIC JIHAD (PIJ)	11069.71
UNITED NATIONAL LIBERATION FRONT (UNLF)	11054.37
ISLAMIC ARMY IN IRAQ (AL-JAISH AL-ISLAMI FI AL-IRAQ)	8539.684
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	8393.344
AL-FATAH	7360.548
MAHDI ARMY	6627.358
REAL IRISH REPUBLICAN ARMY (RIRA)	5532.555
POPULAR RESISTANCE COMMITTEES	5162.467
BASQUE FATHERLAND AND FREEDOM (ETA)	4403.186
RED HAND DEFENDERS (RHD)	4003.377
ULSTER VOLUNTEER FORCE (UVF)	3964.585
HIZBALLAH	3666.966
CHUKAKUHA REVOLUTIONARY ARMY	3601.827
CHUKAKUHA (MIDDLE CORE FACTION)	3601.827
ORANGE VOLUNTEERS (OV)	3560.053
1920 REVOLUTION BRIGADES	3379.14
ARMY OF ISLAM	3350.187
REVOLUTIONARY WORKERS' COUNCIL (KAKUROKYO)	3318.848
RED BRIGADES	3310.669

**Table 5.18: Model 2 – Chemical/ Biological Use/Attempt - Top 25 Hazard Ratios in 2007**

Group	Predicted Hazard Ratio
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	53566.76
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	39661.33
ISLAMIC STATE OF IRAQ (ISI)	13828.44
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	9875.934
IRISH REPUBLICAN ARMY (IRA)	7273.853
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	7177.214
PALESTINIAN ISLAMIC JIHAD (PIJ)	7020.035
UNITED NATIONAL LIBERATION FRONT (UNLF)	5917.665
MAHDI ARMY	5824.991
ISLAMIC ARMY IN IRAQ (AL-JAISH AL-ISLAMI FI AL-IRAQ)	5623.504
AL-QA`IDA	5125.645
REAL IRISH REPUBLICAN ARMY (RIRA)	5034.393

AL-FATAH	4839.071
BASQUE FATHERLAND AND FREEDOM (ETA)	4771.893
POPULAR RESISTANCE COMMITTEES	4278.332
RED HAND DEFENDERS (RHD)	3844.997
CHUKAKUHA REVOLUTIONARY ARMY	3763.231
CHUKAKUHA (MIDDLE CORE FACTION)	3763.231
REVOLUTIONARY WORKERS' COUNCIL (KAKUROKYO)	3471.328
ORANGE VOLUNTEERS (OV)	3407.68
SPECIAL PURPOSE ISLAMIC REGIMENT (SPIR)	3215.852
HIZBALLAH	3112.773
AL-AQSA MARTYRS BRIGADE	3106.986
RED BRIGADES	3056.302
ARMY OF ISLAM	3029.972

**Table 5.19: Model 3 – Chemical/ Biological Pursuit - Top 25 Hazard Ratios in 2007**

<b>Group</b>	<b>Predicted Hazard Ratio</b>
AL-QA'IDA	20223278
TALIBAN	543211.8
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	52785.01
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	10634.6
MUJAHEDIN-E KHALQ (MEK)	8844.764
UNITED LIBERATION FRONT OF ASSAM (ULFA)	8461.988
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	6211.931
ISLAMIC STATE OF IRAQ (ISI)	4851.476
AL-QA'IDA IN SAUDI ARABIA	4669.687
AL-QA'IDA IN THE ARABIAN PENINSULA (AQAP)	4628.796
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	4168.727
ANSAR AL-SUNNA	3748.238
HIZB AL-TAHRIR AL-ISLAMI (HT)	3253.422
POPULAR RESISTANCE COMMITTEES	3227.927
HARKATUL JIHAD-E-ISLAMI	3113.05
JAISH AL-TA'IFA AL-MANSURA	2779.836
ANSAR AL-ISLAM	2405.928
CHECHEN REPUBLIC OF ICHKERIA	2133.514
NATIONAL BOLSHEVIK PARTY (PARTIYA NATSIONALNIKH BOLSHEVIKOV - PNB)	1779.111
PEOPLE'S UNITED DEMOCRATIC MOVEMENT (PUDEMO)	1726.769
PALESTINIAN ISLAMIC JIHAD (PIJ)	1696.897
VANGUARD OF RED YOUTH (AKM)	1692.129
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	1668.156
MUJAHEDEN SHURA COUNCIL	1650.105
MUSLIM BROTHERHOOD	1623.306



**Table 5.20: Model 4 – Chemical/ Biological Pursuit - Top 25 Hazard Ratios in 2007**

<b>Group</b>	<b>Predicted Hazard Ratio</b>
AL-QA`IDA	663399.5
TALIBAN	327144.7
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	29400.27
MUJAHEDIN-E KHALQ (MEK)	8596.073
AL-QA`IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	5629.365
AL-QA`IDA IN THE ARABIAN PENINSULA (AQAP)	5318.25
AL-QA`IDA IN SAUDI ARABIA	5275.701
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	4549.067
ISLAMIC STATE OF IRAQ (ISI)	4082.833
UNITED LIBERATION FRONT OF ASSAM (ULFA)	2836.141
ANSAR AL-SUNNA	2818.91
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	2722.935
HIZB AL-TAHRIR AL-ISLAMI (HT)	2419.487
CHECHEN REPUBLIC OF ICHKERIA	2368.796
HARKATUL JIHAD-E-ISLAMI	2270.906
JAISH AL-TA`IFA AL-MANSURA	2240.222
ANSAR AL-ISLAM	2096.283
PEOPLE'S UNITED DEMOCRATIC MOVEMENT (PUDEMO)	1735.281
NATIONAL BOLSHEVIK PARTY (PARTIYA NATSIONALNIKH BOLSHEVIKOV - PNB)	1722.352
VANGUARD OF RED YOUTH (AKM)	1689.809
POPULAR RESISTANCE COMMITTEES	1600.104
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	1555.5
ORGANIZATION OF SOLDIERS OF THE LEVANT	1551.373
MUSLIM BROTHERHOOD	1479.564
KURDISTAN FREE LIFE PARTY	1406.964

**Model Illustrations for Table 5.16**

**Determinants of Organization Chemical/Biological Weapons, Cox Proportional Hazard Model, Robust Standard Errors with Efron Method for Ties.**

**Table 5.21: Model 1 – Chemical/ Biological Use/Attempt - Top 25 Hazard Ratios in 2007**

<b>Group</b>	<b>Predicted Hazard Ratio</b>
AL-QA`IDA IN IRAQ (TAWHID AND JIHAD)	1382285
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	718014.4
ISLAMIC STATE OF IRAQ (ISI)	451027.3
AL-FATAH	90076.41
AL-QA`IDA	74346.03
UNITED LIBERATION FRONT OF ASSAM (ULFA)	64351.89
LIBERATION TIGERS OF TAMIL EELAM (LTTE)	60494.82
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	57860.4
AL-QA`IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	57280.87
IRISH REPUBLICAN ARMY (IRA)	47205.65

BASQUE FATHERLAND AND FREEDOM (ETA)	44320.87
KURDISTAN WORKERS' PARTY (PKK)	38673.65
AL-AQSA MARTYRS BRIGADE	34723.14
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	33907.11
CONTINUITY IRISH REPUBLICAN ARMY (CIRA)	33795.68
TALIBAN	31004.15
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	28436.24
JANJAWOOD	27780.66
PALESTINIAN ISLAMIC JIHAD (PIJ)	27408.7
NEW PEOPLE'S ARMY (NPA)	26440.72
REAL IRISH REPUBLICAN ARMY (RIRA)	25019.37
JUNDALLAH	22255.89
UNITED NATIONAL LIBERATION FRONT (UNLF)	21292.13
RED BRIGADES	17329.83
FIRST OF OCTOBER ANTIFASCIST RESISTANCE GROUP (GRAPO)	14201.74

**Table 5.22: Model 2 – Chemical/ Biological Use/Attempt - Top 25 Hazard Ratios in 2007**

<b>Group</b>	<b>Predicted Hazard Ratio</b>
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	720716.7
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	426587
ISLAMIC STATE OF IRAQ (ISI)	302435.4
AL-FATAH	65164.96
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	60453.46
UNITED LIBERATION FRONT OF ASSAM (ULFA)	48540.62
LIBERATION TIGERS OF TAMIL EELAM (LTTE)	48424.43
BASQUE FATHERLAND AND FREEDOM (ETA)	45245.47
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	43614.96
TALIBAN	35444.43
AL-AQSA MARTYRS BRIGADE	34289.34
KURDISTAN WORKERS' PARTY (PKK)	31735.2
IRISH REPUBLICAN ARMY (IRA)	30539.62
JANJAWOOD	29808.05
DEMOCRATIC FRONT FOR THE LIBERATION OF PALESTINE (DFLP)	29187.28
AL-QA'IDA	27870.09
JUNDALLAH	27324.86
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	23712.98
NEW PEOPLE'S ARMY (NPA)	23016.61
REAL IRISH REPUBLICAN ARMY (RIRA)	22778.03
CONTINUITY IRISH REPUBLICAN ARMY (CIRA)	20865.64
PALESTINIAN ISLAMIC JIHAD (PIJ)	18940.19
RED BRIGADES	15594.03
FIRST OF OCTOBER ANTIFASCIST RESISTANCE GROUP (GRAPO)	13605.16
ANTI-IMPERIALIST TERRITORIAL NUCLEI (NTA)	12988.25

**Table 5.23: Model 3 - Chemical/ Biological Pursuit - Top 25 Hazard Ratios in 2007**

<b>Group</b>	<b>Predicted Hazard Ratio</b>
AL-QA'IDA	604940.6
TALIBAN	57509.16
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	37585.85
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	22468.91
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	17015.59
UNITED LIBERATION FRONT OF ASSAM (ULFA)	12918.04
HARKATUL JIHAD-E-ISLAMI	9887.801
JUSTICE AND EQUALITY MOVEMENT (JEM)	9624.12
MUJAHEDIN-E KHALQ (MEK)	7567.942
ISLAMIC STATE OF IRAQ (ISI)	7566.871
AL-QA'IDA IN SAUDI ARABIA	5240.766
ANSAR AL-ISLAM	4741.23
AL-QA'IDA IN THE ARABIAN PENINSULA (AQAP)	4643.265
JUNDALLAH	4553.418
AL-SHABAAB	4240.188
KURDISTAN WORKERS' PARTY (PKK)	3888.836
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	3240.375
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	3163.292
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	2885.678
UNION OF FORCES FOR DEMOCRACY AND DEVELOPMENT (UFDD)	2772.961
BASQUE FATHERLAND AND FREEDOM (ETA)	2767.823
PALESTINIAN ISLAMIC JIHAD (PIJ)	2505.561
SUDAN PEOPLE'S LIBERATION ARMY (SPLA)	2493.391
JANJAWOOD	2477.939
JEMAAH ISLAMIYA (JI)	2341.523

**Table 5.24: Model 4 - Chemical/ Biological Pursuit - Top 25 Hazard Ratios in 2007**

<b>Group</b>	<b>Predicted Hazard Ratio</b>
AL-QA'IDA	74724.74
TALIBAN	42849.98
AL-QA'IDA IN IRAQ (TAWHID AND JIHAD)	29374.63
AL-QA'IDA IN THE LANDS OF THE ISLAMIC MAGHREB (AQIM)	21499.16
HAMAS (ISLAMIC RESISTANCE MOVEMENT)	10792.05
JUSTICE AND EQUALITY MOVEMENT (JEM)	8829.837
HARKATUL JIHAD-E-ISLAMI	8270.782
ISLAMIC STATE OF IRAQ (ISI)	7277.695
MUJAHEDIN-E KHALQ (MEK)	7218.854
UNITED LIBERATION FRONT OF ASSAM (ULFA)	6955.658
AL-QA'IDA IN SAUDI ARABIA	5208.86
JUNDALLAH	4828.653
AL-QA'IDA IN THE ARABIAN PENINSULA (AQAP)	4652.941
AL-SHABAAB	4316.812

ANSAR AL-ISLAM	4284.093
KURDISTAN WORKERS' PARTY (PKK)	3351.792
SALAFIST GROUP FOR PREACHING AND FIGHTING (GSPC)	3127.974
JANJAWEEED	2845.874
BASQUE FATHERLAND AND FREEDOM (ETA)	2838.01
REVOLUTIONARY ARMED FORCES OF COLOMBIA (FARC)	2697.183
UNION OF FORCES FOR DEMOCRACY AND DEVELOPMENT (UFDD)	2575.406
POPULAR FRONT FOR THE LIBERATION OF PALESTINE (PFLP)	2200.354
PALESTINIAN ISLAMIC JIHAD (PIJ)	2148.844
CHECHEN REPUBLIC OF ICHKERIA	2066.082
SUDAN PEOPLE'S LIBERATION ARMY (SPLA)	2038.96

## Chapter 6: Expert Elicitation<sup>373</sup>

### INTRODUCTION AND METHODOLOGY

The analysis thus far has been based on the extant literature, as well as open-source empirical data on prior events and actors. While the historical record provides a necessary baseline from which to detect patterns and trends in the behavior of chemical/biological (CB) perpetrators, one must be careful that the analysis does not become prejudiced towards linear thinking. After all, as Hume<sup>374</sup> and others have pointed out, just because something has been relatively consistent up to this point, this is no guarantee that it will remain so in the future and any extrapolations from past behavior must therefore be tentative. The literature often considers present developments and, on occasion, makes predictions about the future, but does not attempt this in a systematic manner. Therefore, the qualitative and quantitative empirical research must be supplemented with analysis that directly considers changes in the future CB actor environment, as well as the possibility of significant discontinuities (often characterized as ‘Black Swans’ or ‘Wild Cards’). This moves the analysis explicitly into the realm of forecasting.

Standard inductive tools are of little use in such an endeavor, so a different approach is called for. One well-recognized forecasting technique is to conduct an elicitation of recognized subject matter experts (SMEs), while controlling as far as possible for biases and other obfuscating factors. The research team therefore designed and conducted an SME workshop that employed both probabilistic and semi-structured elicitation techniques.

### Objectives

The workshop reflected the same general objectives that apply to the entire study. It placed a specific emphasis on identifying downstream actors who have not yet evidenced the capability or motivations for using CB weapons while at all times remaining cognizant that only a very small subset of violent actors demonstrating antipathy towards the United States will ever embark upon a chemical or biological weapons route. Specifically, the primary workshop objectives can be stated as being to:

1. Identify developments in terms of CB perpetrators and associated threat levels that cannot be extrapolated from historical experience. This would entail:
  - Identification of novel, non-trend actors within the time period of the study;

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<sup>373</sup> This chapter was written by Gary A. Ackerman. The author would like to thank Lauren Pinson and Caitlin Scudari for assisting in the preparation of the data for this chapter.

<sup>374</sup> David Hume (1777), *An Enquiry concerning Human Understanding*. Nidditch, P. N. (ed.), 3rd. ed. (Oxford: Clarendon Press, 1975); more recently, Karl Popper and David Miller (see David Miller, *Critical Rationalism: A Restatement & Defence*. (Chicago & La Salle: Open Court Publishing Co, 1994).

- Providing threat levels (probability of acquisition/use) for these new actors; and
  - Incorporating these actors into relative threat rankings.
2. Identify any discernible indicators that increase (or decrease) the probability that a particular actor will pursue CB weapons.

Secondary goals included:

1. Providing additional information / feedback / source of comparison for results obtained in other portions of project; and
2. Providing initial indications of the behavioral aspects of the highest-ranked threats.

## Methodology

The elicitation was designed by Gary Ackerman and Lauren Pinson, based on a template developed by Gary Ackerman and Bilal Ayyub.<sup>375</sup> They were supported by Mila Johns, Sitara Weerasuriya and several student researchers at START.

Workshop preparations included the following:

1. The elicitation design team worked for several months to develop an appropriate elicitation framework that would capture the desired type of information from SMEs.
2. Logistics (including selection of date and venue and supplies) were arranged.
3. Prospective participants were identified and invited. The primary criteria for selecting participants included:
  - a. Prior relevant expertise with either CB weapons or terrorist behavior.<sup>376</sup>
  - b. Heterogeneity in terms of academic discipline, public and private service, areas of substantive expertise, age, gender and types of experience. The final roster included two microbiologists with expertise in biological weapons, a chemical weapons expert, several policy experts, operational law enforcement professionals who had worked specifically in countering WMD terrorism, and two technology futurists.
  - c. Demonstrated ability to communicate ideas effectively.
4. Development of a detailed workshop script and the design of a series of elicitation exercises.
5. Design and development of a collaborative workshop interface, employing Google Forms. Using the Google Forms interface and a variety of custom-built data spreadsheets, participants could

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<sup>375</sup> Ackerman based the semi-structured portions on several years' worth of experience in qualitative elicitation, while the probabilistic methodology was derived primarily from Ayyub, B.M., *Risk Analysis in Engineering and Economics* (Florida: Chapman & Hall/CRC Press, 2003) and Ayyub, B. M., *Elicitation of Expert Opinions for Uncertainty and Risks* (Florida: CRC Press, 2001).

<sup>376</sup> In order to act as controls for the elicitation, two naïve participants were included, i.e., participants with no prior CB or terrorism expertise.

share their individual estimates, which could be rapidly synthesized and viewed by researchers in near-real time during the elicitation.

**Participants**

Subject matter experts from several disciplines attended the two-day elicitation in order to provide full framing of the potential adversaries and modes of attack. These are listed below, in alphabetical order:

<b>Jamais Cascio</b> ( <i>futurist</i> )
Mr. Cascio is an ethical futurist with a focus on emerging technologies. His work has appeared in a variety of publications, including The Wall Street Journal and Foreign Policy. He was selected by Foreign Policy magazine as one of their Top 100 Global Thinkers.
<b>John Caves</b> ( <i>chemical weapons policy expert</i> )
Mr. Caves is currently a faculty member at National Defense University’s (NDU) Center for the Study of Weapons of Mass Destruction where his work has focused on nuclear and chemical weapons threats. Prior to his position at NDU, Caves had a civilian career with the Department of Defense.
<b>David Franz</b> ( <i>biological weapons technical expert</i> )
Dr. Franz is currently the Vice President and Chief Biological Scientist at the Midwest Research Institute and a Senior Advisor in Biosecurity Engagement to the Office of the Assistant to the Secretary of Defense for Nuclear, Chemical and Biological Defense Programs. During his time with the U.S. Army Medical Research and Material Command, he served as Commander of the U.S. Army Medical Institute of Infectious Diseases (USAMRIID). He held several short-term positions including serving as the Chief Inspector on three United Nations Special Commission biological warfare inspection missions to Iraq.
<b>David Fu</b> ( <i>naïve participant</i> )
Mr. Fu is currently working in investment banking at Barclays. His varied background includes work in educational technology and training as a classical pianist.
<b>Gigi Gronvall</b> ( <i>biological weapons technical and policy expert</i> )
Dr. Gronvall is currently a Senior Associate at the University of Pittsburgh Medical Center’s Center for Health Security and an Assistant Professor of Medicine at the University of Pittsburgh. Her work addresses the role of scientists in biodefense and she is an immunologist by training.
<b>Frank Hopper</b> ( <i>naïve participant</i> )
Mr. Hopper’s varied background includes work in information technology, bounty hunting, private investigation and gamer psychology.
<b>Brian Jackson</b> ( <i>terrorist decision-making expert – academic</i> )
Dr. Jackson is currently a senior physical scientist at the RAND Corporation, director of the RAND Safety and Justice Program and a professor at the Pardee RAND Graduate School. His work focuses on terrorist groups’ use of technology and organizational learning by terrorist groups. His physical science background is in bioinorganic chemistry.
<b>John Nagl</b> ( <i>terrorist decision-making expert – academic</i> )
Dr. Nagl is currently a Non-Resident Senior Fellow at the Center for a New American Security and the Minerva Research Fellow at the U.S. Naval Academy. He spent twenty years as an officer in the U.S. Army and was on the writing team that produced the U.S. Army/Marine Corps Counterinsurgency Field Manual.
<b>Graham Pearson</b> ( <i>chemical weapons technical expert</i> )
Dr. Pearson is a Visiting Professor of International Security in the Division of Peace Studies at the University of Bradford and engages in addressing the effective implementation and strengthening of the Conventions prohibiting biological and toxin weapons. He was previously the Director-General and Chief Executive of the Chemical and Biological Defence Establishment at Porton Down for eleven years.

<b>Steven Schwartz</b> ( <i>CBRN terrorist decision-making expert – operational</i> )
Mr. Schwartz is retired from the Israeli National Police. During his time with YAMAM (an Israeli elite counterterrorism unit), he was the supervisor of the Counter-Terror Unit’s Weapons of Mass Destruction Program after spending many years in YAMAM intelligence operations.
<b>John Smart</b> ( <i>futurist</i> )
Mr. Smart is a foresight scholar and systems theorist who studies science and technological culture with an emphasis on accelerating change. He is the founder of the Acceleration Studies Foundation and is currently a professor at the University of Advancing Technology and lecturer at the Naval Postgraduate School.
<b>Amy Smithson</b> ( <i>chemical weapons policy expert</i> )
Dr. Smithson is currently a Senior Fellow at the Center for Nonproliferation Studies. Her work focuses on chemical and biological weapons proliferation and threat reduction mechanisms. She chairs the Global Affairs Council on Nuclear, Biological and Chemical Weapons for the World Economic Forum.
<b>Mitch Stern</b> ( <i>CBRN terrorist decision-making expert – operational</i> )
Mr. Stern is currently the Chief of Staff for the WMD Division of the Federal Bureau of Investigation. A long-serving FBI agent, he was previously detailed to INTERPOL to assist in establishing their CBRNe program.

## Workshop Structure

The workshop was divided into three substantive phases that built on one another and were spread across 22 elicitation sessions taking place over the course of two days (see Appendix VI-A for the final workshop agenda). This allowed for the collection of quantitative and qualitative data from individual participants, small breakaway groups and the overall group.

The three phases in the process can be categorized as:

1. Semi-Structured Brainstorming and Red-Teaming Exercises
2. Filtering and Preliminary Ranking
3. Deep Elicitation (Probabilistic)

Participants were informed that the workshop was being conducted according to Chatham House Rules, which specify that: “participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.” Participants were also supplied with a worksheet detailing the overall project parameters.

## Session Activity Summary

Following the project and administrative introductions, the workshop proper began with a series of preliminary exercises and presentations designed to:

- a. Motivate participants to engage fully with the process through a team exercise involving a simulated attack involving the contamination of breakfast foods with a biotoxin;
- b. Frame the goals and parameters of the project; and
- c. Encourage cognitive bias awareness and mitigation.



The parameters set out were the same as for the overall study (see the study introduction above). However, in order to focus the attention of the experts on the types of attacks that are of most interest to DoD (rather than the lowest level attacks such as individual poisonings), an additional parameter limited the scope of the analysis to CB events that cause more than 50 non-psychogenic injuries or widespread (at least regional) and sustained social disruption.

The workshop then proceeded with the first phase of actual elicitation. The different types of elicitation used in the workshop were interspersed with one another, in order to maintain participant engagement, although to provide a more coherent report, the types of elicitation will be grouped together below. For details on when each session was given, consult the workshop agenda in Appendix VI-A.

## **SEMI-STRUCTURED BRAINSTORMING AND RED-TEAMING EXERCISES**

### **Brainstorming**

In order to prime participants to think about the topic creatively and to move beyond personal “favorite” ideas, the first exercise of this type involved casting a broad net by engaging in rapid-fire brainstorming exercises. Having been previously briefed on the project parameters, participants were asked to consider which organizations or individuals they believed were most likely to commit a CB attack within the relevant period of analysis (10 years). At this stage, participants were not required to be consistent in the specification of actor, and could suggest both specific named actors as well as types of actors. The experts’ suggestions were captured on blue Post-it™ notes, which were then displayed to the group under three categories: Chemical, Biological, or Chemical AND Biological perpetrators. Following this initial round, experts were then asked to suggest any “wildcard” actors they could conceive making such an attack – plausible, but highly improbable, perpetrators, or perpetrators for which there is no basis to make any probability judgments. Those observations were recorded on different colored Post-its™. Following the initial free-form exercise, the suggestions were clustered into similar categories by group consensus.

Table 6.1 below represents a synthesized version of the participants’ contributions, presented in no particular order.

**Table 6.1: Summary of Elicitation Brainstorming Results**

Likely Actors	“Wild Cards”
<i>Chemical and Biological</i>	
Al Qa’ida HQ (senior leadership)	Defeated politician
Right-wing extremists	Computer hacker
Motorcycle gang	A woman
Pakistani Taliban	Sequester baby (scientist who lost funding)
Scientists in the WMD defense field	Disgruntled would-be immigrant

Racist groups	McCormick spice fiend
Disgruntled individual with science knowledge	Monsanto employee
Anti-abortion activists	Counter GMO
People First, Occupy Wall Street	Pro-surveillance group
Al Qa’ida in the Arabian Peninsula	Failed special forces applicant
Lab technician in pharmaceutical company	Group seeking vengeance for U.S. inaction (Tutsis, Syrians, etc.)
Apocalyptic millenarian cult	Somali pirates
Animal rights activists	Avenger against corporate pollution
Al Qa’ida in the Islamic Maghreb	Amazon avenger (ultra-feminist)
Internationalization of Boko Haram	Dock worker – protest against containerization
Nano-tech engineers	Anti-globalization
Individuals tending toward savagery	University professor passed over for tenure
Hezbollah	Mentally ill person (Garden variety “nutter”)
Eugenicists	Separatists
Environmentalists	Texas secessionists
Outsider student	Basques
Zero or negative population growth activists	Real IRA
Frustrated labor union members	Syrian Diaspora
Aleph / Aum Shinriyko	Mid-level manager for relevant industry company
Policy wonk	Bullied high school student
Super-villain copycat	Neo-luddites (Ted Kaczynski type)
	Kurds
Market manipulator	Physicians
United States government worker seeking funding / professional advancement	Botanists
Tax protestor	Crop failure for economic attack
Failed PhD / graduate student	People wronged or imprisoned by the Justice Department
Veterinarian	French vintners, industrial crop attack
	Marketing Scientists
<i>Chemical Only</i>	
	Chemical trucker
	Chemical plant guard
	Agent Orange victim
	Drug trafficker
<i>Biological Only</i>	
	Artist bio-hacker
	Smart angry teen with bio printer
	Genetic improvers

The above potential perpetrators are admittedly somewhat haphazard in terms of their specificity, with no indication of relevant level of threat besides the crude categorization of opposite extremes of “likely”

and “wild card.” Nonetheless, as an initial exercise, the brainstorming gives a good idea of the breadth of actors whom a set of experts believe could conceivably utilize CB weapons. It also both confirms many of the results of the qualitative and quantitative empirical work and further develops other categories of actor, for example, by providing several possibilities for the types and motives of an insider threat. The contents of the above table might provide interesting red-team examples, especially when planners are seeking to broaden the range of simulated opponents.

The facilitator then led the participants in a discussion of whether many of the above perpetrators could be classified into somewhat discrete categories. Although participants could not classify all of the above perpetrators, several broader categories were suggested, which are reproduced below in Table 6.2:

**Table 6.2: Categories of Perpetrators**

Category Description	Perpetrators
Group 1: Disgruntled in Academia	Failed PhD / graduate student
	Professor denied tenure
	Bullied high schooler
Group 2: Policymakers and Government Employees	Policy wonk
	Defeated politician
	US government employee seeking funding / professional advancement
	Failed special forces applicant
Group 3: Scientific / Technical Personnel	Marketing scientist
	Scientists in WMD defense field
	Sequester baby (scientist who lost funding)
	Disgruntled lab employee
	Lab tech in pharmaceutical industry
	Nanotech engineers
	McCormick spice fiend
	Disgruntled veterinarian
	Computer hacker
	Physicians
Botanists	
Group 4: “Green”	Anti-GMO group / individual
	Monsanto employee
	Animal rights activist
	Environmentalists (e.g., Earth First!)
	Neo-Luddites
	Zero or negative population growth activists
Group 5: Apocalyptic	Aleph / Aum

	Other apocalyptic millenarian group
	Eugenicists
Group 6: Industry Based	Corporate middle manager
	Dock worker
	Frustrated labor union members
	Market manipulator
	Chemical trucker
	Chemical plant guard
	French vintners, industrial crop attack
Group 7: Far Right	Tax protestor
	Right wing extremists
	Texas secessionist
	Pro-surveillance
	Anti-abortion activists
	Racists
Group 8: Female	A woman
	Amazonian avenger
Group 9: Transnational Extremist Organizations	TTP (Pakistani Taliban)
	Hezbollah
	AQIM
	AQAP
	AQ senior leadership
	Kurds
	Boko Haram
	Basques
	Real IRA
Group 10: Psychological Disorder	Individual tending toward savagery
	Garden variety "nutter"
	Super-villain copycat
Group 11: Far Left	Anti-globalization
	People First, Occupy Wall Street
Group 12: Criminal Organization	Drug trafficker
	Motorcycle gang
	Somali pirates
Group 13: Ethnopolitical	Syrian diaspora
	Group seeking vengeance for U.S. inaction

	(Tutsis, Syrians, etc.)
Group 14: "Life Hackers"	Artist bio-hacker
	Smart angry teen with bio printer
	Genetic improvers
Group 15: Miscellaneous	Agent Orange victim
	People wronged or imprisoned by the Justice Department
	Disgruntled would-be immigrant

**Future Backwards**

As part of the semi-structured portion of the elicitation, the facilitator led experts through an exercise called "Future Backwards." This exercise is meant to disrupt the experts' ingrained thought processes and force them to think about the problem in a manner to which they are unaccustomed. Participants were asked a series of questions, with a short period for reflection between each question.

The facilitator read the following instructions:

*Put yourself in the year 2050, as if you are talking to someone about something that happened long ago, sometime between 2013 and 2022. The whole point of this exercise is to look back on an incident in a matter-of-fact fashion, rather than to approach the issue from a forward-looking perspective. Therefore, you must describe everything you write in the past tense, as if it is already part of the historical record.*

1. *Write down the first thing that comes to mind to describe the large scale negative consequences of an attack on the U.S. that involved chemical or biological weapons. What was the nature of the large-scale, negative consequence? (e.g. 2,800 fatalities and 7,000 casualties or a 20% decrease in GDP)*
2. *When did this happen? What time of day? Which season? Which year?*
3. *Where did it occur? Be as precise in the location as possible.*
4. *Describe what physical object brought about this negative consequence.*
5. *How did the object bring about the consequence? Did it explode? Enter drinking supplies?*
6. *What precise circumstances immediately prior to the harmful event led to the object causing the negative consequences?*

7. *How were human beings directly responsible for this?*
8. *How did this person or persons know to do this bad thing at this time and place?*
9. *Why did they not do something else entirely?*
10. *What did these people want to achieve?*
11. *Who were these people [that committed the attack]?*

After the initial questions, each participant was requested to place the questions in a standard chronological format and to construct a cohesive narrative, supplementing it with additional details as desired. Several participants were asked to share their stories with the group, followed by brief discussion of these stories. All participants were then given some time to record their stories in whatever style they desired.

The following boxes reproduce the narrative results of the “Future Backwards” exercise:

#### Participant A

The US attack on Iran in the late 2010s targeted the scientific community in particular – not just nuclear scientists, but anyone involved with disciplines that could be weaponized. This included bioscientists; unfortunately, as it turns out, the surviving scientists had both expertise and a serious desire for revenge.

Using the genetic source code for the 1917 influenza, the team worked for four years on adding a more deadly package to the virus. They settled on hemorrhagic fever, similar to Ebola. The result was something highly infectious, but slow to build – millions would have contact with the virus before there was any indication that something was awry.

The target date was planned well in advance—“Black Friday,” the day after Thanksgiving, 2021. Millions of Americans would be in shopping malls, taking part in the last remaining ritual of “brick and mortar” shopping.

The research team managed to recruit a handful of volunteers to distribute the agent, mostly low-level agents or sympathizers; they were organized via [2021 equivalent to] Xbox Live, and honestly had no idea what they were getting into. They were shipped containers with the virus, already connected to the guts of mobile phones. All the volunteers needed to do was to set the shopping bag down at the local mall at the designated time – noon EST, 9am PST.

A few moments later, a mass text went to the phones, releasing the virus. Of the 30 malls that had been targeted, 28 were successfully hit. One package didn’t go off, and one released in the vehicle of the volunteer – a semi-successful result, as the volunteer still spread the virus.

The first week of December saw reports of an aggressive flu not suppressed by that year’s vaccine. The first reported deaths happened the second week – the first few thousand not obviously linked to the flu (after all, when do people bleed out from the flu?), but the CDC quickly made the connection, calling for an immediate quarantine.

#### Participant B:

It caused 1,500 or so casualties, mostly fatalities, and a widespread, persistent fear across the entire U.S. population. It happened about 10 am on October 24, 2017, in a Manhattan office building. If you had been there an hour or so before, you would not have noticed anything out of the ordinary, mostly people emerging from the nearby subway station

heading to work, and perhaps that apparent utility truck and small crew right next to the building, but of course that was not so unusual. The agricultural sprayer used in the attack would easily have been missed among the crew, orange barrels, and other equipment nearby. The non-descript sprayer was loaded with sarin and placed alongside the office building's main external air intake. The perpetrators knew just where to place it and how to blend in, obviously having done their surveillance and research ahead of time. The sprayer was such an easy choice—easily ordered online and easily used, having been made for non-expert applications of pesticides and herbicides by farmers.

The perpetrators committed the act because they wanted to kill large numbers of Americans and leave a legacy of fear across the United States as retribution for the Great Satan's bombing of Iran's nuclear program the year prior. They were a U.S.-based Shia terrorist group, mainly of Iranian ethnic origin. They may have been working at the direction of the Iranian government, but no evidence to that effect has ever been found. It is most likely they took it upon themselves to avenge the destruction that the U.S. missiles and aircraft had visited upon their countrymen in Iran.

#### Participant C:

In the year 2020, during the last week in November, just after the peak of color in New England there was a slight increase in flu-like respiratory disease around the globe. Then more cases... the pandemic curve did not peak for more than three months as patients increased in number and disease and death spread. By February 2021, more than 150 million Americans had fallen ill and five million had died. Similar morbidity was recorded around the world with mortality higher in many less developed countries.

Back in 2020, on November 24 in a crowded pizza restaurant just off Broadway, a single individual sneezed twice, exposing several people around her. As numbers increased, the diagnosis of a strain of H5N1 influenza---not previously identified or sequenced---was made. The index case was never discovered; she died in a busy NYC hospital ten days later. No one ever learned that she was a North Korean dissident who won a free trip to NYC. She was given several immunizations at a government run travel medicine clinic before her departure from her home city Pyongyang.

The source of the devastating outbreak of 2021 was never discovered.

#### Participant D:

The count: 10,000,000 people dead and 25,000,000 more permanently disabled by the time a vaccine had been developed. It occurred on February 22, 2022, and later the start time was determined to be precisely 2:22:22 Eastern time. It began in Times Square; yes, the heart of the Big Apple with its flashing advertisements and signs, the bright red TKTS stairs, the M&M store. This was also the day the New York Fire Department was having its annual fundraiser in the middle of the square – five full-sized fire trucks were placed throughout the square, and there were all sorts of interactive activities and games for families and their children. This is where the biological agent release occurred – something later determined to be a virus with the infectivity of influenza combined with the immune system-crippling virulence factors of HIV. The dispersal had taken place through the trucks, sprinkling large crowds of locals and (especially) tourists continuously throughout the morning and afternoon. Again, it was months later when they determined this was the original source, when they found trace residue of the biological agents in the various fire hoses on the trucks assigned to Times Square.

The perpetrator chose this method of delivery because he was a fireman and had planned months in advance to spread the disease through this means of dispersal. He had worked closely with a faculty member of the infectious diseases department at Columbia Medical School. The two formed a mentally disturbed duo that had attended school together. They had no external extremist affiliations, but a strong belief that the earth had become over-populated and could no longer sustain its people.

#### Participant E:

The year was 2019, when forty thousand people died in the US, with potentially millions more dying worldwide. It was sometime in mid to late February when a high school student in a small town in Pennsylvania released an aerosol spray of modified H3N2, an influenza virus, in his Economics class, using a humidifier. It is not known when the actual attack occurred, as the student had made multiple attempts with multiple preparations, and the unusually heavy flu season that year initially masked the attack. However, the puzzling data soon added up over the course of the next several months—the fact that vaccination was particularly ineffective even though the vaccine was reasonably effective against the naturally circulating H3N2 strain that year; the resistance to Tamiflu even though the naturally circulating strain was sensitive, and the seasonal abnormality. And then finally, the new virus was sequenced in its entirety by Ian Lipkin's laboratory in Columbia, and there were several signs that the virus was pieced together, as there were restriction sites that were not present in naturally occurring flu. In the end, it took years to finally hint that the epidemic originated from this high school, and while there were several boys who could have done it, perhaps together, the evidence was long gone and no one talked. In the end, no one was ever charged.

#### Participant F:

Jessica was extremely excited to be arriving in the big city. The weather was nice and she was feeling great. Her friend Amy had moved to New York a year before, and she hadn't had a chance until now to visit her. Stepping off the train, she was preoccupied with remembering all of the good times they had had together. She exited Penn Station at 3pm on April 10th, 2018, in high spirits, but she neglected to look first before stepping into the street. A sudden screech was the last thing she heard.

John managed to curse as he tried to swerve to avoid the girl. He clipped her fatally but, more importantly, ran the U-Haul onto the curb and into a pole. He turned to Carl as they both began to hear hissing coming from the back of the truck. Knowing they were doomed, they popped pills into their mouths and slumped over in their seats.

The gas was colorless, so the only telltale sign was the hissing. Crowds gathered around the girl's body in the street and the U-Haul truck but nobody opened the doors. Police arrived within one minute, a squad car that was only a block away when the incident happened. The doors of the U-Haul were opened and it was presumed that the men died in the crash. It took 40 minutes before the back door on the truck was opened, during which time the gas was able to escape and blanket the space of a few blocks. Within a few hours people began falling ill, and the first death occurred 24 hours after the incident.

The group responsible for the attack consisted of around a dozen people that met on UFO online chat boards. Most of them were educated and had college degrees, but all shared the common trait of gullibility. Every one of them believed in several different conspiracy theories, and they all listened to "Coast to Coast AM". They had originally intended the gas to escape outside of the New York Stock Exchange with the goal of causing economic damage and panic, but when the device went off prematurely due to the accident and the fail-safe mechanism didn't function correctly, they quickly concocted an alternative plan to cause as much widespread paranoia as possible for the attack.

By posting on message boards and forums all over the internet, and by using the data collected and distributed already as part of several conspiracy theories, the group was able to cause long term, widespread paranoia in the general population. The result, of course, is that businesses that relied on personal contact declined and the already rising trend to purchase goods on the Internet and to engage in social interaction remotely took off. Today, in 2050, we can see how that affected us to the point where very little happens in person.

#### Participant G:

After an extended political dispute over the safety of new pesticides and other working conditions in the agricultural products industry, a small group of former union representatives and workers in the industry decided that the time had come to take more direct action. Getting together and gaining their inspiration from the Rajneshee's previous salad bar plot, they decided that the way to American's minds was through their stomachs – and nothing should demonstrate the



effects of the new agricultural chemicals (blamed by workers for illnesses ranging from skin lesions to gastrointestinal distress) than using the very products at issue to make their point for them. Obtaining a reasonable strain of Salmonella from a local laboratory where one of the participants knew someone, they prepared enough material to treat several truckloads of produce coming through a central Southern California produce firm's distribution hub. Entering during off hours when the facility was staffed less than in business hours, the group posed as employees – taking advantage of internal knowledge they maintained from experience working there – applied their material using manual sprayers. The refrigerated shipments went far and wide, dispersing the material throughout the food system in the lower portion of the country. After cases of Salmonella began to spike, the group went public with a claim of responsibility, alluding that they had infiltrated more firms than they actually had, and laying out their dispute with the treatment of agricultural workers. As a result, a predictable wave of hysteria about the safety of food supplies went through the country, and sales plummeted. Though numbers were rare, a few cases of serious illness leading to death were ascribed to the outbreak.

#### Participant H:

On September 11, 2021, at eight o'clock in the morning, at the Metro Central Metro station, a young white man pressed a button on the handle of the rolling suitcase he was taking into the station. It began to release an aerosol of anthrax into the confined space of the station and the car onto which he walked, and continued to release the aerosol all the way to the Capitol Hill station and up the steps.

He was part of a new generation of Al Qaeda terrorists recruited in the United States and selected for their passports, appearance, and ability to pass undetected through American society. The attack killed all sixty people on the train in time, including the attacker, and sickened another two hundred. It was Al Qaeda's most successful attack in twenty years, but it would not be its last.

#### Participant I:

There was a massive distribution in Washington D.C. on January 20, 2018 at 4:30 PM when there was an anthrax attack in the metro station near the State Department. Nothing was evident at the time—the anthrax spores were disseminated into the atmosphere underground by an individual using an aerosol spray inhaler. At the same time the Washington Post was told at 4:45pm that this attack had been carried out using sufficient technical detail to show that it was a credible actual attack. The anthrax contaminated aerosol spray devices were found in a waste bin whose location was given to the Washington Post. They recognized that there would be a significant delay between the attack and the development of symptoms, hence the importance of the information to the Washington Post backed by the evidence. The disruption resulted in evacuation being required for those at risk and in the event 10 people died and there were 100 casualties. This disruption was carried out by an Al Qaeda cell that wanted to protect against US activities abroad and wished to target State Department personnel. The Al Qaeda cell all knew that the anthrax spores had to be disseminated in an enclosed area as in the open air they would be largely ineffective as a lethal or harmful dose would be hard to achieve. Their aim was not to kill large numbers but to cause disruption to the US government and to do so by mounting the attack in the rush hour in Washington D.C. at a time of year when people would be using the metro rather than alternative means of transportation. They chose to make a single attack initially and threatened to make further attacks if the US government did not amend its policies.

#### Participant J:

There was massive fear of using the mass transit system in the US. A total of 11 dead and 79 hospitalized. It was Independence Day, 2016 at 12:30 PM in the NY subway platform at Times Square in New York when terror returned to the city. Shortly before the incident, people were going and coming onto the platform to get to places for the holiday. A cop looked bored just waiting for his shift to end. Suddenly at one end of the platform people began choking and screaming. A gas was being released. On the opposite end a man took some sort of device out of his pack activated it and threw it further down the platform. As the contents began to mix, a release of cyanide gas was dispersed into the nearby crowd. There was choking, screaming and panic. The terrorists wanted to instill fear and bring death.

AQAP was responsible. The organization decided to bring back Jihad to American cities.

#### Participant K:

The “Peace War” attack of January 2022 was the first truly global simultaneous terrorist attack, or the first “War of the 99%” as its perpetrators would have it be known. It was the first war to use a “Crowdsourced Morality” algorithm at a global scale, and the first to use automated precision strikes applied to individual persons on a mass scale. It happened simultaneously in 13 of the 34 OECD countries, and in 19 less developed countries. Like World Wars, everyone hoped it would be the last, but history and human nature suggest we may expect at least one more on an even greater scale before humans grow wise and restrained enough to put this kind of conflict behind us.

The attack came just as the web itself became truly global, broadband, and conversational. It involved a mass use of micro-UAV quadcopters and planes, some video enabled, streaming to the web as they flew. These UAVs gained air access to military installations (usually in swarms of ten or so at a time), embassies, and private homes of the wealthy and powerful. On getting close to their targets, the UAVs exploded, delivering a toxic chemical that often caused a painful death. Building access was gained when a leader UAV would land and detonate against a window. Follower UAVs would then stream in, with the target typically being an individual whose office was just inside that particular window. Precision was enabled by the quadcopters having human-targeting visual algorithms, and with waypoints previously established by human operators. Attacks were typically staged from boobytrapped boxes in rented storage facilities (self-opening trunks of stored cars, boats, and hatches on RVs) within ten miles of their targets (many micro-uavs with 0.5 kg payloads had a 15 mile range by 2020). They were placed over a four year period, a fraction of the typical six year storage for stored vehicles in private yards.

Chemical weapons were the most common payload, with chemicals intended to cause permanent neurological and toxicological damage, but not typically kill the target. Explosives, intending death to the target, were the next most common, and a small minority were explosives combined with a radiological or lethal chemical payload, intending death to the target and lasting or lethal damage to those who later came to the aid of the target.

The perpetrators said they sought to use the emerging “Wisdom of the Web” to find and punish “The Worst of the Worst” of human actors, in an effort to “cleanse the world of its worst psychopaths”, create a “crowdsourced redline” for intolerable conduct, and to “Enforce Peace” by giving a sword to the people, to execute occasional “Surgical Strikes” against the “Truly Evil Few.” The movement grew out of a crowdsourced website, “Our Crowd Says No”, written anonymously and hosted, for a critical two years, from 2017-2018, in the Cayman Islands. The site took Parade magazine’s annual list of “The World’s Worst Dictators” and added a selection of corporate leaders accused of the greatest ethical violations in the last twenty years, and allowed crowdsourced additions. The system continually organized it into the “Worst 100”, and users submitted crowdsourced video snips and wiki pages telling the story of these 100 in edutainment style. When forums associated with the site started publishing office and home numbers and addresses and private details of the individuals, and suggested creative ways to prank them, US intelligence community intervened and the site was shut down.

Four years later, the Peace War attack occurred. The Peace Force group had organized in the interim, and used a data mining algorithm to pick out a new list of these “Worst 100” folks from all the writing on the global web – a target group automatically crowdsourced from global chatter by the web-enabled populace. By 2020, such semantic analysis was reasonably helpful, due to the conversational interface. The global intelligence community quickly tracked the attack to a “folie a deux” (a “madness of two” individuals who had originally been peripherally involved in the Worst of the Worst site, one quite wealthy). They decided to see if they alone could maim or kill 100 targets if they engaged in a four year planning effort, and they built a strategy around a team size of two (a size that will maintain radicalism with the right duo but is also stable and quite hard to detect and infiltrate), and the idea of a recurrent four year “voting” period, with the Peace War planned every fourth year (2022, 2028, etc.) They hoped to inspire other duos to emerge and copycat them, and an industry of scholars and journalists to follow the results. They suggested that each duo come up with their

own way of finding “the Worst”, and published several algorithms to do so. They proposed a typical duo take on no more than one or two targets, and be willing to sacrifice themselves for the death of their target. They published their methods widely on the web, and through “crowdsourcing”/copycats they hope that the “Democratic Masses” will understand their duty to take out 100 targets every four years, a number they felt was “large enough to serve as a deterrent” and yet small enough to limit collateral violence to innocents. They called this effort “altruistic punishment,” a self-risk and likely self-sacrifice, a “morally guided punishment” as a planetary corrective for immoral leadership.

They urged attacks to continue to occur every four years until all three of the following conditions obtain:

1. All state-on-state and civil warfare must end. Militaries can be maintained but they may not be used, except in self-defense, and not on the citizens of any country.
2. The “Bottom Billion” of humanity must no longer starve. All humans deserve access to food, clothing, and sanitary shelter, and a “survival income” of \$5,000/year.
3. The top 1% of people can no longer control more than 50% or more of social wealth, as determined by an average of ten independent economic monitoring agencies (the figure for such wealth centralization at the time of the Peace War was 88%, a decline from a peak of 92% in 2016).

As of now, six years later, they are still unapprehended. They have said they expect to be caught, but “hopefully at great expense,” and ideally after longer than the ten year manhunt for Osama Bin Laden. There were a handful of copycats in 2026, but nothing on the same scale as 2022, which targeted 100 and inflicted damage on 63 of the targets. Some of the consequences have been that the ultrawealthy and government and military leaders now pay for a lot more security, including anti-UAV UAV networks. Political wags have noted that security spending seems to be commensurate with level of ethical questionability of the actor. Politicians and military and corporate leaders now routinely do self-assessments based on their media profiles, and sweeping new antidefamation, hate speech and libel punishments have emerged. Domestic homeland security and the DoD got major new funding for surveillance and countermeasures. A UAV OS “immune system”, that broadcast’s all UAV’s presence to the web, and allows authorities to shut them down on command and within restricted areas became mandatory.

#### Participant L:

One of Al Qaida’s hallmarks is to use the Western infrastructure to attack Western society. Having failed for over a decade to pull off a mass casualty attack on US soil, Al Qaida is determined to inflict widespread harm and terror in the American heartland. Nothing is more uniquely American than Thanksgiving Day, which reeks of American excess, and the sport of American football, so that becomes the target for a multipoint biological attack executed by AQ-affiliated cells with suicide bombers on Thanksgiving Day 2017. Ultimately, thousands of deaths result, but the multifaceted panic that accompanies the attacks also has widespread economic, political, and sociological impacts.

At the football stadiums hosting football that day, schedules of which are posted long in advance, an hour before kickoff one sees the stadium and many “tailgating” parties taking place in the parking lots nearby. One would not notice the AQ attackers, who will emerge from their vans, pretending to be inebriated and looking for their companions as they weave among the lines of people queuing up to enter at various gates around the stadium. They will be wearing camelback backpacks that spray a contagious agent in a 1-10 micron particle size at roughly nose level as they walk among the crowds. They return to the van and reload to spray again, but they never enter the stadium itself. All attackers are suicide attackers.

AQ HQ doesn’t specify what contagious agents its cells disperse, though it does provide a preferred list of lethal contagious agents. This allows cells with diverse technical capabilities to utilize them to the fullest possible potential. Each cell has a technical core (individuals with fermenting, engineering expertise to grow, purify the agent and to adjust the sprayers to a 1-10 micron particle size) and the suicide attackers themselves. To increase the chances of success, multiple attackers are used at each game.

The effects of the agents released do not materialize for days/weeks, and public health authorities take additional time to track the attacks epidemiologically, allowing maximum opportunity for second/third/fourth generation spread of the disease. AQ HQ does release a video taking credit for the attacks, which strikes further terror into an already terrorized American public, many of whom were sitting in their homes watching the games, not knowing that the attacks were unfolding, and who now feel distinctly vulnerable to harm in their own cities and towns.

#### Participant M:

The abandonment of Afghanistan by the United States and its allies in 2014 led to an unfortunate result. As the Taliban reestablished control over the country, it provided al Qaeda Central territory, protection and breathing space. Al Qaeda wasted no time in reconstituting its financial capabilities and immediately increased investment in its biological terrorism program, including the recruitment of individuals competent in biological engineering and the companion use of innovative technologies. Results paid off quickly as radicalized western Muslims answered the call. Several countries were able to interdict their citizens en route to Afghanistan, but three Germans, two of Turkish descent and one of Iranian descent, who met at university, made it through. By 2018, they were ready. Working in Helmand province in laboratory facilities protected by the Taliban, they were able to engineer a resistant strain of the Spanish Flu.

A young Afghani man, who had spent seven years in the United States, became radicalized after a romantic rejection. He enlisted in the cause. He suggested the virus be placed in tampered saline inhalers marketed for nasal hygiene. French Islamists were recruited to travel to the United States and placed the inhalers on shelves throughout the Northeast. Only one young man was caught. Taken into custody by the authorities, he committed suicide before providing any information regarding the plot.

The first infected victim presented in a MediAlert location in Wayne, NJ on October 28, 2019 at 9:34 pm. The symptoms were non-specific and flu like, but increased in severity rapidly. Pockets of infection were soon detected. After al Qaeda representatives claimed responsibility, public health efforts shifted into high gear. By the time a workable vaccine was developed and distributed, 800,000 persons had died.

The Future Backwards narratives represented a mixture of well-described attacks with some novel actors and provided expanded detail on some of the perpetrators offered during the rapid brainstorming session. The exercise was also intended to stimulate a greater breadth of creativity and perspective in the following formal elicitation.

### Role-Play Red Teaming

In order to avoid “mirror-imaging” and to encourage participants to view the threat from the adversary’s point of view, a red teaming exercise was conducted with participants assigned to particular roles. Another objective of the exercise was to explore the influence of specific ideological, strategic and resource constraints, opportunities and tendencies on the CB adversary attack decisions. Participants were assigned to one of four semi-fictional<sup>377</sup> terrorist groups (three to each group), while ensuring that each group contained at least one person with CB technical knowledge and one person with expertise in terrorist behavior.

<sup>377</sup> That is, groups that do not exist but whose ideology, structure, resources, and so forth were based on one or more actual historical terrorist groups and drawing on archetypes for particular categories of adversaries.

The four semi-fictional terrorist organizations utilized were:

1. **Sons of Jihad (SOJ)** – a particularly virulent, *takfiri*-oriented Libyan offshoot of AQIM led by two fanatical brothers.
2. **Cherokee Dawn** – a highly centralized, well-resourced ethnic Native American extremist group motivated by what it views as the illegal occupation of traditional Cherokee and other Native American lands, additionally fueled by the increased use of insecticides and pollutants on ancestral lands.
3. **Guardians of the Free Republic (GFR)** – a Christian Identity-based, apocalyptic and anti-government domestic U.S. organization.
4. **Chivalric Order of the Golden Dawn (COGD)** – a syncretistic, occultist secret society based in France and viewing the United States as the epicenter of the current debased, materialistic human civilization.

Each group was presented with a one-to-two page “Perpetrator Profile”, which provided detailed information on the characteristics of the adversary, including its history, beliefs, structure, leadership, membership and financial and other resources. Each profile in its entirety is contained in Appendix VI-B.

Each group was also given a set of instructions for developing a detailed chemical or biological (depending on the technical expertise of participants) attack plan in role, according to the information contained in the profile. The attack plans were to be structured to answer a specific set of questions (see Appendix VI-C for sample instructions given to each group). Each group worked separately to develop their attack plan, which was then presented to the wider elicitation group in role. The following are summaries of the in-role discussions that ensued and the resulting attack plans that were generated. It should be noted that the in-role discussions on occasion sacrifice narrative rhythm in order to capture the flow of the group’s decision making.

Group #1 Name	Cherokee Dawn
<b>Group Members</b>	<b>Participant C, Participant H, Participant K</b>
<b>Role-Playing Process</b>	
<p>A four-stage attack plan was conceived by Participant K, set to take place over a number of years. The basic premise involved a gradual approach of “how to make the insane, sane.” The goal was to retake land and so a number of attacks were planned, each for a strategic reason. The four-pronged attack consisted of the following categories: political attack, business attack, species attack and a gradual biological attack, which acted as a raw structure for the plan. Two major devastating attacks were required to make the “unconquitable conquerable.” The first attack involved a targeted selection of politicians using micro UAVs or some other aerosolized attack. The second attack involved attacking businesses with the strategy of inflicting massive economic damage. Attack three involved wiping out a species on a given island to demonstrate the group’s mastery of genetic engineering of a given pathogen (viral most likely). Attack four involved the second “devastator,” in which the group would threaten to release a given biological weapon should demands for land not be met.</p> <p>Participant C ( ) acted as a technical consultant to offer scientific expertise and specific quantities to the ideas of Participant K. Participant C suggested not only attacking a business in the second process, but injecting a toxin into a</p>	

food source which could be used as a psychological and lethal attack. During the strategic attack formulation process, Participant H played devil's advocate, offering practical reality to Participant K's approaches by suggesting how the federal government would theoretically react with each instance and how to improve the overall mission. Participant H finally suggested that the mission probably only needed to include one catastrophic attack to which the American government could not retaliate.

The majority of his arguments centered on the notion that the group would have only a single shot; that is, the group would have the chance to carry out one attack before they were "cuffed and stuffed." The federal response to any biological attack would overwhelm the group and they would likely be quickly rounded up before executing the following attacks. Participant K suggested using the "Japanese Model" where the group finishes with a large final attack for show, similar to how Nagasaki and Hiroshima ended World War II. However, Participant H countered Participant K's parallel of Nagasaki and Hiroshima by stating the Japanese had no capacity to retaliate. The difference in this situation is that the US does have a high retaliation capability.

Participant C, in using Participant K's attack structure as a working plan, brainstormed four agents that might serve as potential weapons. He mentioned toxins as a possibility for Attack 1, due to their discriminatory nature. Aerosolization would risk causing collateral damage and negate potential strategic objectives. Participant H and Participant K agreed with this. Attack 2 was hypothesized as being food-borne in nature.

Agent brainstorming for Attack 3 was more uncertain, but foot and mouth disease (FMD) was mentioned as a low-cost, effective agent. In addition, the original idea of wiping out a species was determined to be counter to Cherokee Dawn's underlying cultural ideology and this aspect of the attack was thus scrapped. Although conotoxin was mentioned as a candidate for Attack 1, Participant H again brought up the "cuffed and stuffed," issue of one attack only. At this point, Participant C mentioned an experiment done with a *Bacillus anthracis* sister strain involving the release of aerosolized bio-material in subways, using the pressure/wind change from passing cars and the enclosed space as an attack scenario. The group expressed interest in this attack as being a viable candidate for attack four. Members would release ten bags of anthrax in 15 cities, but Participant C suggested one city at a time would be best. HVAC delivery systems in skyscrapers or automated semi-explosive release in print cartridges were mentioned, but Participant C questioned the efficacy such automation. Dried spores could also be stored in fire extinguisher tanks throughout the United States to be detonated remotely. Participant K brought the conversation back to Attack 3 and the need to demonstrate the group's power: something innovative, new, and very scary. This was possible due to USAMRIID infiltration and a plot 50 years in the making. Participant H agreed, and mentioned cautious networking within organizations to avoid being "cuffed and stuffed." "Clean white women," sympathetic to the cause were mentioned as viable surrogates to secure and store material so as to escape law enforcement's radar.

At this point, gamma emitters and radiological material were mentioned as possible candidates for one of the attacks, but soon the conversation returned to attack four as casualty estimations were generated by the group for Attack 4. According to Participant C, if done well, 500,000 could be killed / infected for Attack 4. Participant H suggested that Attack 4 should be used first, as it demonstrated a credible threat and offered the shock factor. Participant K insisted Attack 3 should be used first, to demonstrate capability. Participant H then suggested Washington, DC as the initial target. At this point, the group agreed on a de facto compromise that merged the strategy/message of Attack 3 with the agent/target of Attack 4 (aerosolized *B. anthracis*/subway system).

Participant H highlighted the efficacy of a first strike on Washington, DC, in order to kill as many people as possible. Participant C then mentioned releasing a ciprofloxacin and doxycycline resistant strain of *B. anthracis* in the metro system. Group members / operatives releasing the agent would be inoculated using the veterinary or Emergent BioSolution's anthrax vaccine to avoid sickness. The dry powdered *B. anthracis* would be placed in Easter eggs or in light-bulbs with a charcoal solution and released in the metro system at evening rush hour. Symptoms would likely appear in three days. Participant H suggests the press release claiming responsibility for the attack should be timed to

come out on day four after the attack, warning of future attacks if demands aren't met or if they received retaliation. Secondary attacks could take place with stand-by cells in San Francisco, Kansas City, New York, Chicago, and Omaha.

The group's demands include the state of Oklahoma as sovereign tribal land and possibly access to a nuclear weapon to act as a deterrent to the United States. Participant K also suggested that the group demand a federal highway connecting to a port city as part of the new nation so as to have strategic access to the gulf (e.g., in Galveston, Texas). The group reasoned that the state of Oklahoma held little national significance to the U.S. government and would thus be readily acquiesced in response to an attack on DC. All whites, and any other ethnicity, would have to leave the nation or submit to tribal rule.

*Process Notes: Overall, the brainstorming session was remarkably cohesive, with no single participant dominating the conversation. Everyone was fairly lighthearted and acquainted with one another. Participant K presented a four-attack based working plan for the brainstorming session and got the ball rolling. Participant C provided biological agent brainstorming, contextualization, and occasionally mediated between Participant H and Participant K. Participant H played devil's advocate to Participant K's four-attack plan, with the one attack only, "cuff'em and stuff 'em perspective" and initially proposed doing Attack 4 first (big attack). Throughout the discussion, the group gradually incorporated the attack strategies of four separate attacks, into one large attack and several subsequent ones should the demands not be met. The compromise among the group happened very gradually, with little to no overall friction between members. All of the group members routinely made light-hearted jokes both among themselves and with the note-takers, suggesting that they were all very comfortable with each other.*

**Final Attack Plan**

<p>Type of weapon used, including delivery mechanism, and why</p>	<p>The biological weapon used involves ten two-kilogram containers of 10-12 spores per gram of dry-powdered <i>Bacillus anthracis</i>, aerosolized and comparable in quality to, or exceeding, the <i>B. anthracis</i> used in the Amerithrax attacks. The strains of <i>B. anthracis</i> will be stored for ten years and be resistant to ciprofloxacin and doxycycline.</p> <p>The delivery system involves the inserting the stored powder in old incandescent light bulbs treated with activated charcoal, which will be broken and released as the train takes off from the metro platform. Alternatively, Easter eggs may be used to for concealment. The first main attack will take place in Washington, DC, at a given metro stop. Subsequent attacks in various cities may follow if demands are not met. A "dead hand" system will release the agent in case human agents fail or are in any way incapacitated.</p>
<p>Method of weapon and/or component acquisition</p>	<p>Materials and components are gathered from qualified sympathizers and personnel that are part of the organization. The specific strain will likely come from the American Type Culture Collection (ATCC). Light bulbs or eggs are easily and cheaply acquired. <i>B. anthracis</i> can be stored for long periods in a cool/dark area with desiccants (anti-moisture agent).</p>
<p>Intended target(s) and why</p>	<p>Five team members would release spores in the Washington, DC metro system over several hours for maximum damage. Washington, DC will be the primary target for the strategic purposes of gaining attention and presenting a credible threat in which to issue demands for a sovereign tribal state. In addition, Washington, DC acts a symbolic attack because of its insensitivity with respect to the Redskins logo. Subsequent attacks on other cities would then occur if demands are not met. After Washington D.C. has received a catastrophic attack on its metro system, the team plans to have strategic cells activated waiting to release agents in cities across the country. The team selects the following cities as a starting point: San Francisco Bay Area; McPherson, Kansas; Omaha, Nebraska; New York City, Chicago and Los Angeles, which represent both large civilian populations for maximum damage, as well as small towns to show that no person in the country is safe. It also will include geographic areas from coast to coast, and people from all walks of life.</p>
<p>Goal of attack,</p>	<p>Cherokee Dawn seeks to cause all-encompassing damage upon those they feel have hurt them</p>

including intended casualty count, economic and social effects, government relations, etc.	in the past, especially the federal government. In addition, the team group not only wants revenge, but also that the government return the land that rightfully belongs to them. The attacks as a whole are estimated to cause close to 500,000 casualties. People with physical and psychological malady will likely overwhelm America’s health infrastructure, including hospitals, clinics and doctors’ offices. The group intends to use this attack to gain a position of strength in which to issue demands for a sovereign tribal state in Oklahoma from the U.S. government. Subsequent attacks would be launched should the government not comply. There is a high probability that the federal response would be large and likely capture all members of the DC strike team, their known associates, and the group elders. Smaller-cells in cities would likely be untouched due to compartmentalization.
Weapon storage and transportation to target area	The weapon will be stored in “pig containers,” in a cool dark area free of moisture. Transportation methods were not discussed.
Prevention of discovery or interdiction of attack before launch	Operational members and other personnel responsible for acquisition and production would operate in a compartmentalized fashion, with each having little to no knowledge of the other for OPSEC reasons. Any collaborators, scientists or otherwise, will be eliminated prior to the attack. While young, white females would raise fewer alarms, the team needs to recruit men with unwavering loyalty, who are extremely focused and trained to conduct a covert mission. Loyalty and culling are part of Cherokee Dawn’s method to ensure compliance with the mission objectives. The operation members are unlikely to be stopped at the metro due to a current lack of capabilities to detect biological agents in sealed containers.
Key leader(s) method of assurance that weapon use is carried out as per their wishes	This was not discussed extensively, but loyalty and culling were emphasized throughout the discussions.
Size of attack team and selection criteria	The DC attack team will be comprised of two individuals with special forces training. The group already has access to this desired skill set as noted in the Cherokee Dawn profile. In total, the group will attempt to gather 20-25 former special forces members activated in sleeper cells to sicken an estimated 500,000 people.
Warnings or claims of responsibility and knowledge of group’s involvement	Cherokee Dawn will not give prior warning. A press release/manifesto claiming responsibility will be released on day three or four following the attack once symptoms are in full effect. The group has three explicit demands in the manifesto: Sovereignty over Oklahoma (except for Oklahoma City), a road between Texas and Louisiana which ensures access to a port and a nuclear capability for deterrence.
Post-attack plans for egress and dealing with consequences	The team plans to coerce the federal government into acceding to the three demands or the follow-on cities will be attacked via sleeper cells. While the government will obviously be dealing with catastrophic damage to its citizens, transportation system and financial system, it will be necessary to respond to the threats so that more damage is not caused. The attack team would return to a prearranged destination while the other cells in separate cities would be on stand-by should further attacks be necessary. These specifics were not well described by participants.

<b>Group #2 Name</b>	<b>Guardians of the Free Republic (GFR)</b>
<b>Group Members</b>	<b>Participant D, Participant M, Participant L</b>
<b>Role-Playing Process</b>	
Each participant in this exercise heralds from a different professional background; Participant D was selected as a naïve participant due to their profession as an investment banker, Participant L as a chemical and biological weapons expert and Participant M as a high level law enforcement agent. It was obvious that both Participants M and L were both	



experts in their respective fields as they began discussing field-relative intricacies. Participant D contributed by making sure the technical decisions of both Participants L and M were in alignment to the group's overall philosophy. For this exercise, Participant L arrived about ten minutes late, so Participant M and D were already devising a strategy for the attack when Participant L arrived. The group kept focusing on attacking the government because the government is illegitimate in their eyes. Overall, the group conversation flowed very well and everyone contributed their ideas to the red-teaming exercise.

Participant M was the dominant personality in the group, yet everyone had plenty of time to express their ideas. He became the group's self-appointed Minister of War due to his law enforcement and military expertise. The group initially decided on five targets but then increased to seven for a more widespread damage radius, to which Participant M used Google maps to choose his targets in Missoula, Montana. The motto was "to go big or go home" concerning his attack strategy.

Participant L was given the task of creating a strategy for carrying out the attacks, but was also delegated to obtain the weapons that will be used for the attacks. On her own time, she became the team member who would grow castor plants so that ricin could be extracted.

Participant D was responsible for deciding whom to kill and whom they did not want to kill. The group decided to pretty much kill everyone, except for several important members in the community. The group hopes to gain leverage by keeping those individuals as hostages. Participant D also did not want any suicide attacks since the group did not want to lose any of their own capable members.

Participant M immediately wanted to attack governmental buildings because he understood that the GFR was virulently anti-government, but he also noticed that since the group was anti-Semitic, they had to attack any Jewish synagogues in the area. Participant M primarily decided on the targets while Participant L began working on her own after she was told that she was responsible for deciding on the chemicals that the group could use for the attacks.

Participant L began brainstorming the different chemicals that the group could obtain with their resources and connections. The group delegated their functions according to their respective strengths. Participant M approached the problem from a law enforcement mindset of how to best target the government without the plans being interdicted. Participant L contemplated the most likely chemicals that could be obtained and disseminated by the group from her previous experience in chemical weapons proliferation. Participant D provided rationality and scientific naivety to ensure the group remained focused on undertaking the overarching mission without getting bogged down in technical details.

Once the group decided on attacking the government, they began to debate the seven targets. They discussed local government buildings in Missoula, Montana such as courthouses, transportation hubs, police headquarters, military buildings or any infrastructure that would cripple the governmental system. Revenge was the primary goal. Team members agreed that the U.S. District Courthouse would serve well as a primary target invoking maximum physical and symbolic damage to the community. When the plan was to attack five targets, the subsequent buildings were to be an FBI office, local police headquarters, highway patrol headquarters and National Guard Armory. The group decided that these attacks were to occur simultaneously on a seemingly normal business day. They finally extended the target list to a synagogue in order to enforce their strict Christian beliefs upon the "children of Satan." In addition, they decided to take the mayor and his wife hostage to blackmail the American government. Participant L states that she wants to emphasize GFR's success through semiotics by planting the group's flag on their overtaken property.

The attack will commence at 2:00AM to ensure that everyone can gather in the local football stadium before the 12:00PM goal. GTR targets the US District Courthouse as their primary target for a high profile beginning, then will proceed to the subsequent buildings. The explosive device should detonate at the temple promptly at 9:30AM once the normal business day has started. Once the "Jew Headquarters" has been destroyed, the hostage team will be activated

to kidnap the mayor with his wife in the hope of removing the town’s leader from power to ensure more chaos and to coerce the group’s enemies. Each team is instructed not to discern between enemies and those who do not abide by GTR’s new plan in a “you are either with us or against us” mindset. Next, the following teams will begin their assault by releasing a ricin rub on surfaces such as doorknobs in the target locations. In addition, methyl isocyanate that has been mixed with water will either be splashed or poured on patrons. The team discussed releasing a chemical into the presurveyed ventilation system of the buildings and blocking the entrances so these people will be locked in buildings and gassed, but the plan was not fully developed. These attacks should persuade citizens to join and fight with GTR – the final goal of the strategy – as everyone makes their way to the new headquarters at the stadium.

*Process Notes: The group discussed the plan again before they finalized the plan. All members worked together to make sure that they understood the whole process from the targets to how the attacks will be carried out.*

**Final Attack Plan**

Type of weapon used, including delivery mechanism, and why	Chemical weapons (plus some biotoxins) will be used mainly because they disfigure the body, which further adds a shock factor to the attacks. The weapons used here will be ricin, butyric acid and methyl isocyanate. Butyric acid and methyl isocyanate will be either splashed or poured over people. Ricin will be rubbed against the targeted doorknobs and car door handles. A follow-up weapon is to extract plague from prairie dogs, although this was recognized to be technically demanding to turn into a viable weapon. Additionally, traditional explosives will be used to blow up the synagogue.
Method of weapon and/or component acquisition	GFR’s weapons expert will grow castor beans that will be turned into ricin several years before the attacks in anticipation of the attack day. Methyl isocyanate and butyric acid will be bought from standard chemical companies. Plague will be isolated from prairie dogs in the wild. An explosives expert for the group will assemble the explosives.
Intended target(s) and why	Missoula, Montana was selected as the base city for its proximity to GFR’s headquarters on a Native American reservation in Montana and to hopefully cripple the economic system by taking over the University of Montana. The targets are mainly government buildings, including the U.S. district court, police headquarters, FBI headquarters, Montana Highway Patrol, and the National Guard Armory that are all located in town. These locations threaten America’s core governing structure by weakening local and federal law enforcement, military and the court system simultaneously. The mayor’s house and a local synagogue will also be attacked for religious and strategic motives. The mayor and his wife will be taken hostage and brought to the stadium using tranquilizer guns. With the mayor taken hostage and the governing buildings under attack, GTR expects the town to fall into their power.
Goal of attack, including intended casualty count, economic and social effects, government relations, etc.	The group ultimately wants to expedite the Tribulation. Their goals are to take over the local town by destroying their infrastructure and assume power over their government buildings. The group wants to take powerful and well-known people as hostages in the hope that they will convince the locals to accept this new form of governance. This also means that the people will have to accept the new form of religion as their own. The spawn of Satan, or Jews according to the group, will have to all be killed. Through fear, such as witnessing disfigured people and public executions, the group hopes to attract the locals to join their new form of government. The federal government will be thwarted from interfering because the group believes that threatening the plague after showcasing their chemical weapons capability would serve as a deterrent to any government interference.
Weapon storage and transportation to target area	Although it was not explicitly specified, the weapons will be stored on GFR property. They will be transported by two competent members, who will also carry out the attacks.
Prevention of discovery or interdiction of attack	Only the most highly trusted members of GFR will know of the plan. The members that will carry out the attacks must prove their competence through loyal service.

before launch	
Key leader(s) method of assurance that weapon use is carried out as per their wishes	The attacks will be followed directly because the members carrying out the attacks are specifically chosen for having proven competence and are extremely loyal to the group. Leading members will also execute the plan, which limits hierarchal miscommunication. Cookie, one of the group’s top leaders, is personally responsible for infiltrating a chemical company. An example of an appropriate facility would be Tuella Depot, which is where the U.S. stores its chemical arsenal. Her duties also include growing castor bean plants on the reservation for several years that will be harvested and turned into a heavy slurry.
Size of attack team and selection criteria	GTR will split into two overarching teams: hostage team and chemical/toxin dissemination team. The people carrying out these attacks will be limited to two individuals for each attack, which makes the total less than 20 individuals. The selection criteria consist of previous experience and a proven dedication to the cause.
Warnings or claims of responsibility and knowledge of group’s involvement	There will be no warnings. The attacks will create a huge shock in the community, on which the GFR hopes to capitalize, to create a band of dedicated followers. The group will claim responsibility for all of the attacks through media and publicly. The attacks will occur as simultaneously as possible, and then GTR will release widespread media coverage to explain their ideology.
Post-attack plans for egress and dealing with consequences	Egress will not be too difficult since most of the people in the attacks will be killed. The consequences of the attacks will then motivate the locals to join the GFR.

Group #3 Name	Chivalric Order of the Golden Dawn (COGD)
Group Members	Participant I, Participant G, Participant A
<b>Role-Playing Process</b>	
<p>The Chivalric Order of the Golden Dawn (COGD) is planning to launch an attack that cuts to the core of American greed and gluttony—the meat suppliers for McDonalds. This attack will consist of two-man teams contaminating the meat supply in several processing plants by adding a mixture of dioxin and cremains to the meat—all while filming the repeated contaminations over several months. This will achieve the COGD’s goal of ecological protection by disrupting the production of meat, which has an enormous carbon footprint. The goal will be to cause mass chaos and confusion among people around the world due to the global reach that production has accumulated in the recent decades. The COGD also wants to plant doubt in the public as to COGD’s involvement—instead, pointing the blame towards another group that would want to harm the American public. The COGD aspires to create “sickness over fear” in the populace and to cause disruption to the great demand for meat and the American economy. They want to cause full-fledged panic, which would subsequently create social and economic disruption.</p> <p>50 willing and able loyal acolytes will infiltrate American meat processing plants to contaminate the beef that is distributed to companies such as McDonalds. The infiltration members will work in two-partner teams, unknown to other teams, to introduce approximately 100 milligrams of the mixture in the meat. They plan to use the system on itself, similar to how al Qaeda used American commercial aviation as a weapon against itself. Their primary environmentalist goal is to force Americans to avoid inhumanely produced beef as well as to breed mistrust between the people and the government. They believe that immediate death would be too short-sighted a goal; they want to cause sickness and sow mistrust more than lethality.</p> <p>The group began to discuss the proper contaminant and method of execution to fulfill their team’s goals. They needed a non-persistent chemical that would not undermine their overall agenda, one that could be readily available commercially for a low cost. Participant A suggested choosing a toxin that would psychologically devastate the country, to which he suggested using ashes after human cremation, or “cremains.” This tactic would invoke the idea that not only are human remains in the meat, but that they could be people whom we personally know. Participant I countered that</p>	

the remained toxins would not be considered a chemical attack per se, so he suggested adding a strong chemical to cause deaths to which Participant G advised using dioxin.

Initially, the group discussed stealing a common chemical agent from a tanker truck, which could be feasible with their limited liquid funds and local connections. Participant I made the point that they would need employees working inside the agencies to know the trucks’ transportation routes and sensitive information and thus brought the deliberation of the benefits of a covert versus overt attack. Participant A, using the psychological destruction model, suggested attacking the beef industry to seek revenge on McDonald’s harmful carbon footprint and informing the world by funding widespread media coverage. As multiple chemicals and toxins were brought into the mix, the group members had to keep returning to the true motives and goals that they needed to accomplish.

The pinnacle of this attack originates by causing people to question beliefs they considered mundane and accepted. This plan doesn't have the theatrics of dropping a bomb or massive shooting, but it has the benefit of being a “silent killer.” When people begin to second-guess their daily activities, they turn to a lockdown mode and overreact, which would put strain on the financial markets, healthcare system and businesses.

*Process Notes: The group communicated well and discussed their attack plan respectfully among each other. Participant G initially led the discussion with Participant I countering with technical questions and Participant A asking broad overarching questions to challenge the other two. Once they became more comfortable with each other, they began to mesh well and work more cohesively. Participant A created the two-part attack with a long term contamination process then distributing their whereabouts online.*

**Final Attack Plan**

Type of weapon used, including delivery mechanism, and why	The group will contaminate a meat-processing and packaging plant by adding dioxin and “cremains” to the meat. Using cremains attacks the mental psyche, while dioxin is one of the most toxic chemicals that exists.
Method of weapon and/or component acquisition	Dioxin is readily available and can be purchased commercially through a chemical company like Aldrich. Cremains can be obtained from hospitals, veterinary clinics, etc.
Intended target(s) and why	The target will be the meat processing plants used by McDonalds because the group believes that beef is an ecological nightmare—its production process has a huge carbon footprint. The globalization of food has reached new levels, which fuels the idea that no one is safe from harm. Furthermore, McDonalds is a symbol of American culture and factors into greed and gluttony. The plan will not only kill people with the dioxin, but will cause psychological damage, economic panic and essentially make the world question what they considered ordinary.
Goal of attack, including intended casualty count, economic and social effects, government relations, etc.	The group will seek to instill fear and disruption throughout the American populace by fostering distrust between producer and consumer. As a result, people are likely to panic, overwhelm hospitals and medical facilities, alter financial markets, and utter chaos.
Weapon storage and transportation to target area	Insiders in the meat processing companies (members of COGD that are employees at the various plants) will smuggle the dioxin and cremains in their lunches/thermoses. Each team will consist of two members who will bring the toxin mixture in their lunchboxes, with one person tasked with dispersing the material and the other one in charge of filming the act.
Prevention of discovery or interdiction of attack before launch	The group’s structure ensures that the several two-man teams will only be aware of their partner and of no other team, nor will they know about the goals of the highest levels of leadership. The highest leaders (those in level 30-33 membership) have developed a sophisticated plan to have the teams record each contamination (each team will contaminate meat many times over several months). Only an estimated 90 people of the total 1,500

	members have reached the inner circle of the organization to be considered “knights,” which displays the highly selective hierarchal system since selective higher levels ensure that few people learn about pertinent organizational news. After sufficient video evidence of contamination, the group will post these videos online to create mass disruption.
Key leader(s) method of assurance that weapon use is carried out as per their wishes	The leaders are confident that the plan will be carried out per their wishes because it is a simple attack that does not require expert knowledge.
Size of attack team and selection criteria	There will be several attack teams—two men per team. Fifty agents will infiltrate American meat processing factories. The selection process involves members of the group who are willing to, and can be, employed at the meat processing plants, but the vetting of members for loyalty was not greatly discussed. Over 40 of their members have intelligence experience and are well-educated and/or well-trained.
Warnings or claims of responsibility and knowledge of group’s involvement	No warnings will be given before the attacks. The group will begin by posting the videos on YouTube and sending them to both liberal and conservative bloggers to spread the disruptive effects. However, the group will aim to have the blame placed on other operating terrorist groups. This will be done in order to ensure the long-term goals of COGD.
Post-attack plans for egress and dealing with consequences	As previously stated, the post-attack plan consists of releasing the videos to the public, showing the contamination of meat with dioxin and cremains in order to create fear in the masses. Again, the group will aim to shift blame to another group to protect its future plans.

Group #4 Name	Son of Jihad (SOJ)
<b>Group Members</b>	<b>Participant E, Participant J, Participant F</b>
<b>Role-Playing Process</b>	
<p>The plan consists of two separate cells entering a crowded mall in the metropolitan Washington, DC area. The first group will be known as the “knife team” and the other as the “biological team.” Before the plan is put into effect, the cells in the West, specifically in Northern Virginia/DC, will be notified of either their role as the knife fighters, or their roles as the biological team. Newer members will be part of the knife cell, while more seasoned members of the Sons of Jihad will be part of the biological team. Each cell will consist of four members. There will be no issue with dissent, or with failure to execute the plan correctly because members owe a blood oath to the brothers, meaning they will accomplish their mission or die trying.</p> <p>Using one participants experience as a former member of a biological vaccine testing program, they acquire high quality, fine powdered <i>B. anthracis</i> spores, approximately two pounds (about a kilogram) in weight. The anthrax is sent from North Africa to Taiwan, where wealthy sympathizers live and can act as an intermediary. From there, it is shipped in a container to the United States, or more specifically, to a post office box that was previously rented by one of the cells there. Using steganography, the Salaya brothers will encode a message for the American cells and post it on a frequently checked blog/forum. The message will be sent the Friday before the intended attack date.</p> <p>The intended attack date will be a Saturday, in the early evening at 5:00 pm at Tyson’s Corner Mall in Virginia. At 4:50 pm the two cells will arrive at the mall. The knife cell does not know about the anthrax cell. The anthrax cell knows about the knife cell. The anthrax cell will go to the second floor, one above the food court, two near each exit, while the fourth member being the driver, will remain in the car. Each member inside (this excludes the driver) will have a battery operated fan and a sandwich bag of <i>B. anthracis</i> spores. They wait in their positions until the knife cell has fulfilled their assignment.</p> <p>The knife cell will have one driver who drops them off several hundred yards from the entrance and wait there throughout the assignment. The other three members will go into the mall and find two exits and the food court. Each</p>	

member has a box cutter (the “knife”). At 5:00 pm, each of the knife members will start stabbing as many people as they can before they are a) apprehended by security or police personnel, b) shot by other mall patrons, or c) able to escape back to the parking lot and the get-away car.

Once the panic has set in that there are knife-wielding criminals attacking people (a signal that they had been told to wait for), the anthrax team will discreetly open their bags of powder and turn on their fans. They pour the spores into the air stream so that they fall from the second floor to the first floor in a wide swath, covering the people leaving the mall. When this team runs out of powder, they will pack up their fans and bags and calmly walk out of the mall to their car, and leave.

The anthrax team will lay low in Baltimore in a safe house owned by the Sons of Jihad (SOJ). If the knife team escapes, they will hide out in a cabin in West Virginia for an indefinite amount of time. If they do not escape, they are left to their own devices for escape or prosecution. The group will not claim responsibility at first, but will wait until people show up in the hospital with symptoms of anthrax infection. Then they will claim their superiority over al-Qaida because they were successful in a recent attack on Americans, and hopefully gain more members and supporters.

Estimated casualty levels could range from zero to a couple dozen, since the cause of death could occur from the anthrax, box-cutters, being trampled from mass exit or heart attacks from the panic. The plan can only work as a combination of covert and overt tactics that work simultaneously.

*Process Notes: Due to their background and expertise, Participant J created the attack plan and event timeline, Participant E established the specifics of the biological agents and Participant F questioned both for clarification and forced them to think of a realistic attempt. It seemed that Participant J already had a plan before they attempted to discuss the ideas for an attack. Participant E knew more of the science side of the discussion, so Participant J deferred to her for details, but had already decided she was a Libyan expat scientist working with them. Participant F seemed to try to think outside of the game plan initially proposed by Participant J, asking penetrating questions and offering ideas to questions and issues as they came up in discussion. Participant E also asked productive questions in an attempt to work out the details a bit further. Participant J’s ideas were elementary, given the amount of money they had access to. Part of the group summary was that Sons of Jihad were unhappy with al-Qaida because their interpretation of jihad was not extreme enough. However, Participant J seemed intent on copying the ideas of al-Qaida with box cutters (the knives in the attack plan) and did not seem to push forward the goal of looking more aggressive and superior in thinking to al-Qaida. As it seemed that Participant J was very receptive to any new developments in his plan, Participant F and Participant E did well to work with him to better articulate the plan for the final presentation.*

**Final Attack Plan**

Type of weapon used, including delivery mechanism, and why	The group plans to use a biological agent: <i>B. anthracis</i> , being spread by a fan. Originating in North Africa, this is the most sophisticated weapon they could acquire tacit knowledge about, since a member of the group is a Libyan bioscientist. In addition, box cutters have proven to be a successful weapon, as seen on 9/11.
Method of weapon and/or component acquisition	A week before the planned attack, a shipment will arrive from Taiwan to home grown SOJ operatives in a parcel sent via ocean shipping container. The shipment will contain 2.5 pounds of a dry, micro-encapsulated formulation of spores. Operatives will have the fans already ready to go and box cutters are easily obtained from local hardware stores. Each “knife assailant” will have two box cutters each for their part.
Intended target(s) and why	The intended target is Tyson’s Corner Mall because it is easily accessible, equipment is easy to acquire, and mass casualties are expected for a dense urban population. Team members can release the biological agent on the unknowing shopping population simultaneously with the box-cutters diversion.
Goal of attack, including intended	The group seeks to achieve notoriety and awareness for its cause. The results would hopefully have a few dozen people in the hospital from the anthrax infection in addition to several dead

casualty count, economic and social effects, government relations, etc.	from knife wounds. However, the most damage would occur from the fear and psychological damage on the part of citizens wondering if they could be contaminated.
Weapon storage and transportation to target area	Four members of the cell will transport the spores with the fans in regular plastic bags. The box cutters are easily concealed in pockets or bags.
Prevention of discovery or interdiction of attack before launch	The two cells will not be connected; the knife fighters don't know there is a second part to the attack. The fan blowers will be discrete with attention averted because of the knife panic.
Key leader(s) method of assurance that weapon use is carried out as per their wishes	The team members all took a blood oath to prove their loyalty before being trusted with important knowledge. The leaders will task the more trusted and experienced operatives with the more vital tasks.
Size of attack team and selection criteria	There will be two teams of four persons. The first is the "knife team" with one driver and three attackers. They will be the most dispensable members. The second team with the fans dispersing anthrax involves the more seasoned members with one driver and three attackers as well.
Warnings or claims of responsibility and knowledge of group's involvement	There will be no warnings. Members will take credit afterward and they want it to be widely known so people know about their group.
Post-attack plans for egress and dealing with consequences	The team members with knives will probably not escape from the mall. If they do escape, they will regroup in a cabin in West Virginia where they will be on lockdown. They will likely be detained or killed in their attempts. The team members with fans will remain in a safehouse in Baltimore. The worst case scenario involved losing the shipment and all eight men. However, even then, the public would know that the group obtained anthrax and they were a potential threat.

**“Stone Soup” Resource Constraints Exercise**

This exercise is designed to encourage participants to move away from thinking about highly-sophisticated threats that embrace the latest technologies and to dwell on adversary improvisation in the face of severe resource constraints, a situation faced by many non-state adversaries. It is meant to emphasize the importance of considering that, even though the adversary may lack substantial capabilities in biological or chemical weapons, improvisation and tactical ingenuity can still result in attacks with serious consequences.

The exercise begins this approach *ad absurdum*. Participants were separated into groups of three experts each, including at least one person with operational and one person with technical expertise in at least one of the weapons. The groups were given brief backgrounds on the adversaries they were meant to represent (unlike the extensive profiles used in the role-playing exercise previously). Each group was then given the same identical set of materials:

- 1 tube of mint toothpaste
- 6 eggs in Styrofoam carton
- 1 flashlight (large battery included)

They were instructed to use only these materials and any objects currently on their person to design a CB attack that resulted in as many casualties and as much disruption as possible. After a given period of time with this admittedly extremely difficult task, the groups were allowed to select another object of their choosing, of less than \$100 value, to add to their inventory, which could be utilized to facilitate their attack. After a further period of in-group discussion, the groups were allowed to select yet another object of their choosing of less than \$100 value and incorporate that into their attack plan. At the end of the exercise, each group was asked to present their final attack plan to the plenary.

The following represents the process and outcomes of each of the groups in the exercise:

<b>Group #1 Name</b>	<b>Defenders of Life Everlasting</b>
<b>Group Members</b>	<b>Participant L, substitute for Participant H, Participant F</b>
<b>Group Type</b>	Anti-Abortion
<b>Group Description</b>	The Defenders of Life Everlasting are a small, extreme anti-abortion group. Numbering only three members, including one chemical weapons expert and one former highly decorated soldier, the group believes that any society that countenances the brutal murder of the unborn gives up its right to exist.
<b>Materials</b>	Standard Items: one tube of mint toothpaste, six eggs in Styrofoam carton, and one flashlight (large battery included)  Additional Items: gas mask, second-hand laptop
<b>Overview and Discussion of Final Plot</b>	
<p>The group’s ideology is very straightforward and brutal because they believe that anyone associated with the killing of innocent newborns deserve to die. After several questions and concerns, the facilitator made it clear to the group that they can only use the three given items. Due to the scant amount of resources, Participant F claimed, “we’re naked with these items.”</p> <p>Participant L talks about how it would be really easy to age the eggs where salmonella will grow. The Salmonella extracted from the eggs will then be used to attack salad bars. The facilitator urged the groups to be more creative when he overheard Participant L talk about contaminating salad bars. In addition, the facilitator reminded the group that they are assigned to carry out a chemical attack against their targets. During this time, Participant F mentions that the fumes from the burning of Styrofoam are a neurotoxin.</p> <p>With very little resources, Participant L comes up with the idea of raiding a chemical laboratory and stealing a variety of chemicals where she will create a toxic chemical soup. One of the members of the group has access to a chemical laboratory so stealing the chemicals will not be too difficult. The containers from which the chemicals are to be stolen will then be replaced with water to delay anyone discovering that the chemicals were stolen. Participant H mentions that she has current knowledge on how to smuggle chemicals from the University of Maryland (UMD) chemical storage room.</p> <p>As far as the location, Participant L does want to attack a place where many deaths will result. Additionally, she wants the attacks to be difficult to be traced back to the group. Participant L eventually sets her eyes on attacking the Supreme</p>	



Court. Other possible targets include the annual meeting of the American Medical Association (AMA), and Planned Parenthood offices. Participants F and H feel that the attack on the Supreme Court is unfeasible, but Participant L stays persistent on attacking the building.

The facilitator now says that the group can purchase anything worth \$100 or less. Participant L wants to purchase a gas mask with this money since she will be the person pouring the chemical soup into the ventilation system of the buildings. Participant F finds an Israeli gas mask for \$80. The plan so far is that Participant L will be the person responsible for actually pouring the chemical soup inside the ventilation system of the buildings while the other two barricade the buildings so that people inside are forced to inhale the chemicals. Participants F and H will steal metal from construction sites that will be used to barricade the exits of the building. Another possibility is that Participants F and H can hotwire some vehicles and use those to barricade the exits since both have the knowledge to accomplish that task. There was also discussion of how to hamper the first responders. They first thought about bringing down a power line in front of the building using a stone attached to a rope. This idea was quickly abandoned because it was deemed too risky.

Participants F and H will both enter the chemical storage area to smuggle the chemicals that will be used to create the chemical soup. Participant L wants a methyl isocyanate-type attack. She calls this the methyl-ethyl attack. The facilitator encouraged the group to be specific about what exact chemicals they want to steal.

The facilitator then allowed the group to “purchase” another item for \$100 or less. Participants F and H decide that they will buy a cheap laptop with this money. Participant H finds a list of toxic inhalation chemicals. Participants L and H pick some possibilities which include sulfuric acid, anhydrous ammonia, sulfur dioxide, ethylene dioxide, and hydrogen fluoride. Participant H knows how to make arsine. She then writes down the chemical reactions and the needed substances.

Participants L and F also discuss the possibility of attacking a chemical tanker in a railroad station. Participant L claims that it will be easy to identify a chemical tanker because it is well-marked. Participant L then says that this attack will be a distraction from their initial goals.

Participant H and F steal chemicals from the chemical storage inside a university. Eggs and toothpaste will be used to adhere paper to the security cameras to obscure their identities. Flashlights will be used to physically incapacitate anyone that gets in the way of the operation. Participants H and L will create the chemical soup although not all of the ingredients will be mixed at that time. Participant L gains entry into the annual meetings where she will pour the chemical soup into the ventilation system of the building while wearing her gas mask. Participants H and F will barricade the building to prevent anyone from exiting. Additionally, the group wants to attack the Supreme Court while a trial involving abortion is taking place, but specifics were not provided.

Group #2 Name	Branson Family
Group Members	Participant C, Participant M, Participant D
Group Type	Branson Family
Group Description	Led by a charismatic public defender who has become disillusioned by the American system of “justice,” the Branson Family also consists of two acolytes, one of which has extensive knowledge of microbiology. Michael Branson has convinced his minions that the only way to reform society is to purge it of the undeserving, which includes government employees at all levels, as well as anyone with tertiary education.
Materials	Standard Items: one tube of mint toothpaste, six eggs in Styrofoam carton, and one flashlight (large battery included)  Additional Items: bolt cutter, propane
<b>Overview and Discussion of Final Plot</b>	

Following a brief consideration of available material, the group members discussed various pathogens that could be cultivated via egg culture. Sever acute respiratory syndrome (SARS), H1N1 influenza virus, and *Francisella tularensis* were all considered. *F. tularensis* was briefly debated due to its extremely low infectious dose (ID50) as an attractive weapon. However, it was agreed that *F. tularensis* was seldom fatal, as well as non-contagious, and so the group members considered their options for a chemical-based attack. Phosgene was mentioned earlier, but one group member indicated that an agent that could kill, and keep killing, was ideal.

Inspection of the toothpaste container yielded no results, so contamination of a water source using a dead animal as a vector was discussed. Explosives and the selection of a physical target like a building were discussed. The toothpaste was at one point suggested to serve as an accelerator after being soaked in gasoline. Paired with napalm, it could serve as a potent IED.

Next, *F. tularensis* was again mentioned. This time, however, the group members discussed contamination of the produce-sprinkler system at a grocery store to infect vegetables. After being ruled out, chlorine was explored as an agent along with propane. A group member suggested that steel bolt cutters would be needed to access locked equipment or tanks (propane). The next attack scenario involved stealing two or more propane tanks and around one 140lb canister of chlorine. The initial explosion, in a closed area of the building, such as a stairway, would generate a low-visibility environment. The chlorine would then be released (dumped down the stairs) contributing to initial fume toxicity. With the choke point created, generating further casualties could be more likely.

The materials were seldom, if ever used. Bolt cutters, propane, and chlorine, stolen or bought with the allotted \$100. The team members would be transported to the target building through unknown means, possibly 26 Federal Plaza, which is the Federal Building in New York City. Although the group initially wanted to use a biological agent, it decided that this was not possible and instead it settled on a chemical attack involving exploded propane tanks, creating bottleneck within the building as people tried to escape. The chlorine would then be released, taking advantage of closed areas and fumes from detonated propane while people are trapped. The time frame and estimated fatalities were not determined.

<b>Group #3 Name</b>	<b>Schenectady Three</b>
<b>Group Members</b>	<b>Participant K, Participant J, Participant I</b>
<b>Group Type</b>	Jihadist Cell
<b>Group Description</b>	The Schenectady Three is a label given to three jihadists, two of them cousins and the third a close family friend, hailing from Schenectady, New York. One of the cousins is a chemical engineer, while the family friend has received intensive operational training at a terrorist camp in Khyber Pakhtunkhwa, Pakistan. They are bent on avenging the plight of the Umma at all costs.
<b>Materials</b>	Standard Items: one tube of mint toothpaste, six eggs in Styrofoam carton, and one flashlight (large battery included)  Additional Items: liquid nitrogen

**Overview and Discussion of Final Plot**

The Schenectady Three discuss how best to attack the non-believers and decide to attack a crowded flea market filled with infidels with a chlorine truck. They chose a geographic location with a large population and a depressed bowl-like landform so that the chemicals continue to concentrate once released. They debated attacking a mass transit system, public building and finally decided upon a flea market. They also discussed which type of chemical should be used, which came down to ammonia or chlorine. Chlorine was unanimously chosen for its properties and easy accessibility.

Over a ten-month period, the team members will survey the site regularly in order to discover when the largest

population of people is present and attempt to isolate the best meteorological conditions for the attack. Participant K argued for a chlorine layer laid around the periphery, while Participant J disagreed and argued that a rupture and explosion is the only rational attack plan.

The members also spend extensive time studying the routes of chlorine tankers through the area. The day of the attack, the members will lie in the road with toothpaste in and around their mouths to appear diseased, then use flashlights to temporarily blind the drivers of chlorine tankers. Once the drivers are distracted, the members will storm the doors and overtake the driver. The truck needs to be obtained near the flea market site on a one-lane road to limit its maneuverability. In addition to hijacking a truck, the team needs to obtain a car by throwing eggs at the windows in order to use it for a crash set-up. They decide for this to be a suicide mission with one member to open the chlorine valve in the back of the truck while another member drives the truck into a major pillar of the depression. They agree that the truck needs to make impact with the pillar shortly after weakening the back of the tank for maximum damage.

With the additional \$100, the group discussed buying explosives or hand grenades, but decided upon liquid nitrogen on Craigslist for its relatively cheap cost and availability on the Internet. The liquid nitrogen will weaken the middle of the chlorine tanker to ensure an explosion on impact.

At 11:00 am on a Saturday, the group members will begin the process of hijacking a chemical truck to send into a large Berkeley flea market full of unsuspecting citizens. The entire process should last from 11:00 am to 3:00 pm. The attack will kill or at least injure an estimated 3,000-5,000 people. The group members have purchased liquid nitrogen online through Craigslist under the cost requirements and embrittled the metal on the back of the truck with liquid nitrogen to increase the dispersal when the truck makes impact. The group will test the plan first in an abandoned junkyard to reduce surprises on the actual day.

Group #4 Name	Gaia's Vengeance
Group Members	Participant E, Participant G, Participant A
Group Type	Environmental
Group Description	Gaia's Avengers is a tiny offshoot of the Earth Liberation Front that has abandoned the movement's reticence against causing mass casualties. Consisting of a university-educated microbiologist and two technically-savvy young undergraduates, the group was inspired by R.I.S.E. and is bent on reclaiming the earth on behalf of the innocents from Homo Roboticus.
Materials	Standard Items: one tube of mint toothpaste, six eggs in Styrofoam carton, and one flashlight (large battery included)  Additional Items: (none)

**Overview and Discussion of Final Plot**

With the presented items, the group was told to create a large and effective biological attack within ten years. The group collectively had a difficult time beginning the process of creating an attack. They placed all items in the middle of the circle to visually grasp the task at hand. Participant G started the discussion when he suggested stealing ammonium tanks using the flashlights as blinding agents to distract the chlorine truck drivers. Next, Participant E somewhat jokingly suggested using the members' fecal matter to mix with the eggs for a plot to contaminate food production on a large scale. Participant A then wanted to create maximum damage with a symbolic aspect to which he offered a plan to attack Hajj, but the group was too limited by money and thus could not travel there. The group also debated poisoning an airline pilot so that he crashes and physically poisoning people using fluoride were also discussed to no avail. After the facilitator informed the group that they would receive \$100, the team members discussed what material or toxin could be bought or obtained with the money. Purchasing a firearm or potassium cyanide to kill more people was discussed. Participant E added that the team could obtain common biological agents such as *Escherichia coli* (E. coli) and tuberculosis (TB) to add to the rotten eggs through the group's laboratory access, but a definite usage of these agents was not determined.

Participant G initially suggested a psychological attack at a large enclosed space, such as a sports stadium. The plan would be based on the concept of threatening the stadium goers by yelling that the now rotten eggs are a part of a chemical attack, causing mass hysteria. As the stadium patrons become panicked and run for the same exits, they will inevitably trample each other to death while a team member uses the flashlight to physically beat stragglers to death. In addition, toothpaste will be applied to exposed body parts of team members three days before the attack, which will give the appearance of grotesque sores to add to the fake chemical toxin plot. No official time frame was determined, but was agreed to take place in the near future with no long-term preparation requirements.

The role-playing and stone soup exercises were designed to make participants aware of the practical realities of launching an attack and also the decision-making dynamics that might occur within groups planning a CB attack. As such, the process that the participants went through to reach their final tactical decisions is just as important, if not more so, than the outcome. In this regard, it is clear that qualities such as the inherent risk propensities and creativity of decision makers has an impact on the decision-making process, while decisions are circumscribed by existing resources and defenses. At the same time, no strong claims are made about the extent to which expert participants can act as proxies for actual CB adversaries. At the very least, however, the red-team exercises do highlight the often fluid nature of CB attack plans and how they can adapt to take strategic and tactical exigencies into account.

## ADVERSARY FILTERING

The range of *all* conceivable non-state perpetrators of CB attacks is vast, as indicated by the brainstorming sessions. Moreover, the task of identifying CB adversaries between now and 2022 is ineluctably complicated by the realization that a chemical or biological threat might emanate from an actor which is not currently known to security forces, or might in fact not currently even exist (for example, a terrorist organization or cell that will only be formed in 2015). Obviously, it is both impractical and unnecessary to engage in an in-depth probabilistic elicitation of the magnitude of the threat posed by every one of the vast number of conceivable users of CB materials. The second phase of the elicitation was therefore directed towards narrowing down the set of potential perpetrators to a manageable number that could be subjected to more intensive analysis.

This “filtering” function was performed in two stages and considered a large number of adversary entities, including specifically named groups and unidentified groups characterized by a) the motivating ideological milieu and b) whether the organization was based in the United States or overseas.

### Category Weighting

The first stage of the “filtering” process focused on the category of actor involved. The very nature of small, unaffiliated cells and lone actors, especially, implies that they have no accessible identity as potential CB users and therefore these actors can be ranked by type only. This stage considered a total of

90 types of actor, a combination of 15 ideological types, three organizational types and whether the actor was foreign or domestic based.

Participants were presented with two large paper grids spread over conference tables, one for chemical and one for biological weapons. Each grid listed 30 ideology types (15 basic types repeated for both U.S.-based and foreign-based actors) on its rows and three organization types (developed organization, unaffiliated cell, and lone actor) on its columns. The distinction was made between foreign and domestically based actors, since this criterion influences the ease with which the actors could move personnel, materials or weapons into a particular target area (i.e., the U.S. homeland or an overseas U.S. target).

The experts were divided into two teams and each expert was provided with 200 poker chips, specifically marked for that expert. One team was assigned to each of the grids and asked to “bet” on the most likely perpetrator types for the weapon type reflected on the grid. Betting was conducted by the expert placing a number of poker chips relative to the likelihood that they assigned to that actor pursuing either a chemical attack or a biological attack (similar to the game of Roulette). Once the experts had assigned 100 of their chips to a particular weapon type, they moved to the other grid and repeated the exercise for the other weapon type until all 200 chips had been “spent.” When all the “betting” was completed, START staff took immediate note of the highest ranking groups for use in the later probabilistic elicitation. The poker chips were then collected according to category and stored for a more precise, future count where the contributions of each expert could be tallied separately. The aggregate percentages for all participants are displayed below in Tables 6.3 and 6.4.

Table 6.3: Percentage of Total Number of Chips Allocated to Each Actor Category (Chemical)			
Ideological Motivation	Developed Organization	Unaffiliated Cell	Lone Actor
<i>Foreign Based</i>			
Sunni Jihadists	5.3%	5.6%	2.8%
Shi'i Jihadists	5.3%	2.5%	1.8%
Ethnonationalists/Separatist	0.6%	0.6%	0.1%
Left Wing	0.3%	0.8%	0.5%
Right Wing	0.4%	0.9%	0.6%
Environmentalists/Animal Rights	1.3%	0.2%	0.2%
Anti-abortion (single-issue)	0.4%	0.6%	0.6%
New Religious Movement	0.4%	0.4%	0.2%
Jewish Extremist	0.0%	0.3%	0.3%
Christian Extremists (non-RW)	0.2%	0.3%	0.3%
Other Religious Extremist	0.3%	0.9%	0.3%
Other Single-Issue (e.g., nativist; anti-homosexual; anti-war; anti-prostitution)	0.6%	0.8%	0.8%
UFO and Related	0.0%	0.0%	0.0%
Criminal	1.2%	1.3%	1.2%
Personal Grudge/Idiosyncratic	0.0%	0.8%	2.7%

<b>Foreign-Based Total</b>	<b>16.1%</b>	<b>15.8%</b>	<b>12.0%</b>
<i>Domestic (U.S.-Based)</i>			
Sunni Jihadists	2.3%	2.0%	1.0%
Shi'i Jihadists	0.8%	0.6%	0.6%
Ethnonationalist/Separatist	0.6%	0.4%	0.4%
Secular Left-Wing	0.3%	0.9%	0.6%
Right-Wing (incl. Christian Identity; militia movement; tax protesters; supremacists)	1.4%	2.9%	3.3%
Environmental/Animal Rights	0.5%	1.3%	1.7%
Anti-abortion (single-issue)	0.8%	1.3%	1.1%
New Religious Movement	2.8%	2.2%	0.9%
Jewish Extremist	0.0%	0.0%	0.0%
Christian Extremist (non-RW)	0.5%	0.0%	0.1%
Other Religious Extremist	0.4%	0.8%	0.0%
Other Single-Issue (e.g., nativist; anti-homosexual; anti-war; anti-prostitution)	0.8%	1.1%	1.3%
UFO and Related	0.0%	0.0%	0.0%
Criminal	4.4%	3.2%	3.1%
Personal Grudge/Idiosyncratic	0.0%	2.2%	7.8%
<b>Domestic-Based Total</b>	<b>15.5%</b>	<b>18.8%</b>	<b>21.8%</b>
<b>GRAND TOTAL</b>	<b>31.6%</b>	<b>34.6%</b>	<b>33.8%</b>

Table 6.3 indicates the following with respect to chemical weapons:

1. Overall, the experts believe that the threat of chemical adversaries is split fairly evenly across all three types of organizational category. However, for foreign-based threats, developed organizations and unaffiliated cells are favored over lone actors, whereas for domestic-based threats, the converse is the case.
2. According to the experts, the overall threat is fairly equally divided between foreign- and domestic-based adversaries, with domestic-based adversaries slightly favored (56%).
3. Looking at developed organizations, the experts gave most weight to foreign-based Sunni and Shi'i jihadists. In the domestic sphere, somewhat surprisingly, criminal organizations were felt to constitute the highest threat (4.4% of the overall threat), followed by new religious movements (including apocalyptic millenarian cults), Sunni jihadist and right-wing groups.
4. When small cells that are not operationally linked to formal organizations are considered, the experts gave the greatest weight to foreign-based Sunni jihadist cells, followed by domestic criminal cells and domestic-based right-wing cells.
5. The lone actor category is interesting, in that experts selected a domestic-based lone actor with idiosyncratic motives as the highest threat category across the entire spectrum (7.8%) of adversaries. This was followed by a domestic right-wing lone actor and a domestic criminal lone-actor. Rather unsurprisingly, the bulk of the lone actor threat is believed to reside within the United States.

<b>Table 6.4: Percentage of Total Number of Chips Allocated by Actor Category (Biological)</b>			
<b>Ideological Motivation</b>	<b>Developed Organization</b>	<b>Unaffiliated Cell</b>	<b>Lone Actor</b>
<i>Foreign Based</i>			
Sunni Jihadists	7.4%	3.2%	1.4%
Shi'i Jihadists	5.7%	1.9%	1.3%
Ethnonationalists/Separatist	0.5%	0.3%	0.1%
Left Wing	0.3%	0.6%	0.5%
Right Wing	0.3%	0.6%	0.3%
Environmentalists/Animal Rights	2.2%	1.3%	0.8%
Anti-abortion (single-issue)	0.1%	0.1%	0.1%
New Religious Movement	0.3%	0.3%	0.3%
Jewish Extremist	0.3%	0.4%	0.3%
Christian Extremists (non-RW)	0.2%	0.3%	0.3%
Other Religious Extremist	0.1%	0.1%	0.1%
Other Single-Issue (e.g., nativist; anti-homosexual; anti-war; anti-prostitution)	0.8%	1.3%	0.4%
UFO and Related	0.1%	0.1%	0.1%
Criminal	3.3%	0.7%	0.7%
Personal Grudge/Idiosyncratic	0.1%	0.3%	1.3%
	7.4%	3.2%	1.4%
<b>Foreign-Based Total</b>	<b>21.7%</b>	<b>11.3%</b>	<b>7.8%</b>
<i>Domestic (U.S.-Based)</i>			
Sunni Jihadists	5.1%	3.4%	1.1%
Shi'i Jihadists	3.1%	1.6%	0.8%
Ethnonationalist/Separatist	0.1%	0.3%	0.3%
Secular Left-Wing	0.1%	0.6%	0.5%
Right-Wing (incl. Christian Identity; militia movement; tax protesters; supremacists)	0.3%	2.8%	2.0%
Environmentalist/Animal Rights	1.1%	1.7%	0.9%
Anti-abortion (single-issue)	0.9%	0.9%	1.2%
New Religious Movement	2.2%	0.8%	0.1%
Jewish Extremist	0.1%	0.1%	0.1%
Christian Extremist (non-RW)	0.8%	0.1%	0.1%
Other Religious Extremist	0.3%	0.4%	0.1%
Other Single-Issue (e.g. nativist; anti-homosexual; anti-war; anti-prostitution)	1.8%	1.0%	2.5%
UFO and Related	0.1%	1.8%	0.1%
Criminal	5.5%	1.8%	2.1%
Personal Grudge/Idiosyncratic	0.1%	1.1%	7.7%
<b>Domestic (U.S.-based) Total</b>	<b>21.4%</b>	<b>18.3%</b>	<b>19.4%</b>
<b>GRAND TOTAL</b>	<b>43.1%</b>	<b>29.7%</b>	<b>27.3%</b>

Table 6.4 indicates the following with respect to biological weapons:

1. Experts believe that more of the threat lies with developed organizations (43.1%) than with either autonomous cells (29.7%) or lone actors (27.3%). While true for both domestic-based and

foreign-based adversaries, the difference is far more pronounced in the case of foreign-based adversaries.

2. According to the experts, the biological weapons threat arises more from domestic-based than foreign-based actors, although the difference is not extremely large (59% to 41%).
3. When focusing on developed organizations only, the experts selected foreign-based Sunni and Shi'i jihadists as the most likely adversaries, while U.S.-based criminal organizations and U.S.-based Sunni jihadists are the next most heavily weighted.
4. With respect to small unaffiliated cells, the experts again favored Sunni jihadists (foreign and domestic-based), with right-wing domestic cells as the next highest weighted category.
5. The lone actor threat was regarded as being predominantly domestic-based, with the threat of a lone actor driven by a personal grudge or other idiosyncratic motive receiving the greatest weight across the entire table, followed by single-issue and criminal lone actors.

Overall, the category weighting exercise concurs with much conventional wisdom – Sunni jihadists (both foreign and domestic) are viewed as major threats for both chemical and biological weapons, whether these are in the form of developed organizations like al-Qaeda or autonomous cells. Domestic right-wing unaffiliated cells also feature prominently under both weapons types. Neither is the identification of idiosyncratically motivated lone actors as a major threat that surprising, given the long history of involvement from this quarter in CB activity (despite often not receiving sufficient attention in the literature). Somewhat more surprising, however, is the prominence of domestic criminal actors (of all organizational types) in the experts' threat assessment. Traditionally, these actors (with the exception of lone actor extortion plots) have not been seen as major CB threats, at least not at the level of developed criminal organizations.

## Ranking

The next stage in the filtering process involved moving from generic categories to including specific entities (while still allowing for generic entities where needed). The experts were asked to perform two ranking tasks on two separate lists of potential perpetrators – one for chemical attacks, consisting of 64 separate actors and one for biological weapons, consisting of 63 separate actors. The lists of potential groups were compiled from named organizations derived from prior qualitative and quantitative empirical research and literature reviews, as well as a broad number of “generic” groups based on a typology of ideologies created by START and used extensively in terrorism databases, including the Global Terrorism Database. It was also supplemented when necessary by actors that emerged from the brainstorming exercises. To complete the rankings, the participants were requested to rank, from most to least likely, the top 20 perpetrators in terms of chemical or biological threats, respectively. Participants were also permitted to write in additional adversaries not on the list and rank them accordingly.<sup>378</sup> The

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<sup>378</sup> Owing to one of the participants, a chemical weapons policy expert, not being able to attend the second day of the elicitation, the chemical weapons ranking was completed by 11 experts and the biological weapons ranking by 10 (in addition to the naïve participants).



results of the individual raw rankings were compiled, converted to a calculated score, and combined to allow for an aggregate ranking. The aggregated rankings across all participants (excluding naïve participants) are shown below in Tables 6.5 and 6.6.

Rank	Perpetrator Group	Aggregate Score
1	Al-Qa'ida central	141
2	Al-Qa'ida in the Arabian Peninsula (AQAP)	102
3	Unspecified Sunni jihadist group (foreign-based)	98
4	Militia / Survivalist group (U.S.-based)	97
5	Al-Qa'ida in the Islamic Maghreb (AQIM)	96
6	Unspecified disgruntled group of scientists technicians w/access (U.S.-based)	92
7	Unspecified apocalyptic millenarian cult (U.S.-based)	88
8	Chemical industry personnel	82
9	Unspecified Right-Wing group (incl. Christian identity; militia movement; tax protesters; supremacists) (U.S.-based)	78
10	Unspecified Shi'i jihadist group (foreign-based)	75
11	Hizb'allah	73
12	Unspecified disgruntled group of scientists w/access (foreign-based)	73
13	Unspecified apocalyptic millenarian cult (foreign-based)	69
14	Army of God-type anti-abortion group (U.S.-based)	59
15	Pakistani neo-Taliban elements (incl. TTP, Haqqani network)	57
16	Unspecified domestic criminal organization	56
17	Unspecified other single-issue (e.g. nativist; anti-homosexual; anti-war; anti-prostitution) group (U.S.-based)	54
18	Unspecified Sunni jihadist group (U.S.-based)	50
19	Unspecified environmentalist / animal rights group (U.S.-based)	48
20	Unspecified foreign-based transnational criminal organization (e.g., Ndrangheta, Sinaloa Cartel)	44
21	Afghan Taliban	39
22	Neo-Luddites	39
23	Unspecified Shi'i jihadist group (U.S.-based)	36
24	Newly-emerging Iraq-forged mujahidin networks (successors of AQI/ISI)	35
25	Hamas	34
26	Unspecified environmentalist / animal rights group (foreign-based)	33
27	Unspecified other single-issue (e.g. nativist; anti-homosexual; anti-war; anti-prostitution) group (foreign-based)	28
28	Sovereign citizens group (U.S.-based)	27
29	Unspecified other type of religious extremist (U.S.-based)	26
30	Palestinian Islamic Jihad	25
31	Lord's Resistance Army	23
32	Unspecified other type of religious extremist (foreign-based)	22
33	Unspecified New Religious Movement not including apocalyptic / millenarian cults (U.S.-based)	18
34	Chechen (or other North Caucasus) jihadists	16
35	Unspecified Left-Wing group (foreign-based)	16
36	Unspecified Left-Wing group (U.S.-based)	15

37	Unspecified New Religious Movement, not including apocalyptic / millenarian cults (foreign-based)	15
38	Unspecified Right-Wing group (incl. Christian Identity; militia movement; tax protesters; supremacists) (foreign-based)	14
39	Unspecified ethnonationalist / separatist group (U.S.-based)	13
40	Maras Salvatruchas (MS-13)	12
41	Motorcycle gang	12
42	Unspecified ethnonationalist / separatist group (foreign-based)	11
43	Jemaah Islamiyah	10
44	Revolutionary Armed Forces of Colombia (FARC)	9
45	Sipah-e-Sahaba (Pakistan)	6
46	Ultrationalists (foreign-based)	6
47	Al-Fatah / Al-Aqsa	3
48	Lashkar-e-Tayyiba	2
49	Unspecified non-Right Wing Christian extremist (U.S.-based)	2
50	al-Shabaab	1
51	Al-Takfir wa al-Hijra	0
52	Boko Haram	0
53	Continuity / Real Irish Republican Army	0
54	La Familia Michoacana / Knights Templar	0
55	Movement for the Emancipation of the Niger Delta (MEND)	0
56	New People's Army (Philippines)	0
57	Popular Front for the Liberation of Palestine (PFLP)	0
58	Unspecified Jewish extremist organization	0
59	Unspecified non-Right Wing Christian extremist (foreign-based)	0
60	Unspecified UFO or related group (foreign-based)	0
61	Unspecified UFO or related group (U.S.-based)	0
62	Volksfront / National Alliance hybrid (U.S.-based)	0
63	Alienated Student/Teenager	0
64	Somali Pirates	0

**Table 6.6: Aggregate Ranking of Perpetrator Groups (Biological Weapons)**

Rank	Perpetrator Group	Aggregate Score
1	Al-Qa'ida central	134
2	Al-Qa'ida in the Arabian Peninsula (AQAP)	113
3	Unspecified disgruntled group of scientiststechnicians w/access (U.S.-based)	105
4	Al-Qa'ida in the Islamic Maghreb (AQIM)	102
5	Unspecified disgruntled group of scientists w/access (foreign-based)	99
6	Unspecified apocalyptic millenarian cult (U.S.-based)	81
7	Militia / Survivalist group (U.S.-based)	79
8	Unspecified Right-Wing group (incl. Christian Identity; militia movement; tax protesters; supremacists) (U.S.-based)	76
9	Unspecified other single-issue (e.g. nativist; anti-homosexual; anti-war; anti-prostitution) group (U.S.-based)	68
10	Hizb'allah	65
11	Unspecified environmentalist / animal rights group (U.S.-based)	65
12	Unspecified Sunni jihadist group (foreign-based)	63
13	Army of God-type anti-abortion group (U.S.-based)	53

14	Unspecified other type of religious extremist (foreign-based)	52
15	Unspecified other type of religious extremist (U.S.-based)	52
16	Unspecified New Religious Movement not including apocalyptic / millenarian cults (U.S.-based)	49
17	Sovereign Citizens group (U.S.-based)	46
18	Unspecified other single-issue (e.g. nativist; anti-homosexual; anti-war; anti-prostitution) group (foreign-based)	44
19	Unspecified environmentalist / animal rights group (foreign-based)	43
20	Hamas	42
21	Unspecified apocalyptic millenarian cult (foreign-based)	38
22	Unspecified Sunni jihadist group (U.S.-based)	35
23	Unspecified New Religious Movement, not including apocalyptic / millenarian cults (foreign-based)	30
24	Palestinian Islamic Jihad	29
25	Unspecified ethnonationalist / separatist group (U.S.-based)	27
26	Unspecified Shi'i jihadist group (foreign-based)	27
27	Pakistani neo-Taliban elements (incl. TTP, Haqqani network)	25
28	Unspecified domestic criminal organization	25
29	Afghan Taliban	22
30	Unspecified Shi'i jihadist group (U.S.-based)	22
31	Chechen (or other North Caucasus) jihadists	21
32	Neo-Luddites	21
33	Unspecified Left-Wing group (foreign-based)	19
34	Unspecified non-Right Wing Christian extremist (U.S.-based)	19
35	Lashkar-e-Tayyiba	17
36	Motorcycle Gang	17
37	Unspecified Left-Wing group (U.S.-based)	16
38	Revolutionary Armed Forces of Colombia (FARC)	15
39	al-Shabaab	14
40	Jemaah Islamiyah	14
41	Unspecified non-Right Wing Christian extremist (foreign-based)	12
42	Unspecified Right-Wing group (incl. Christian Identity; militia movement; tax protesters; supremacists) (foreign-based)	11
43	Unspecified UFO or related group (U.S.-based)	11
44	Unspecified ethnonationalist / separatist group (foreign-based)	10
45	Al-Takfir wa al-Hijra	8
46	Unspecified foreign-based transnational criminal organization (e.g., Ndrangheta, Sinaloa Cartel)	5
47	Newly-emerging Iraq-forged mujahidin networks (successors of AQI/ISI)	4
48	Sipah-e-Sahaba (Pakistan)	4
49	Lord's Resistance Army	3
50	Popular Front for the Liberation of Palestine (PFLP)	3
51	Al-Fatah / Al-Aqsa	1
52	Boko Haram	0
53	Continuity / Real Irish Republican Army	0
54	La Familia Michoacana / Knights Templar	0
55	Maras Salvatruchas (MS-13)	0
56	Movement for the Emancipation of the Niger Delta (MEND)	0

57	New People's Army (Philippines)	0
58	Somali Pirates	0
59	Ultranationalists (foreign-based)	0
60	Unspecified Jewish extremist organization	0
61	Unspecified UFO or related group (foreign-based)	0
62	Volksfront / National Alliance hybrid (U.S.-based)	0

After the completion of the two filtering exercises, during subsequent discussion and the lunch break, Workshop organizers performed a preliminary analysis of the results in order to determine the list of actors that would be subject to in-depth elicitation. This was then provided to the group, who considered the most highly-ranked unaffiliated cells and lone actors from the first filtering exercise, as well as the most highly-ranked specific organizations from the second exercise for the purpose of determining a list of actors for more detailed analysis. After extensive discussion and debate amongst the group, a consensus list of the experts' most likely potential perpetrators was generated. The following are the resultant lists (in alphabetical order) of actors selected by the group for probabilistic assessment. The actors represent a variety of specifications, from generic groups and lone actors, to specific known terrorist organizations.<sup>379</sup>

### List 1: Chemical Actors of Concern

- Al-Qa'ida Central
- Al-Qa'ida in the Arabian Peninsula (AQAP)
- Al-Qa'ida in the Islamic Maghreb (AQIM)
- Domestic-based criminal organization
- Domestic-based Sunni jihadist lone actor
- Domestic-based lone actor with an idiosyncratic motive
- Domestic-based lone actor with a right-wing motive
- Domestic-based organization of militia-survivalists
- Domestic-based unaffiliated cell of Sunni jihadists
- Domestic-based unaffiliated cell with a right-wing motive
- Domestic-based unaffiliated cell with a new religious movement motive
- Foreign-based lone actor with an idiosyncratic motive
- Foreign-based Sunni jihadist lone actor
- Foreign-based unaffiliated cell of Shi'i jihadists
- Foreign-based unaffiliated cell of Sunni jihadists
- Hizballah
- Unspecified domestic-based apocalyptic millenarian cult
- Unspecified domestic-based organization with a left-wing motive

<sup>379</sup> The experts decided to subsume "disgruntled scientists with access" within the "lone actor with a grudge" category for chemical weapons, whereas for biological weapons, since access and technical knowledge were considered so crucial, the categories were kept separate.

- Unspecified domestic-based organization with a right-wing motive (e.g., Christian identity, tax protestors, supremacists)
- Unspecified foreign-based organization of Shi'i jihadists
- Unspecified foreign-based organization of Sunni jihadists

## List 2: Biological Actors of Concern

- Al-Qa'ida Central
- Al-Qa'ida in the Arabian Peninsula (AQAP)
- Al-Qa'ida in the Islamic Maghreb (AQIM)
- Domestic-based unaffiliated criminal cell
- Domestic-based lone actor with an idiosyncratic motive
- Domestic-based organization of militia-survivalists
- Domestic-based lone actor with a right-wing motive
- Domestic-based Sunni jihadist lone actor
- Domestic-based unaffiliated cell with a right-wing motive
- Domestic-based unaffiliated cell of Sunni jihadists
- Domestic-based unaffiliated cell with UFO and related motives
- Foreign-based Sunni jihadist lone actor
- Foreign-based unaffiliated cell of Shi'i jihadists
- Foreign-based unaffiliated cell of Sunni jihadists
- Hizballah
- Unspecified domestic-based apocalyptic millenarian cult
- Unspecified domestic-based disgruntled scientist/technician with access
- Unspecified foreign-based disgruntled scientist/technical with access
- Unspecified domestic-based environmentalist/animal rights organization
- Unspecified domestic-based right-wing organization (e.g., Christian identity, tax protestors, supremacists)
- Unspecified domestic-based unaffiliated cell with other single-issue motive (e.g., nativist, anti-homosexual, anti-prostitution)

## IN-DEPTH PROBABILISTIC ELICITATION

The lists of likely perpetrators that emerged from the filtering exercises provide a good starting point for further analysis, especially in terms of paring down the large number of possible threats to a more manageable set of threats of non-negligible magnitude. Yet, eliciting bare rankings (whether of specific actors or categories of actors) is rarely sufficient when considering such multi-faceted phenomena as chemical and biological terrorism. Such rankings can lead experts to gloss over the complexities inherent

in various components of the threat and are thus especially susceptible to the availability heuristic. Several sessions of the elicitation were therefore devoted to a more in-depth threat analysis employing conditional probabilities in order to help the experts to provide opinions for specific scenarios defined by the events in the conditional probability statement. Such an approach ensures consistency across experts, and enhances reliability of the study outcomes.

The mechanics of the elicitation involved the use of the Google Forms. During an interval, workshop organizers customized a set of previously prepared templates to produce an elicitation worksheet for each actor in the above list.

### **Ideological Modifier**

The first step in this process involved eliciting subjective beliefs regarding the ideological proclivities of the actors under investigation. This was done at the start because the ideology variable would be used as a modifier in the subsequent analysis and it would be necessary to aggregate the results across the experts in order to ensure consistency in the probabilistic elicitation.

For each separate actor in List 1 and List 2, participants were asked to select a number corresponding to their beliefs about the actor's ideological proclivity towards CB weapons, according to a predetermined schema, which represented an ordinal categorization of ideological stances with respect to CB weapons and their effects, ranging from outright proscription to explicit endorsement. The schema (shown below) distinguishes between explicit references to CB weapons and to the more general effects these weapons might have, as well as between dogmatic strictures and less forceful ideological guidelines.

#### *Chemical Weapons:*

1. Ideology specifically outlaws the use of chemical weapons.
2. Ideology explicitly outlaws attacks with effects that are similar to those caused by chemical weapons.
3. Ideology cautions against causing effects associated with chemical weapons, including massive casualties, contamination, etc.
4. Ideology gives no indication regarding chemical weapons or their effects.
5. Ideology allows for causing effects associated with chemical weapons, including massive casualties, contamination, etc.
6. Ideology alludes to attacks with effects that are similar to those caused by chemical weapons. This could be based on historical or sacred textual references.
7. Ideology of the actor specifically prescribes the use of chemical weapons.

#### *Biological Weapons:*

1. Ideology specifically outlaws the use of harmful biological agents in attacks.

2. Ideology explicitly outlaws attacks with effects that are similar to those caused by harmful biological agents in attacks.
3. Ideology cautions against causing effects associated with harmful biological agents in attacks, including massive casualties, lingering death or illness, contamination, etc.
4. Ideology gives no indication regarding harmful biological agents in attacks or their effects.
5. Ideology allows for causing effects associated with harmful biological agents in attacks, including massive casualties, lingering death or illness, contamination, etc.
6. Ideology alludes to attacks with effects that are similar to those caused by harmful biological agents in attacks. This could be based on historical or sacred textual references.
7. Ideology of the actor specifically prescribes the use of harmful biological agents in attacks.

The results did not reflect large variation across experts, with standard deviations across experts ranging from 0.29 to 1.5, the latter for the rather nebulous category of a “Foreign-based lone actor with an idiosyncratic motive”. Using an aggregate measure was thus unlikely to introduce large distortions into subsequent analysis. When this is coupled with the analytical benefits of using a standardized ideological score, researchers found it reasonable to select the median value across experts as the “ideological score” for each actor in List 1 and List 2. Moreover, none of the experts present expressed strong opposition when presented with these aggregate scores. The median score for each actor is given below in Table 6.7.

**Table 6.7: Aggregate Ideological Scores (based on the above schema in List 1 and List 2)**

Chemical		Biological	
Actor	Median Score	Actor	Median Score
Al-Qa’ida in the Arabian Peninsula (AQAP)	5	Al-Qa’ida in the Islamic Maghreb (AQIM)	5
Al-Qa’ida in the Islamic Maghreb (AQIM)	5	Al-Qa’ida Central	5
Al-Qa’ida Central	6	Al-Qa’ida in the Arabian Peninsula	5
Domestic-based unaffiliated cell with a new religious movement motive	4.5	Domestic-based unaffiliated criminal cell	4
Domestic-based lone actor with an idiosyncratic motive		Domestic-based lone actor with an idiosyncratic motive	5
Domestic-based unaffiliated cell with a right-wing motive	5	Domestic-based lone actor with a right-wing motive	5
Domestic-based lone actor with a right-wing motive	4	Domestic-based unaffiliated cell with a right-wing motive	5
Domestic-based Sunni jihadists lone actor	5	Domestic-based Sunni jihadist lone actor	5
Domestic-based unaffiliated cell of Sunni jihadists	5	Domestic-based unaffiliated cell of Sunni jihadists	5
Domestic-based criminal organization	4	Domestic-based unaffiliated cell with UFO and related motives	5
Foreign-based lone actor with an idiosyncratic motive	4	Foreign-based unaffiliated cell of Shi’i jihadists	5
Foreign-based unaffiliated cell of Shi’i jihadists	5	Foreign-based Sunni jihadist lone actor	5
Foreign-based Sunni jihadist lone actor	5	Foreign-based unaffiliated cell of Sunni jihadists	5
Foreign-based unaffiliated cell of Sunni jihadists	5	Hizballah	5
Hizballah	5	Domestic-based organization of militia-	5

		survivalists	
Domestic-based organization of militia-survivalists	5	Unspecified domestic-based apocalyptic millenarian cult	5
Unspecified domestic-based apocalyptic millenarian cult	5	Unspecified domestic-based disgruntled scientist(s)/technician(s) with access	4
Unspecified domestic-based organization with left-wing motive	4	Unspecified foreign-based disgruntled scientist(s)/technician(s) with access	4
Unspecified domestic-based organization with right-wing motive (e.g., Christian identity, militia movement, tax protesters, supremacists)	4	Unspecified domestic-based environmentalist/animal rights organization	5
Unspecified foreign-based organization of Shi'i jihadists	5	Unspecified domestic-based unaffiliated cell with other single-issue motive (e.g., nativist, anti-homosexual, anti-war, anti-prostitution)	4
Unspecified foreign-based organization of Sunni jihadists	5	Unspecified domestic-based right-wing organization (e.g., Christian identity, tax protesters, supremacists)	5

The table is consistent with the filtering process, since none of the actors received a score that indicated any ideological impediments to using these weapons. While al-Qa'ida central received a median score of 6, almost all other entities for both chemical and biological weapons received a 4 or a 5, which accords with much of the literature – while there are no specific ideological prescriptions for most actors to use CB weapons, many actors believe it is permissible to do so, or at least that it is not forbidden by their belief systems.

**Elicitation of Conditional Probabilities**

After assigning their ideology rankings, the actual elicitation portion of the exercise began. The facilitator gave a basic introduction to probabilistic elicitation and described the parameters of the exercise to the participants. The exercise itself consisted of each participant completing an elicitation worksheet for each of the 21 potential chemical perpetrators and 21 potential biological perpetrators in Lists 1 and 2. Each elicitation template was identical, a sample of which is provided in Appendix IV-D.

The elicitation was anchored on the basic threat equation described earlier in this report (**Potential CB THREAT = MOTIVATION ✶ CAPABILITY**) and represented this in terms of conditional probabilities as follows:

$$P(\text{Attack})=P(\text{Motivated}|\text{Ideology, Capability}\{\text{Having Personnel, Having Raw Materials, Having Logistical Backbone}\})$$

This can be broken down into five variables, which were reflected on the elicitation worksheet. These variables are:



- a. **Basic Motivation (M)**: considers the relative strategic, tactical, intragroup, and emotional benefit of using a CB weapon, i.e. whether, from the perspective of the potential perpetrator, the expected benefits of use exceed the expected costs. This variable excludes ideological considerations and was often referred to in the elicitation as “bare” motivation.
- b. **Modified Motivation (M|I)**: considers all the elements of Basic Motivation PLUS the actor’s aggregate ideological score (obtained previously). The use of the ideological modifier allowed researchers to some degree to isolate the effects of ideology on motivation.<sup>380</sup>
- c. **Capability – Personnel (P)**: considers whether the actor possesses the requisite human resources and skill levels to produce and/or deploy a CB weapon.
- d. **Capability – Raw Materials (R)**: considers whether the actor will obtain access to either chemical or biological materials for use in a CB weapon.
- e. **Capability – Logistical Backbone (L)**: considers whether the actor will have access to the necessary laboratories, testing areas or equipment to successfully acquire and deploy a CB weapon.

**Probability Specification:** Participants were asked to supply a range of probabilities (a “probability band”) between 0 and 100 in which they were 90% confident that each variable would be satisfied within the designated time period for the particular actor under consideration. So, for example, if an expert was assessing the Personnel variable for al-Qa’ida Central and chemical weapons, he would ask himself the question “How likely is al-Qa’ida Central to succeed in acquiring the requisite personnel needed to produce and/or deploy a nuclear weapon between now and 2022?” If he believed that, for instance, he was 90% sure that the true likelihood would be somewhere between 50 and 70 on the 100-point scale, then the resulting probability band would be [50-70].

It is well-known that many subject matter experts, particularly those without a quantitative background, often find it difficult to provide 90% confidence intervals of this nature, which are necessary for a conditional probability elicitation. Therefore, in order to guide the participants in determining a band, the experts were provided with a set of five categories (Very Low, Low, Moderate, High, and Very High) for each variable, together with textual descriptions of each category in the context of the variable. Participants could thus consult these descriptive categories to help orient their thinking, although they were not required to select a particular category or follow a defined a mapping between a particular category, such as “Low” and a corresponding probability band. The experts completed the same template for each potential adversary using a Google Forms interface, with the resulting data being analyzed subsequent to the elicitation.

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<sup>380</sup> An additional motivation variable was collected to capture the (unlikely but plausible) scenario that an actor which lacked the motivation to engage in a C or B attack, could be prompted or tempted towards doing so by high capabilities. The experts were asked to consider this alternative motivation variable – denoted  $M|(I,C\{P,R,L\})$  – if their initial estimate of the modified motivation variable was low or moderate, i.e., to reassess motivation in light of their estimates of capability in order to see whether high capability values might have an impact on motivation scores. However, during post-elicitation analysis it appeared as if many participants may have used this variable inconsistently (so that, for example, some participants revised M|I even when the original value was high, while others did not revise the motivation value even when it was clearly very low). Therefore, this alternative motivation could not be utilized in analysis, although previous elicitation experience has indicated that the variable does not usually result in many substantive changes to overall outcomes.

The basic procedure for calculating the threat level for each actor was the following:

1. For each variable, calculate the range (upper minus lower bounds) and compute the mid-point of the probability band for each participant.
2. For each variable, calculate the median across participants for the lower bound, the mid-point and the upper bound. The median is used as it is not sensitive to the presence of extreme values or opinions.<sup>381</sup>
3. Calculate the actor's probability score of  $M|I * P * R * L / 100^4$  for both the estimated mid-point and upper and lower bound medians,<sup>382</sup> which corresponds to multiplying  $P(\text{Have Motivation given Ideology})$ ,  $P(\text{Have Personnel})$ ,  $P(\text{Have Resources})$  and  $P(\text{Have Logistics})$  and normalizing.

This yields a probability of attack for each actor, which can be compared across the different threat actors.

Two variations of the above calculations were conducted on the elicited data, as follows:

- a. **Variation 1: Basic Probability of Attack Calculation:** This is the basic variation described in the above procedure.
- b. **Variation 2: Weighting by Participant Expertise:** This variation explicitly considered the heterogeneity of the participants. Since participants were intentionally selected to provide a wide range of substantive expertise, certain participants were more familiar with some portions of the subject domain than others. For example, some of the participants were experts in terrorist decision-making and strategic thinking, but had less expertise in the technical aspects of RN weapons, whereas others possessed deep knowledge of proliferation pathways but little familiarity with the ideological aspects of VNSAs.<sup>383</sup> To control for this variation beyond merely averaging their inputs, participants were asked to complete a brief questionnaire regarding their expertise along seven dimensions on a ten-point scale:
  - Describing terrorist behavior and decision-making =  $\alpha$
  - Breadth of knowledge of current terrorist groups =  $\beta$
  - Technical understanding of chemical weapons production / use =  $\gamma$
  - Technical Understanding of biological weapons production/use =  $\delta$
  - Understanding of proliferation pathways of CB materials =  $\epsilon$
  - Understanding of security of CB materials =  $\zeta$
  - Knowledge of defensive measures against CB use, incl. nonproliferation, detection, target hardening, prophylaxis, emergency and medical response to an event, etc. =  $\eta$

<sup>381</sup> See Ayyub, B.M., and McCuen, R., *Probability, Statistics and Reliability for Engineers and Scientists*, Chapman & Hall/CRC Press, 2003 for details on the median, computations and applications.

<sup>382</sup> It must be noted that calculating the upper and lower bounds in this way does not make any assumptions about interdependencies.

<sup>383</sup> It is also through this procedure that the inputs of the naïve participants would be underweighted, since their expertise was likely to be low in almost all areas.

Each participant’s answers (1-10) were then converted to a “weighting score” for each variable, as follows:

Weight for M, M I and M (I,C{P,R,L}) = $1+((\alpha+\beta)/2-5)/10$
Weight for P = $1+((\beta+\gamma)/2-5)/10$ (for chemical weapons) and $1+((\beta+\delta)/2-5)/10$ (for biological weapons)
Weight for R = $1+((\beta+\varepsilon+\zeta+\eta)/4-5)/10$
Weight for L = $1+((\beta+\gamma+\eta)/3-5)/10$ (for chemical weapons) and $1+((\beta+\delta+\eta)/3-5)/10$ (for biological weapons)

The elicitation scores for each variable were then multiplied by the corresponding expert’s weighting score for that variable. The basic probability calculation was performed on this weighted data.

Tables 6.8a and b and 6.9a and b below depict the summary attack probabilities, with estimated mid-point, upper and lower bounds, for chemical and biological weapons threats respectively. The *a* and *b* designation corresponds to both of the two variations described above. Actors have been sorted from highest to lowest threat values.

Table 6.8a: Summary Attack Probabilities (Chemical Weapons) – Variation a					
Group Description			Percentage Probabilities		
Foreign/ Domestic	Perpetrator Type	Group Name/Ideology	Estimated Mid-Point	Lower	Upper
	Organization	Al-Qa'ida Central	22.05%	11.07%	39.63%
	Organization	Hizballah	17.64%	8.10%	33.60%
Domestic	Organization	Criminal Organization	15.93%	5.53%	36.47%
Domestic	Organization	Unspecified Apocalyptic Millenarian Cult	14.46%	5.74%	30.45%
	Organization	Al-Qa'ida in the Arabian Peninsula (AQAP)	14.06%	6.49%	26.85%
Domestic	Organization	Unspecified Right-Wing Group (incl. Christian Identity; tax protesters; supremacists)	13.96%	6.45%	26.68%
Domestic	Unaffiliated Cell	Sunni Jihadists	11.82%	4.62%	25.25%
Domestic	Unaffiliated Cell	Right-Wing	11.15%	3.35%	28.07%
Foreign	Organization	Unspecified Sunni Jihadist Group	10.44%	3.96%	22.69%
Domestic	Lone Actor	Personal/Grudge (Idiosyncratic)	10.40%	3.79%	23.12%
Domestic	Organization	Unspecified Left-Wing Group	10.40%	4.24%	21.53%
Domestic	Unaffiliated Cell	New Religious Movement	10.25%	3.12%	25.50%
Foreign	Unaffiliated Cell	Sunni Jihadists	9.83%	3.81%	21.12%
Domestic	Lone Actor	Right-Wing	8.63%	2.76%	20.70%
Foreign	Lone Actor	Sunni Jihadists	8.59%	2.83%	20.29%
Domestic	Organization	Militia-Suivalist Group	8.27%	3.61%	16.40%
Domestic	Lone Actor	Sunni Jihadists	8.13%	2.98%	18.02%
	Organization	Al-Qa'ida in the Islamic Maghreb (AQIM)	7.81%	3.03%	16.72%
Foreign	Lone Actor	Personal/Grudge (Idiosyncratic)	7.56%	2.08%	19.96%
Foreign	Unaffiliated Cell	Shi'I Jihadists	7.56%	2.36%	18.48%

Foreign	Organization	Unspecified Shi'I Jihadist Group	6.88%	1.97%	17.77%
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**Table 6.8b: Summary Attack Probabilities (Chemical Weapons) Variation b**

Group Description			Percentage Probabilities		
Foreign/ Domestic	Perpetrator Type	Group Name/Ideology	Estimated Mid-Point	Lower	Upper
	Organization	Al-Qa'ida Central	24.08%	12.56%	42.05%
	Organization	Hizballah	19.22%	8.53%	37.67%
	Organization	Al-Qa'ida in the Arabian Peninsula (AQAP)	17.39%	7.86%	33.72%
Domestic	Organization	Unspecified Apocalyptic Millenarian Cult	16.49%	6.80%	33.92%
Domestic	Organization	Unspecified Right-Wing Group (incl. Christian Identity; tax protesters; supremacists)	14.67%	6.96%	27.50%
Domestic	Organization	Criminal Organization	13.91%	5.99%	27.69%
Domestic	Lone Actor	Personal/Grudge (Idiosyncratic)	13.00%	4.84%	28.64%
Domestic	Unaffiliated Cell	Sunni Jihadists	12.82%	5.31%	26.39%
Foreign	Organization	Unspecified Sunni Jihadist Group	11.78%	4.44%	25.77%
Domestic	Organization	Unspecified Left-Wing Group	11.25%	4.15%	24.73%
	Organization	Al-Qa'ida in the Islamic Maghreb (AQIM)	10.71%	4.29%	22.52%
Foreign	Lone Actor	Personal/Grudge (Idiosyncratic)	10.55%	3.52%	24.86%
Foreign	Organization	Unspecified Shi'I Jihadist Group	10.43%	3.37%	25.16%
Foreign	Unaffiliated Cell	Sunni Jihadists	10.23%	3.89%	22.23%
Domestic	Unaffiliated Cell	Right-Wing	10.23%	3.74%	22.79%
Foreign	Lone Actor	Sunni Jihadists	10.04%	3.53%	22.94%
Domestic	Unaffiliated Cell	New Religious Movement	9.60%	3.43%	21.64%
Domestic	Lone Actor	Right-Wing	9.43%	3.09%	22.45%
Domestic	Lone Actor	Sunni Jihadists	9.23%	3.12%	21.62%
Domestic	Organization	Militia-Suivalist Group	8.74%	3.18%	19.51%
Foreign	Unaffiliated Cell	Shi'I Jihadists	6.81%	2.01%	17.18%

**Table 6.9a: Summary Attack Probabilities (Biological Weapons) Variation a**

Group Description			Percentage Probabilities		
Foreign/ Domestic	Perpetrator Type	Group Name/Ideology	Estimated Mid-Point	Lower	Upper
Domestic	Unaffiliated Cell/Lone Actor	Unspecified disgruntled scientist(s)/technician(s) w/access	30.69%	16.51%	52.13%
Foreign	Unaffiliated Cell/Lone Actor	Unspecified disgruntled scientist(s)/technician(s) w/access	25.57%	13.12%	45.17%
	Organization	Al-Qa'ida Central	23.98%	12.94%	40.92%
	Organization	Al-Qa'ida in the Arabian Peninsula (AQAP)	19.82%	10.08%	35.29%
	Organization	Hizballah	16.08%	6.96%	32.03%
Domestic	Organization	Unspecified Environmentalist/Animal Rights Group	15.98%	6.79%	32.27%
	Organization	Al-Qa'ida in the Islamic Maghreb (AQIM)	15.33%	7.09%	29.22%
Domestic	Organization	Unspecified Apocalyptic Millenarian Cult	13.49%	5.52%	27.90%
Domestic	Unaffiliated Cell	UFO and Related	12.43%	4.55%	27.72%
Domestic	Unaffiliated Cell	Sunni Jihadists	11.36%	4.59%	23.66%
Foreign	Unaffiliated Cell	Sunni Jihadists	9.65%	3.98%	19.83%
Domestic	Organization	Unspecified Right-Wing Group (incl. Christian	9.34%	3.84%	19.29%

		Identity; tax protesters; supremacists)			
Domestic	Lone Actor	Sunni Jihadists	8.75%	3.53%	18.22%
Foreign	Lone Actor	Sunni Jihadists	8.31%	3.53%	16.77%
Domestic	Unaffiliated Cell	Right-Wing	8.28%	2.65%	20.06%
Domestic	Organization	Militia-Survivalist Group	8.15%	3.04%	17.91%
Domestic	Unaffiliated Cells	Unspecified Other Single-Issue (e.g. nativist; anti-homosexual; anti-prostitution)	8.14%	3.12%	17.62%
Domestic	Lone Actor	Personal-Grudge (Idiosyncratic)	8.13%	3.15%	17.49%
Foreign	Unaffiliated Cell	Shi'I Jihadists	7.88%	2.59%	18.77%
Domestic	Lone Actor	Right-Wing	7.76%	3.28%	15.72%
Domestic	Unaffiliated Cell	Criminal	6.23%	2.14%	14.46%

**Table 6.9b: Summary Attack Probabilities (Biological Weapons) Variation b**

Group Description			Percentage Probabilities		
Foreign/ Domestic	Perpetrator Type	Group Name/Ideology	Estimated Mid-Point	Lower	Upper
Foreign	Unaffiliated Cell/Lone Actor	Unspecified disgruntled scientist(s)/technician(s) w/access	29.29%	15.91%	49.49%
Domestic	Unaffiliated Cell/Lone Actor	Unspecified disgruntled scientist(s)/technician(s) w/access	27.63%	14.85%	46.94%
	Organization	Al-Qa'ida Central	22.39%	10.93%	41.09%
	Organization	Al-Qa'ida in the Arabian Peninsula (AQAP)	21.90%	10.59%	40.41%
	Organization	Al-Qa'ida in the Islamic Maghreb (AQIM)	20.35%	9.03%	39.93%
Domestic	Unaffiliated Cell	Sunni Jihadists	16.09%	6.35%	34.16%
Domestic	Organization	Unspecified Apocalyptic Millenarian Cult	15.75%	6.77%	31.51%
Domestic	Organization	Unspecified Environmentalist/Animal Rights Group	15.07%	6.15%	31.28%
Foreign	Unaffiliated Cell	Sunni Jihadists	13.92%	5.75%	28.67%
Domestic	Unaffiliated Cell	UFO and Related	12.80%	5.05%	27.18%
Domestic	Lone Actor	Right-Wing	11.85%	5.51%	22.53%
	Organization	Hizballah	11.26%	4.31%	24.38%
Domestic	Organization	Unspecified Right-Wing Group (incl. Christian Identity; tax protesters; supremacists)	11.20%	4.84%	22.26%
Domestic	Lone Actor	Sunni Jihadists	11.04%	4.41%	23.20%
Foreign	Lone Actor	Sunni Jihadists	10.54%	4.69%	20.62%
Domestic	Organization	Militia-Survivalist Group	10.19%	3.96%	21.81%
Domestic	Lone Actor	Personal-Grudge (Idiosyncratic)	10.13%	3.47%	23.50%
Domestic	Unaffiliated Cells	Unspecified Other Single-Issue (e.g. nativist; anti-homosexual; anti-prostitution)	9.83%	3.10%	24.06%
Foreign	Unaffiliated Cell	Shi'I Jihadists	9.54%	3.19%	22.53%
Domestic	Unaffiliated Cell	Right-Wing	9.33%	3.17%	21.80%
Domestic	Unaffiliated Cell	Criminal	6.49%	2.14%	15.41%

**Analysis**

**1. Chemical Weapons:**

- a. The greatest threat (by a fairly large margin) for the large-scale use of chemical weapons by a non-state adversary was seen by the experts to still reside with the core of al-Qa'ida, which although weakened in recent years, is still believed to retain a fervent motivation and at least some capability to directly attack the United States with unconventional weapons.
- b. Also prominent were Hizballah and al-Qa'ida in the Arabian Peninsula (AQAP). This is not too surprising since Hizballah has extensive operational capabilities and has recently begun taking a more adventurous military posture, in Syria and elsewhere, whereas AQAP is one of the only al-Qa'ida affiliates that has attempted to attack the United States directly.
- c. Other highly ranked adversaries were a domestic apocalyptic millenarian cult (in the mold of Aum Shinrikyo) and an amorphous group hailing from domestic far-right quarters, both actors that were highlighted in the literature and the qualitative analysis.
- d. It is interesting to note that the top six-ranked threats all took the organizational form of developed organizations, perhaps indicating that the experts believed that these types of structures were most likely to possess the capabilities for engaging in a large-scale chemical attack. It is only in lower ranked positions that unaffiliated cells (Sunni jihadists) or lone idiosyncratic actors make an appearance.
- e. The highly ranked adversaries seem to favor neither foreign nor domestic origins, which implies that the threat might come from both quarters and equal attention should be paid to each.
- f. The differences between the unweighted and weighted rankings were fairly minor, with the exception of domestic criminal organizations, which appeared in the number three position in the unweighted rankings and the sixth position in the (presumably better calibrated) weighted rankings. This is a somewhat surprising result in that criminal organizations are not usually regarded as large chemical weapons threats in the literature or policy statements. While it is not possible to know exactly why this type of adversary was ranked so highly, there was much discussion during the elicitation about criminal organizations such as drug trafficking organizations possessing extensive technical expertise in chemistry and chemical engineering, as well as the notion that some of these organizations might see profit in contaminating products or might adopt a more ideological and less pecuniary posture (as has happened with groups like La Familia Michoacan in Mexico).

## 2. Biological Weapons:

- a. The assessment of biological weapons adversaries differed somewhat from that of chemical adversaries. The primary distinction is that the highest-ranked threat was determined to be domestic or foreign disgruntled scientists or technicians (working either alone or in a small cell) who have access to seed stocks of dangerous pathogenic agents and the technical know-how to create weaponized strains of agent. The model here is Bruce Ivins, the purported "anthrax letter" attacker of 2001, whom the experts presumably do not think was a singular case. This ranking might also indicate the experts' assessment of the

difficulty of obtaining and weaponizing biological agents to the level of constituting mass-casualty weapons – in other words, that the most likely perpetrators are those with preexisting access and expertise.

- b. Following the disgruntled scientists in the ranking are several recognized terrorist organizations, including al-Qa’ida central, AQAP, Hizballah and AQIM. As with chemical weapons, apocalyptic millenarian cults and a homegrown cell of Sunni jihadists were also ranked quite highly
- c. There are also new adversaries indicated by the elicitation rankings that did not rank highly (or even feature) in the chemical threat index. These include a domestic environmentalist or animal rights group and a UFO-related cell. The former would ideologically forswear chemical weapons, but might view biological weapons as avatars of Mother Nature, while the latter have shown themselves capable of using unconventional weapons and often have a fascination with high technology (including biotechnology).
- d. In comparison with the chemical rankings, right-wing actors feature far less prominently in the biological list, presumably because these actors are not believed by experts to be likely to possess the greater technical expertise needed to acquire, produce or use biological weapons. Criminal organizations are situated at the bottom of the biological ranking, in contrast to their prominent place in the chemical rankings.
- e. As with the chemical weapons ranking, the highest ranked threats reflect both domestic and foreign origins, and do not provide any indication that resources should be focused in either direction.
- f. There are several significant shifts between the unweighted and weighted rankings. While the top four ranked adversaries remain the same, Hizballah drops several places, from fifth to twelfth. Also, Islamist threats, including Sunni jihadist cells and AQIM displace the environmentalist and UFO groups. There is no clear reason for these shifts, other than perhaps that those expert with most knowledge of current terrorist threats put greater emphasis on the jihadist threat in the forthcoming decade than the other threats (besides disgruntled scientists).

## EMERGING THREAT DISCUSSIONS

Participants were asked, in turn, to describe where they each believe that the main future CB threat from non-state adversaries lies and to discuss this with the group. The following summarizes these discussions.

Participant Name	Participant L
	Participant L believes that the main future threat lies in chemical micro-processing technology. The authorities used to look for sites where terrorists could make chemical warfare agents in large warehouses with large scrubbers and heat signatures. However, with chemical micro-processing, it is possible to fit that entire factory into the size of a bookshelf. This is nearly impossible to uncover since it circumvents typical detection methods. The technology is now publicly available from large industrial companies, such as

Hitachi. It is capable of making chemicals in large quantities amounting to 40 tons in a few weeks or 72 tons per year, which is considered militarily significant quantities of chemicals. Scientists have already created phosgene and methyl isocyanate using these methods. The terrorist or terrorist organization would be using readily available information that is accessible to the public, which would be difficult for authorities to trace. These chemicals are also becoming safer to create with the processes becoming increasingly computer driven rather than standard batch reactors; there is also more access to safety tips and assistance online. In order to make a warfare agent, all anyone needs to know is how to take the current standard formula to a military level. A terrorist could work in a top 100 chemical company or university in order to learn how to translate a solvent process to low solvent technology.

<b>Participant Name</b>	<b>Participant E</b>
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Participant E believes that the next large attack will be biology-based involving remote knowledge transfer. The path and means to a biological weapon have been around for hundreds of years, but it takes someone with the technical ability, training, time, patience, and will to produce an actual product. In particular, she noted that globalization and virtual technology makes any basic information dangerous. Terrorists do not need to be geographically close in order to produce a weapon since knowledge can be transferred remotely through online tutorials, training videos and chat-rooms. Above all, it takes people who do not kill themselves in the process to be able to make a successful biological weapon.

<b>Participant Name</b>	<b>Participant K</b>
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Participant K stated that the scientific ability to isolate certain characteristics in a virus is dangerous threat. He used the example of releasing the *Myxoma* virus in New Zealand to control the increasing rabbit population. Scientists can select for infectivity and lethality, causing genetically engineered pathogens to attack a predetermined population. It is worrisome that scientists have created a highly lethal virus, released it on a population and observed the results. Even if this process has been practiced on rabbit populations, it is possible to think that this method could be used on humans. Statistical models for genetic testing are becoming more accessible to all people. In addition, there is currently a lack of money being spent on immune technology and avoidance of this problem.

<b>Participant Name</b>	<b>Participant D</b>
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The main concern for Participant D lies with existing threats becoming more commercialized. The first step of this idea is reducing the cost of something that is incredibly expensive and thereby to improve accessibility. Technology often has a special trickle down capability in terms of availability and has a tendency to become exponentially more commercialized with time. Comparing technology from ten years ago to today might help provide information to formulate what technologies will exist in the future.

<b>Participant Name</b>	<b>Participant A</b>
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Participant A states that he is worried about technological and behavioral concerns for the future. He cites the increasingly inexpensive process to code the individual genome, which is now less than \$1000, as a particularly worrisome technological advance. If terrorists can isolate genomes for little cost, then they could target specific individuals or races with ease. Participant A believes that we need to fight our natural tendencies to restrict technological access because attempting to restrict a virus will inevitably cause it to expand. For example, the best response to SARS was to release its genome on the internet. This allowed more people access, which reduced the spread.

<b>Participant Name</b>	<b>Participant M</b>
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Participant M states that the increase in social communication is highly worrisome. He states that networks and websites that allow for greater interaction will only increase as organizations recruit more technical experts. He worries about the existence of an interconnected system similar to a "terrorist LinkedIn." Many highly functioning terrorist organizations need more computer experts to control their operations, so an increasing threat is technical people being successfully recruited by a violent non-state actor.

<b>Participant Name</b>	<b>Participant J</b>
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Participant J credits rapidly advancing and spreading technology as his main concern. As with any creation, technology will continue to spread around the globe and become increasingly cheaper as technical experts work to improve what is already in existence. These methods allow groups more opportunities to subvert the defense structures that we currently have in place.

<b>Participant Name</b>	<b>Participant F</b>
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Participant F deems computing technology the highest threat priority and cites two examples to stake his claim. He suggests that



wearable computing, such as Google glasses or an Apple watch, will have a great effect on society in the near future. It would change how people operate, command and control functions, communication, sensors, etc. In addition, Participant F believes that quantum computing will become a larger problem in the near future as well. It would greatly increase computing power, change IT-based security, models, projections, etc. In effect, these advancing improvements would make current cryptography obsolete.

<b>Participant Name</b>	<b>Participant C</b>
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Participant C believes that the main threats lie with behavioral issues and the ability to weaponize viruses. Participant C states that proliferation of the basic techniques and equipment has already largely occurred, but the tacit knowledge has not spread everywhere yet. The inflection point is the first major attack, then he believes it is all downhill from there in terms of more attacks. If one attack is successful, then copycats are more likely to occur. On the other hand, safety, not security, should be our top concern and where we need to place our attention. Participant C worries that the transmissible H5N1 influenza virus be released and contamination would spread rampantly, which would encourage terrorists to work with agents like Ebola, even if they might cause harm to themselves in the process.

<b>Participant Name</b>	<b>Participant I</b>
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Participant I believes that the main upcoming terrorist threats will not come from the chemical realm due to the large quantity of chemical or toxin needed to make an impact, but foresees a biological attack possibly utilizing an agent that would attack animals in the food chain leading to infections in humans. This could cause mass hysteria. Overall, his main concern is the possibility of an attack using an infectious agent that is transmissible among humans. However, he was also concerned about the potential for mass hysteria from an attack on animals in the food chain..

<b>Participant Name</b>	<b>Participant G</b>
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The main concern for Participant G is the broad availability of knowledge and the ability to build expertise. In particular, he worries about the ease with which agents can be created and accessed. For example, chemicals become increasingly more difficult to trace as they become more widely available, such as through the common purchase of chemical kits by respectable chemical companies. In addition, terrorists can potentially obtain improved viruses such as influenza in order to release it into society if they choose.

## CONCLUSION

The elicitation process was designed to leverage the best judgment of a variety of experts about future threats. It accomplished this by first brainstorming both likely and outlier CB threats. The resulting set of threat actors was situated within a threat space covering all the main actors and actor types and subjected to a process of ranking and filtering to produce a subset for closer analysis. This kernel of high-priority actors was then characterized by a set of conditional probabilities that took into account the various motivational and capability-related aspects of the threat. Overall, both the chemical and biological results to a large extent vindicate the other research streams used in the study, even though the elicitation was designed to be more forward-looking than the previous sections. There are, however, several interesting departures that deserve to be highlighted.

For chemical weapons, Sunni jihadists of various stripes predominated, with al-Qa’ida and its offshoots identified by the experts as high-level threats, as well as ‘homegrown’ jihadist cells. Some of the other “usual suspects” for CW, such as Hizballah, apocalyptic millenarian cults and far right actors also featured prominently (although in the probabilistic elicitation the militia/survivalist strain did not rank as highly as the religious strain of the far right). One novel result was the fairly high ranking by the experts of criminal organizations as fairly high CW threats, something that is not emphasized in the literature.

While the experts did discuss insiders (such as chemical plant workers) as threats when it came to chemical weapons, it was in the consideration of biological weapons that such adversaries were truly highlighted, with disgruntled bioscientists or technicians viewed as the primary biological non-state actor threat. The implication here is that personnel reliability in the biological sciences is paramount. This was emphasized by the Commission on the Prevention of WMD Proliferation and Terrorism, whose report states that “the United States should be less concerned that terrorists will become biologists and far more concerned that biologists will become terrorists.”<sup>384</sup> Aside from rogue scientists, the majority of the biological threat was thought to come from developed terrorist organizations with substantial resources and logistical capabilities, including al-Qa’ida and its franchises, as well as apocalyptic millenarian and even radical environmentalist groups.

Interspersed with the formal elicitation process were several red-teaming exercises, which explored the decision making of CB adversaries under different organizational and ideological conditions, and also encourages the experts to “think outside the box”. A key concern highlighted by many of the experts is the role that emerging technologies, not only in the chemical and life sciences, but also in terms of communication and coordination, will play in the threat of CB terrorism in the next ten years. The experts appeared to believe that while much of the threat currently lies with traditional adversaries, this may not be the case for much longer.

While it might be tempting to accept the probabilities produced during the elicitation as actual indicators of the likelihood of a CB threat materializing, the methodological difficulties attending any elicitation make it more appropriate to regard the threat results in a relative fashion. Nonetheless, the large numerical difference between some of the elicited probabilities is strongly suggestive (for example, the chemical attack probabilities of al-Qa’ida central are almost double that of a generic unaffiliated Sunni jihadist cell) and one is thus able to use the results to get some idea of the magnitude differences in likelihood between certain threat actors.

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<sup>384</sup> Bob Graham, Jim Talent, Graham Allison, Robin Cleveland, Steve Rademaker, Tim Roemer, et al., *World at Risk: The Report of the Commission on the Prevention of WMD Proliferation and Terrorism* (New York: Vintage Books, 2008), p. 11.

## Chapter 7: Combining the Research Streams<sup>385</sup>

### STUDY SUMMARY

The overall objective of the *Anatomizing Chemical and Biological Adversaries Project* is to use a multi-methodological approach to better characterize non-state CB perpetrators and potential perpetrators. The first phase of the project, of which this report forms the primary deliverable, seeks to determine the most likely future CB perpetrators within the next decade and to develop means of proactively identifying them through differentially diagnostic indicators.

Briefly, the first phase consisted of three separate research streams:

1. A qualitative analysis based on extant literature and empirical profiles.
2. Statistical Modeling using an organization-level dataset of terrorist characteristics.
3. Expert elicitation (both semi-structured and probabilistic).

The results of the above streams are represented in the following products, presented at various points as part of this report:

1. A detailed review of the literature and concomitant qualitative analysis of the components of the CB VNSA threat;
2. The Chemical and Biological Nuclear Non-State Adversaries Database (CABNSAD) and associated codebook (data available as a separate deliverable);
3. A set of adversary threat rankings from each research stream;
4. Sets of indicators that can be used to operationally track adversary threat levels;
5. Visual and statistical overviews of collected data.

### COMPARISON OF RESULTS

The remaining task of the study is to compare the potential non-state CB perpetrator rankings that emerged from each research stream, though it is first necessary to establish which of the results should serve as the basis for comparison. For the qualitative rankings, the selection was simple – the final results that reflected a qualitative synthesis of the multiple systematic rankings, as well as the research team’s input. Of the elicitation results, the final (weighted) scores from the probabilistic elicitation were used, since these reflected the most detailed input from the participants, aggregated and weighted by levels of expertise. For the quantitative analysis, the selection process was more difficult. Ideally, one would apply

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<sup>385</sup> This chapter was written by Gary A. Ackerman.

the best fitting model from the quantitative analysis to the most recent data to identify those organizations that most closely match the characteristics statistically associated with pursuing or using CB weapons. However, the quantitative data needed to accomplish this across all known terrorist organizations only exists up until 2007 and the variable values for most terrorist groups have changed considerably over that time. Moreover, there were multiple statistical approaches utilized and it was not always clear which model(s) were superior. A number of heuristics were therefore employed to derive a viable ranking from the statistical results, as follows:

1. All organizations no longer extant as of the end of 2013 were removed from consideration. For example, UNITA and the Communist Party of Nepal-Maoist have both laid down their arms within the early 2000's.
2. Organizations that had changed their name or otherwise evolved, were replaced by their most recent incarnation. For example, al-Qa'ida in Iraq was replaced in the rankings by the Islamic State of Iraq and the Levant (ISIS) and the Chechen Republic of Ichkeria by the Caucasus Emirate.
3. The organizations that dominated multiple models (in both the logistic regression and event history analyses) were privileged, with a rough rank ordering determined by their most common one-to-one comparison across organizations. For example, if the Taliban ranked higher than Lashker-e-Taiba in almost all the models, it would probably do so in the synthesized model.<sup>386</sup>
4. Since the statistical analysis only examined organizations that might use CB weapons, but did not explicitly take into account whether those organizations are ever likely to attack the U.S. or U.S. targets, organizations that either had attacked the U.S. or U.S. targets in the past, or whose ideology included antipathy towards the U.S. were privileged over those who did not. So, for instance, the Real IRA was demoted relative to the Afghan Taliban in the rankings.<sup>387</sup>

The following tables (7.1 and 7.2) summarize the results thus obtained from each research stream. A few notes are needed before proceeding. It was not expected that the results would be the same across all research streams (for example, the quantitative analysis could only be performed on terrorist organizations active between 1998 and 2007 and thus could not account for organizations that only emerged thereafter, nor for that matter organizations that are yet to emerge). At the same time, the three research streams are not completely independent (for example, much of the literature relies on at least some set of past events and, in addition, the expert elicitees have varying knowledge of the extant literature). Yet, although a cross-comparison of results cannot be regarded as constituting independent validation of any of the findings, the different techniques employed do simultaneously approach the larger problem from a number of disciplinary and methodological vantage points, each with their own strengths and limitations (see the lower boxes in Tables 7.1 and 7.2). In fact, the very purpose of the

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<sup>386</sup> Since the event history models could only study CB together, the resulting hazard ratios were used to inform both the chemical and biological rankings.

<sup>387</sup> The Islamist-oriented Palestinian groups like HAMAS and the PIJ were not likewise demoted. Even though these organizations have only targeted Israel in the past, their underlying ideology and their disdain for U.S. policy vis-à-vis the Israeli-Palestinian conflict, make them very different in orientation from purely ethnonationalist groups like some of the Indian ethnic separatist organizations.

multi-methodological analysis was to provide the most comprehensive possible treatment of the question.

**Table 7.1. Chemical Non-State Adversary Threat Rankings**

Qualitative Analysis		Quantitative Modeling		Elicitation	
1	Disgruntled Scientist(s) / Technician(s)	1	Al-Qa'ida Central	1	Al-Qa'ida Central
2	Al-Nusrah Front	2	Taliban	2	Hizballah
3	Al-Qa'ida Central	3	Islamic State of Iraq and the Levant (ISIS)	3	Al-Qa'ida in the Arabian Peninsula (AQAP)
4	Hizballah	4	Revolutionary Armed Forces of Colombia (Las FARC)	4	Apocalyptic Millenarian Cult (Domestic)
5	Islamic State of Iraq and the Levant (ISIS)	5	Al-Qa'ida in the Islamic Maghreb (AQIM)	5	Right-wing Extremist Group (Domestic)
6	Apocalyptic Millenarian Cult	6	Al-Qa'ida in the Arabian Peninsula (AQAP)	6	Criminal Organization (Domestic)
7	AQAP	7	HAMAS (Islamic Resistance Movement)	7	Lone Actor with a Personal Grudge or Idiosyncratic Motive (Domestic)
8	Al-Qa'ida in the Islamic Maghreb (AQIM)	8	Palestinian Islamic Jihad (PIJ)	8	Unaffiliated cell of Sunni Jihadists (Domestic)
9	Revolutionary Armed Forces of Colombia (Las FARC)	9	Caucasus Emirate	9	Unspecified Sunni Jihadist Group (Foreign)
10	Lashkar-e-Janghvi (LeJ)	10	Lashkar-e-Janghvi (LeJ)	10	Left-Wing Group (Domestic)
11	Jemaah Islamiyah	11	Hizballah	11	Al-Qa'ida in the Islamic Maghreb (AQIM)
12	Los Zetas	12	Lashkar-e-Taiba (LeT)	12	Lone Actor with a Personal Grudge or Idiosyncratic Motive (Foreign)
13	La Familia Michoacan/Knight Templar	13	Harakatul Jihad-e-Islami (HUJI)	13	Unspecified Shi'i Jihadist Group (Foreign)
14	Right-Wing Extremist Militia-Survivalist Group	14	National Liberation Army of Colombia (ELN)	14	Unaffiliated cell of Sunni Jihadists (Foreign)

**Table 7.1. Chemical Non-State Adversary Threat Rankings**

Qualitative Analysis		Quantitative Modeling		Elicitation	
15	Christian Identity Group	15	Justice and Equality Movement (JEM)	15	Unaffiliated cell of Right-Wing Extremists (Domestic)
16	Lashkar-e-Taiba (LeT)	16	Al-Aqsa Martyrs Brigade	16	Lone Sunni Jihadist Actor (Foreign)
17	Tehrik-i-Taliban Pakistan (TTP)	17	Ansar al-Islam	17	Unaffiliated cell of a New Religious Movement (Domestic)
18	D-Company	18	Hizb al-Tahrir al-Islami (HT)	18	Lone Right-Wing Extremist Actor (Domestic)
19	White Supremacists	19	Jundallah	19	Lone Sunni Jihadist Actor (Domestic)
20	Caucasus Emirate	20	Al-Shabaab	20	Right Wing Extremist Militia-Survivalist Group
CHARACTERISTICS OF ANALYSIS					
Based on review of literature, adversary profiles and analyst expertise. <b>Strengths</b> •Incorporates past, extant and future threats. •All non-state actors. •Combination of analysis by project researchers.  <b>Limitations</b> •Not rigorously systematic. •Potential for analyst bias.		Based on historical data (BAAD2; POICN, etc.). <b>Strengths</b> •Allows for exploring variation in dependent variable. •Takes into account every actor in dataset (including null cases). •Statistical tests of significance and sensitivity possible. •Results / models are reproducible.  <b>Limitations</b> •Limited time-scale of data (1998-2007). •Only includes terrorist/insurgent organizations (no criminal groups; lone actors, etc.). •Cannot make out-of-sample forecasts (i.e., limited to groups in dataset).		Combines the judgment of multiple domain experts. <b>Strengths</b> •Specifically oriented towards future threats. •Heterogeneous expertise (operational; technical; policy; futurist). •All non-state actors.  <b>Limitations</b> •Potential for expert bias •Relatively non-reproducible. •Lack of specific knowledge of potential listed non-state adversaries.	

When comparing the chemical weapons threat from VNSAs across the research streams, despite the large differences in approach, there are several clear similarities. First, given that all three streams examined particular terrorist organizations, it increases the confidence in the results that all three streams generated al-Qa’ida central and two of its most active affiliates, al-Qa’ida in the Islamic Maghreb (AQIM) and al-Qa’ida in the Arabian Peninsula (AQAP), as among the most highly ranked threats. In addition,

despite a current lack of direct confrontation towards the United States, all three research streams singled out the Shi'i jihadist group Hizballah as a major threat (although the quantitative analysis, perhaps because it did not capture Hizballah's most recent activism in Syria and elsewhere, ranked the organization somewhat of a lower threat than the other two streams). Indeed, a consistent finding across the three research streams was that the threat of non-state chemical weapons pursuit and use lies heavily with jihadists of all stripes, with 7 out of the top 10 (11 of the top 20) spots in the qualitative analysis, 9 out of the top 10 (at least 17 out of the top 20<sup>388</sup>) in the quantitative analysis, and half of the top 10 (and top 20) in the elicitation, all occupied by jihadist actors.

There are further commonalities where the scope of the different analyses allowed for this. For example, both the qualitative analysis and the elicitation identified a lone disgruntled actor (especially an insider technician or scientist) as a major threat for causing harm with chemical agents, as well as apocalyptic millenarian and domestic right-wing groups as potential threats, although each ranked a different type of right-wing group as the higher threat.<sup>389</sup> The qualitative analysis is noteworthy for ranking insiders as the number one threat, highlighting the importance of competent facility security and personnel reliability in the chemical sciences and industry (not only in the U.S. but worldwide) to reducing the threat of a chemical attack by a non-state actor. One of the more surprising results overall was the appearance in the threat rankings of criminal groups as potential chemical weapons threats, in the '2<sup>nd</sup> tier' of both the qualitative and elicitation analyses, since this threat is hardly mentioned, if at all, in the literature.

Furthermore, when comparing the qualitative and quantitative analyses that were conducted independently by different research groups, there are several organizations highlighted by each (despite the fact that the quantitative analysis was limited in its temporal range and thus could not identify more recently emerged groups like the al-Nusra Front in Syria). These included, in addition to the four organizations already mentioned, the Islamic State of Iraq and the Levant (ISIS), Las FARC in Columbia,<sup>390</sup> Lashkar-e-Taiba (LeT) and Lashkar-e-Jangvi (LeJ). Another interesting point to note is that all three analyses identify actors motivated by left-wing ideology as among the top ten potential chemical threats, which is also somewhat contrary to conventional wisdom.<sup>391</sup>

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<sup>388</sup> This is less surprising than it looks when one considers that key organizational attributes that emerged as significant from the statistical modeling are the tendency to kill prolifically and maintenance of extensive networks with other violent organizations, two factors that are characteristic of jihadist groups.

<sup>389</sup> The qualitative analysis ranked right-wing groups lower overall in terms of causing a substantial chemical weapons incident (primarily because of capability assessments), but ranked the militia-survivalist strain at #14, the Christian Identity strain at #15 and the non-religious white supremacist strain at #19, whereas the elicitation ranked right-wing extremist groups (including both Christian Identity (CI) and white supremacist strains) at #5 and the militia-survivalist strain at #20. However, if one were to combine the threat rankings of CI and white supremacists in the qualitative analysis, the combined set of actors would rise in the rankings and the results might look much more similar.

<sup>390</sup> Las FARC may be *sui generis* when it comes to CB weapons among far-left organizations. In addition to its hybrid criminal-terrorist nature, it is one of the few such organizations in the past two decades to have actually used or attempted to acquire unconventional weapons (its use of chemical agents and apparent forays into uranium smuggling).

<sup>391</sup> The possibility must be entertained, however, that the appearance of Las Farc in the qualitative and quantitative analyses and the ELN in the quantitative may represent more of the criminal, pecuniary aspects of these groups than their sometimes nominal Socialist / Marxist ideologies.

At the same time, there are some clear differences between the various analyses. The qualitative analysis placed more emphasis on the disgruntled scientist aspect and included some recently emerged actors that were either not considered or not ranked highly by the other analyses, such as the Tehrik-e-Taliban Pakistan (TTP) and the al-Nusra Front. Also, while both the qualitative analysis and the elicitation highlighted the threat from organized crime, the qualitative analysis placed more emphasis on transnational criminal organizations, while the elicitation, reflecting the exercise’s parameters, seemed to favor U.S.-based criminal organizations as the bigger threat. The main distinctive features of the quantitative analysis were its high ranking of the Afghan Taliban (which did not feature highly in the other two streams) and the inclusion of Palestinian Islamist organizations, HAMAS and the Palestinian Islamic Jihad. The elicitation, as the only analysis to focus directly on future, as yet unmanifested threats, and on small, autonomous cells or “groupuscles”, as expected drew our attention to more amorphous threat actors. An interesting, potentially anomalous result, is the experts’ somewhat high placement of a “new religious movement” (as distinct from an apocalyptic millenarian cult), perhaps signaling a concern on the part of experts with emerging religious actors that are not connected to traditional categories. One last point to note about the chemical threat analyses is that not a single non-religious ethnonationalist group that is still active made it into the top twenty spot as a potential chemical adversary.

**Table 7.2. Biological Non-State Adversary Threat Rankings**

Qualitative Analysis		Quantitative Modeling		Elicitation	
1	Disgruntled Scientist(s) / Technician(s)	1	Islamic State of Iraq and the Levant (ISIS)	1	Disgruntled Scientist(s) / Technician(s) (Foreign)
2	Hizballah	2	Al-Qa’ida Central	2	Disgruntled Scientist(s) / Technician(s) (Domestic)
3	Al-Qa’ida in the Arabian Peninsula (AQAP)	3	Taliban	3	Al-Qa’ida Central
4	Apocalyptic Millenarian Cult	4	Caucasus Emirate	4	Al-Qa’ida in the Arabian Peninsula (AQAP)
5	Al-Nusra Front	5	Al-Qa’ida in the Islamic Maghreb (AQIM)	5	Al-Qa’ida in the Islamic Maghreb (AQIM)
6	Lashkar-e-Taiba (LeT)	6	Jemaah Islamiyah (JI)	6	Unaffiliated Cell of Sunni Jihadists (Domestic)
7	Environmental Liberation Front (ELF)/Animal Liberation Front (ALF)	7	Al-Qa’ida in the Arabian Peninsula (AQAP)	7	Apocalyptic Millenarian Cult (Domestic)



**Table 7.2. Biological Non-State Adversary Threat Rankings**

Qualitative Analysis		Quantitative Modeling		Elicitation	
8	Al-Qa'ida in the Islamic Maghreb (AQIM)	8	Revolutionary Armed Forces of Colombia (Las FARC)	8	Unspecified Environmentalist/Animal Rights Group (Domestic)
9	Islamic State of Iraq and the Levant (ISIS)	9	Lashkar-e-Taiba (LeT)	9	Unaffiliated cell of Sunni Jihadists (Foreign)
10	Al-Qa'ida Central	10	HAMAS (Islamic Resistance Movement)	10	Unaffiliated Cell of UFO and Related Activists (Domestic)
11	Revolutionary Armed Forces of Colombia (Las FARC)	11	Ansar al-Islam	11	Lone Right-Wing Extremist Actor (Domestic)
12	Right-Wing Militias	12	Harakatul Jihad-e-Islami (HUJI)	12	Hizballah
13	Lashkar-e-Janghvi (LeJ)	13	Al-Aqsa Martyrs Brigade	13	Right-Wing Extremist Group (Domestic)
14	Jemaah Islamiyah (JI)	14	Justice and Equality Movement (JEM)	14	Lone Sunni Jihadist Actor (Domestic)
15	Christian Identity Group	15	Jundallah	15	Lone Sunni Jihadist Actor (Foreign)
16	Caucasus Emirate	16	Al-Shabaab	16	Right-Wing Militia/Survivalist Group (Domestic)
17	Haqqani Network	17	Popular Front for the Liberation of Palestine (PFLP)	17	Lone Actor with a Personal Grudge or Idiosyncratic Motive (Domestic)
18	Hindu Extremists	18	Hizb al-Tahrir al-Islami (HT)	18	Unaffiliated Cell Representing Other Single Issue (Domestic)
19	Tehrik-i-Taliban Pakistan (TTP)	19	United Liberation Front of Assam (ULFA)	19	Unaffiliated Shi'i Jihadist Cell (Foreign)
20	HAMAS (Islamic Resistance Movement)	20	Kurdistan Workers Party (PKK)	20	Unaffiliated Right-Wing Extremist Cell (Domestic)

**CHARACTERISTICS OF ANALYSIS**

**Table 7.2. Biological Non-State Adversary Threat Rankings**

Qualitative Analysis	Quantitative Modeling	Elicitation
<p>Based on review of literature, adversary profiles and analyst expertise.</p> <p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>•Incorporates past, extant and future threats.</li> <li>•All non-state actors.</li> <li>•Combination of analysis by project researchers.</li> </ul> <p><b>Limitations</b></p> <ul style="list-style-type: none"> <li>•Not rigorously systematic.</li> <li>•Potential for analyst bias.</li> </ul>	<p>Based on historical data (BAAD2; POICN, etc.).</p> <p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>•Allows for exploring variation in dependent variable.</li> <li>•Takes into account every actor in dataset (including null cases).</li> <li>•Statistical tests of significance and sensitivity possible.</li> <li>•Results / models are reproducible.</li> </ul> <p><b>Limitations</b></p> <ul style="list-style-type: none"> <li>•Limited time-scale of data (1998-2007).</li> <li>•Only includes terrorist/insurgent organizations (no criminal groups; lone actors, etc.).</li> <li>•Cannot make out-of-sample forecasts (i.e., limited to groups in dataset).</li> </ul>	<p>Combines the judgment of multiple domain experts.</p> <p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>•Specifically oriented towards future threats.</li> <li>•Heterogeneous expertise (operational; technical; policy; futurist).</li> <li>•All non-state actors.</li> </ul> <p><b>Limitations</b></p> <ul style="list-style-type: none"> <li>•Potential for expert bias.</li> <li>•Relatively non-reproducible.</li> <li>•Lack of specific knowledge of potential listed non-state adversaries.</li> </ul>

Comparing the biological threats that emerged from the different research streams, many of the results parallel those of the chemical analysis. For instance, AQIM, AQAP and al-Qa’ida central are still considered significant threats across all three research streams, although al-Qa’ida central is not ranked as highly in the qualitative analysis, probably as a result of the apparent diminution in its capabilities and freedom of operation since Bin Ladin’s assassination. Jihadist actors nonetheless continue to predominate, with 7 out of the top ten and 13 of the top 20 in the qualitative analysis, 9 out of the top 10 and at least 14 of the top 20<sup>392</sup> in the quantitative analysis, and 5 out of the top 10 and 9 out of the top 20 in the elicitation results.

One of the biggest changes from the chemical rankings is the appearance of disgruntled scientists as the top-ranked threats in both of the analyses that considered them (the qualitative analysis and the elicitation). As mentioned previously, this reiterates that competent laboratory security and personnel reliability in the biosciences and biotechnology industry (not only in the U.S. but worldwide) is paramount to reducing the threat of a biological attack by a non-state actor. After the insider scientist / technician and the major jihadist threats, apocalyptic millenarian cults are seen as the next most pronounced biological threat in both the qualitative analysis and the elicitation. Hizballah appears in these analyses (but not in the quantitative analysis in the biological domain), yet there are substantially different conceptions of the threat posed by particular perpetrators, with the qualitative analysis ranking

<sup>392</sup> This does not count the al-Aqsa Martyrs’ Brigade or the Justice and Equality Movement, which both have jihadist elements but are mainly nationalist in orientation.

it as #2 and the elicitation as #12. Similarly, although right-wing actors also feature in both the qualitative and elicitation rankings, they are overall in a lower position than in the chemical rankings, most likely owing to the relatively higher technical thresholds that are required to mount an effective attack with biological agents. In terms of commonalities between the qualitative and quantitative streams, Las FARC once again appears fairly highly ranked (in the ‘second tier’), with LeT and the Caucasus Emirate also reappearing, although the latter is ranked higher than in the chemical rankings. In terms of biological threats, Jemaah Islamiyah (JI) and HAMAS are now both in the top 20, although HAMAS is not ranked as highly. There are also differences between the streams, such as certain actors appearing in only one research stream, such as the TTP and the al-Nusrah Front which are only found in the qualitative analysis.

In addition to the increased prominence in the rankings given to disgruntled scientists and technicians, there are several new actors that appear in the biological rankings but do not in the chemical rankings. The most prominent of these are the most radical fringes of the animal rights and environmentalist movement, which appear in the qualitative and elicitation analyses at positions #7 and #8 respectively. Despite eschewing chemical agents as pollutants from an ideological standpoint, such actors appear far more amenable to using “natural” biological agents.<sup>393</sup> Other new actors include Hindu extremists (such as the Bajrang Dal) and UFO-related groups (such as a potentially violent offshoot of the Raelian movement). Purely ethnonationalist organizations also appear for the first time in the quantitative analysis. However, with the exception of the radical environmentalists (and possibly the UFO-related groups), most of the new actors occupy the lower rankings in the top 20. Another key difference between the biological and chemical rankings is that the biological rankings do not include any purely criminal organizations.<sup>394</sup> Aside from these marked differences the two rankings are similar, reflecting the theoretical notions expressed in the literature review that chemical and biological weapons use by non-state actors share several motivational and organizational antecedents.

## POLICY RELEVANCE AND FUTURE WORK

The results of the current analyses have several standalone deliverables and uses, including:

- Providing policy guidance for the strategic investment by government decision makers of resources to counter the threat of non-state CB use over the next ten years by highlighting the most likely potential perpetrators.
- Generating operational products that can be used by intelligence and law enforcement agencies to proactively interdict the threat by
  - Providing a list of high-priority intelligence targets among extant perpetrators.
  - Supplying a set of indicators that can be applied to emerging actors to detect shifts in CB threat potential and to assist in the establishment of investigative priorities.

<sup>393</sup> Gary Ackerman, “Beyond Arson? A Threat Assessment of the Earth Liberation Front” *Terrorism and Political Violence*, 15, 4 (Winter 2004).

<sup>394</sup> Both Las Farc and the Haqqani network are hybrid groups that have extensive criminal operations, but both also have a substantial ideological component.

- Producing a concise yet relatively comprehensive review of the literature related to non-state CB perpetrators that can be utilized as an introduction for training purposes.
- Generating the most comprehensive open-source database of CB perpetrators ever compiled (CABNSAD), which can continue to be mined for insights by researchers and analysts in a variety of applications, from social network analysis to machine learning.
- In addition to CABNSAD, producing a range of quantitative elicitation and statistical data that can be incorporated into various computational risk assessment and modeling efforts.

These findings and products are incorporated and extended in the follow-on phases of the study. The relevant deliverables of those phases can be consulted for details, but follow-on activities consist firstly of drawing on the threat rankings derived in this report to select a set of perpetrators of interest and then to build on the initial theory and empirical data collection to create in-depth behavioral profiles (including likely tactical behaviors) of six different perpetrators. The second major follow-on is to encapsulate the insights derived in this study into a Bayesian net that can be updated periodically with new data so that it can reflect the latest threat information.

The three research streams and their attendant products seek to collectively provide a comprehensive analysis of the identity of likely and potential CB adversaries. Yet, limitations on data and resources did not allow for the maximum possible certainty in the results. The research team thus believes that there is much scope for future work to validate and extend the results presented herein.

Specifically:

- More time and effort could be devoted to investigating the CABNSAD profiles in greater depth, for example, by interviewing perpetrators, victims and others involved with specific cases directly. This would be greatly facilitated by applying forensic psychology techniques to certain of the cases.
- The updating (through collection and coding) of the main existing quantitative data set (BAAD2) from 2007 through 2013 at least, would allow for far greater model validation and far more predictive models than those presented here.
- The inclusion in the BAAD dataset of several of the CABNSAD variables (especially those related to technical knowledge, would potentially allow for the statistical identification of additional indicators.
- New data sets could be constructed and novel methodologies employed to duplicate the quantitative analysis with individual actors.
- The existing elicitation was only able to consider one state of the world (status quo). Additional elicitation exercises could reevaluate expert opinion under different global socio-political circumstances.
- An elicitation exercise to evaluate the most likely C and B materials to be utilized by prospective perpetrators.
- A workshop could be held at which a panel of independent experts discuss and attempt to reconcile the results of the three different research strands.

The products of the current task (including this report and attendant deliverables described above) represent one of the most comprehensive attempts to date to identify and characterize future CB adversaries. The results of this analysis can serve as the baseline for future work and analysis in this regard and can be revisited as new actors appear and current actors evolve. This initial phase of the broader Anatomizing Chemical and Biological Non-state Adversaries study therefore serves not only as the first stage in an ongoing project, but also as a vital first step in the broader endeavor to understand the future chemical and biological threats that the U.S. is likely to face within the near to medium term.

## **APPENDICES**

## Appendix I: Indicators<sup>395</sup>

### APPENDIX I-A: CHEMICAL INDICATORS

#### *POSITIVE CHEMICAL MOTIVATIONAL INDICATORS*

Motivational factors that, when observed in individuals, groups and established organizations, may indicate an increased chemical threat.<sup>396</sup>

<b>Positive Chemical Motivational Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><b>Ideological</b>  <i>Chemical Proclivities</i></p> <ul style="list-style-type: none"> <li>Actors which have produced and/or subscribe to a manifesto or other doctrines that expressly endorse the use of chemical weapons/agents.</li> </ul>	<b>Very Strong</b>
<p><b>Doctrines</b>  <i>Manichean</i></p> <ul style="list-style-type: none"> <li>Manichean - Actors whose doctrines differentiate starkly between “good” and “evil” and explicitly advocate or encourage the “terrorizing” of their demonized and therefore dehumanized enemies, the causing of mass casualties, the extermination of “evildoers,” or the total destruction of the “corrupt” existing world order, all of which may serve to encourage them to violate normal moral taboos against mass murder and, consequently, to make the use of chemical weapons/agents appear more attractive.</li> </ul>	<b>Weak</b>
<p><i>Violent Millenarianism</i></p> <ul style="list-style-type: none"> <li>Actors with apocalyptic millenarian doctrines which mandate that believers take violent action themselves in order to bring about the prophesied “end times” (as opposed to passively awaiting the outcome of ongoing cosmic clashes between</li> </ul>	<b>Medium</b>

<sup>395</sup> This Appendix was prepared by Mila Johns.

<sup>396</sup> It has been noted that, “Ideology provides a motive—and possibly a formula—for action.” C.J.M Drake, *Terrorists’ Target Selection* (New York: St. Martin’s, 1998), p. 16. In that regard, Jeffrey Bale has observed that, “Ideologies, unlike the vague conceptions held by most people about how the world operates, are structured, relatively coherent, and often all-encompassing worldviews that purport to explain what is wrong with the world, identify those who are to blame for perpetrating those wrongs, and provide a guide for action that is designed to right those wrongs and thereby usher in a better world for the broader constituencies whose interests the ideologues and their followers claim to represent. In this way, ideologies not only act as crucial perceptual filters through which all external information is refracted and processed, but also as important drivers of the actual behaviors of those who adhere to them.” Ackerman et al., *Anatomizing Chemical and Biological Non-State Adversaries*. Emphasis added.

<b>Positive Chemical Motivational Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
“good” and “evil” supernatural beings).	
<p><i>Proscription Against Killing</i></p> <ul style="list-style-type: none"> <li>Actors whose ideology proscribes killing in general, but only allows incapacitating or wounding their enemies.</li> </ul>	<b>Medium</b>
<p><b>Strategic/Tactical/Operational Objectives</b><sup>397</sup></p> <p><i>Assassination</i></p> <ul style="list-style-type: none"> <li>Actors which seek to carry out assassinations through methods that may be undetectable, untraceable, and/or deniable, thus generating less reaction from the groups’ enemies, the public, etc.</li> </ul>	<b>Strong</b>
<p><i>Incapacitation</i></p> <ul style="list-style-type: none"> <li>Actors with operational objections which prioritize attacks in which victims are incapacitated, rather than killed, in order to generate less reaction – either from the groups’ enemies, the public, etc.</li> </ul>	<b>Medium</b>
<p><i>Covert/Delayed Effects</i></p> <ul style="list-style-type: none"> <li>Actors which seek to carry out attacks without drawing the immediate attention of victims, the public, authorities, etc.</li> </ul>	<b>Medium</b>
<p><i>Contamination/Area Denial</i></p> <ul style="list-style-type: none"> <li>Actors which seek to force humans/human activity to withdraw from a particular geographic area.</li> </ul>	<b>Strong</b>
<p><i>Psychological Impact</i></p> <ul style="list-style-type: none"> <li>Actors which, as a strategic/tactical goal, seek to magnify the psychological impact of an attack in order to generate disproportionate fear amongst their enemies.</li> </ul>	<b>Medium</b>
<p><i>Publicity</i></p> <ul style="list-style-type: none"> <li>Actors which, as a strategic/tactical goal, seek to obtain maximum publicity for an attack through the use of unconventional weapons.</li> </ul>	<b>Weak</b>
<p><i>Mass Casualty</i></p> <ul style="list-style-type: none"> <li>Actors which explicitly, in manifestos, public statements, etc., state that conducting mass casualty attacks is a strategic/tactical goal.</li> </ul>	<b>Medium</b>

<sup>397</sup> Several of the authors of this report have previously defined *Operational Objectives* as referring to “all of those results that terrorists seek to achieve by carrying out a particular attack, both in the short term and in the longer term [...] It should be emphasized that, in contrast to ideology, which is relatively stable in at least the short and medium terms, the operational objectives of an attack constitutes a dynamic variable that can fluctuate dramatically according to circumstances that are both internal and external to the terrorist group.” Gary Ackerman, et al, “Assessing Terrorist Motivations for Attacking Critical Infrastructure.” Lawrence Livermore National Laboratory, UCRL-TR-227068, December 4, 2006, 25. Available at: <http://www.llnl.gov/tid/lof/documents/pdf/341566.pdf>



<b>Positive Chemical Motivational Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><i>Mass Casualty – Specific Number</i></p> <ul style="list-style-type: none"> <li>Actors which explicitly, in manifestos, public statements, etc., state that conducting mass casualty attacks, with a specific and high number of casualties sought, is a strategic/tactical goal.</li> </ul>	<b><i>Strong</i></b>
<p><i>Disruption of Agriculture</i></p> <ul style="list-style-type: none"> <li>Actors which seek to cause economic disruption specifically through attacking agriculture.</li> </ul>	<b><i>Strong</i></b>
<p><i>Disruption of Critical Infrastructure</i></p> <ul style="list-style-type: none"> <li>Actors which seek to cause economic disruption by targeting the critical infrastructure of their enemy.</li> </ul>	<b><i>Weak</i></b>
<p><i>Deterrence and/or Coercion</i></p> <ul style="list-style-type: none"> <li>Actors which seek to remedy the imbalance in capabilities between themselves and an avowed enemy, which possesses CBRN weapons.</li> </ul>	<b><i>Weak</i></b>
<p><i>Rivals</i></p> <ul style="list-style-type: none"> <li>Actors which are competing against rival groups.</li> </ul>	<b><i>Medium</i></b>
<p><i>Status Building</i></p> <ul style="list-style-type: none"> <li>Actors which feel that that in order to enhance or elevate their status, there is an imperative to escalate their attacks, casualty counts, etc.</li> </ul>	<b><i>Medium</i></b>
<p><b>Desire to Increase Operational Capabilities<sup>398</sup></b></p> <p><i>Propensity to Innovate</i></p> <ul style="list-style-type: none"> <li>Actors which have consistently displayed innovation in their use of weapons and/or tactics</li> </ul>	<b><i>Medium to Strong</i></b>
<p><i>Recruitment Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which undertake conscious efforts to recruit people with relatively advanced technical or scientific skills in the realms of chemistry, chemical agents, chemical engineering, etc.</li> </ul>	<b><i>Strong</i></b>
<p><i>Educational Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which seek advanced education for their members in the realms of chemistry, chemical agents, chemical engineering, etc.</li> </ul>	<b><i>Medium</i></b>
<p><i>Employment Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which seek employment opportunities for their members in the realm of</li> </ul>	<b><i>Very Strong</i></b>

<sup>398</sup> In the most general sense, *Operational Capabilities* refers to a terrorist group’s ability to imagine, design, manage, and carry out attacks. In this regard, “one can include the group members’ possession of specialized skills (of a non-technical sort); their degree of technical expertise, which allows them to devise and/or manufacture sophisticated weapons and equipment as needed and, inter alia, their propensity to innovate, which refers to their willingness to employ novel weapons and attack modalities.” Ibid, p. 21.

<b>Positive Chemical Motivational Indicators</b>	
INDICATOR	Estimated Strength of Indicator
chemistry, chemical agents, chemical engineering, etc.	
<b>Organizational Dynamics<sup>399</sup></b> <i>Social Isolation</i> <ul style="list-style-type: none"> <li>Actors which are socially isolated, do not seriously aim to appeal to—much less claim to represent—a broader constituency, and are thus relatively unconcerned about the negative “blowback” resulting from their actions.<sup>400</sup></li> </ul>	<b>Medium</b>
<i>Factionalization</i> <ul style="list-style-type: none"> <li>Actors with challenger faction/s within an organization that display a desire to usurp the mantle of leadership from existing leaders who are perceived to be too passive or insufficiently aggressive, or leaders who seek to repel a challenge to their authority and power.</li> </ul>	<b>Weak</b>
<i>Leadership Background</i> <ul style="list-style-type: none"> <li>Actors with a leader/key decision-maker who possesses a technical background in chemistry, chemical agents, chemical engineering, etc.</li> </ul>	<b>Medium</b>
<i>High Self-Casualty Threshold</i> <ul style="list-style-type: none"> <li>Actors which have a high threshold for the number of casualties suffered by members of the group, either in an attack or in a retaliatory strike.</li> </ul>	<b>Weak</b>
<b>Expressive Factors</b> <i>Fetishism</i> <ul style="list-style-type: none"> <li>Actors with a leader who is obsessed with chemical agents and/or weapons.</li> </ul>	<b>Strong</b>
<i>Delusional Goals</i> <ul style="list-style-type: none"> <li>Actors which profess delusional, utopian agendas that cannot possibly be realized.</li> </ul>	<b>Weak</b>
<i>Language, Symbols and/or Tropes</i> <ul style="list-style-type: none"> <li>Actors which display or express—in any form—positive interest, sentiments, images, and/or symbols in chemical weapons/agents.</li> </ul>	<b>Medium to Strong</b>
<i>Narcissism/Self-Glorification</i> <ul style="list-style-type: none"> <li>Actors in which the leader/key decision-makers displays a ‘Mastermind Complex’</li> </ul>	<b>Weak to Medium</b>
<i>High Technology Fascination</i> <ul style="list-style-type: none"> <li>Actors where the leader/key decision-makers have displayed a predilection for high-technology weapons or other operational equipment</li> </ul>	<b>Weak to Medium</b>
<i>Sadism</i>	<b>Weak</b>

<sup>399</sup> *Organizational Dynamics* refers to all those characteristics of the organization that are *not* embodied or reflected in its formal organizational structure and which act, behind the scenes, to facilitate or interfere with its actual functioning. See, *Ibid*, p. 20.

<sup>400</sup> This indicator, specifically with regard to constituencies, could also be listed under the heading of *Relations with External Actors* below.

<b>Positive Chemical Motivational Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<ul style="list-style-type: none"> <li>Actors which have previously demonstrated sadism and/or sadistic tendencies, either within the group or against enemies.</li> </ul>	
<i>Revenge</i> <ul style="list-style-type: none"> <li>Actors which claim past use of chemical weapons/agents against themselves or their constituency by enemies.</li> </ul>	<b>Medium to Strong</b>
<b>Ease of Acquisition</b> <i>Potential for Easy Acquisition</i> <ul style="list-style-type: none"> <li>Actors which have their headquarters/main operations in an area where there are high opportunities for acquiring chemical weapons/agents.</li> </ul>	<b>Weak</b>
<i>Serendipitous Acquisition</i> <ul style="list-style-type: none"> <li>Actors which serendipitously – through fortuitous discovery or other unsought means – are known to have come across chemical weapons/agents.</li> </ul>	<b>Medium</b>
<i>Direct Acquisition</i> <ul style="list-style-type: none"> <li>Actors which are directly provided with chemical weapons/agents by an outside actor.</li> </ul>	<b>Medium</b>
<b>Prior Behavior and Historical Context</b> <i>Escalating Casualty Count</i> <ul style="list-style-type: none"> <li>Actors which have an attack history that demonstrates a pattern of escalating casualty counts.</li> </ul>	<b>Weak to Medium</b>
<i>Prior History of Mass Killings</i> <ul style="list-style-type: none"> <li>Actors which have engaged in mass killing in the past</li> </ul>	<b>Weak</b>
<i>Prior Acquisition Attempts</i> <ul style="list-style-type: none"> <li>Actors which have previously attempted to acquire chemical weapons/agents or the materials necessary to fabricate such weapons/agents (including plume simulation software).</li> </ul>	<b>Very Strong</b>
<i>Prior Threats</i> <ul style="list-style-type: none"> <li>Actors which have previously explicitly threatened to use chemical weapons/agents.</li> </ul>	<b>Medium</b>
<i>Prior Demonstration of Ability</i> <ul style="list-style-type: none"> <li>Actors which have exhibited explicit evidence that they possess the capability to acquire chemical weapons/agents.</li> </ul>	<b>Very Strong</b>
<i>Prior Usage</i> <ul style="list-style-type: none"> <li>Actors which have previously used chemical weapons/agents successfully.</li> </ul>	<b>Very Strong</b>
<i>Group Relocation</i> <ul style="list-style-type: none"> <li>Actors which relocate their headquarters/main operations to an area where there are high opportunities for acquiring chemical weapons/agents.</li> </ul>	<b>Medium to Strong</b>
<i>Suspicious Behavior</i>	<b>Strong</b>

## Positive Chemical Motivational Indicators

INDICATOR	Estimated Strength of Indicator
<ul style="list-style-type: none"> <li>Actors with members who have displayed odd or suspicious behavior at or near chemical facilities.</li> </ul>	
<p><i>Unexplained Illness/Deaths</i></p> <ul style="list-style-type: none"> <li>Actors with members who display unexplained symptoms of illness and/or death associated with chemical weapons/agents, especially members who exhibit symptoms of poisoning with an unusual or particularly toxic agent.</li> </ul>	<b><i>Strong</i></b>
<ul style="list-style-type: none"> <li></li> </ul>	

**NEGATIVE CHEMICAL MOTIVATIONAL INDICATORS**

Motivations found in individuals and groups that argue against them posing a chemical threat.

<b>Negative Chemical Motivational Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><b>Ideological/Doctrinal</b></p> <p><i>Proscribe Mass Killing</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that explicitly proscribe killing or incapacitating large numbers of people.</li> </ul>	<b>Medium</b>
<p><i>Repudiation of the Use of Chemical Weapons</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that explicitly prohibit the use of chemical weapons/agents.</li> </ul>	<b>Strong</b>
<p><i>Rejection of Modern Technologies</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that explicitly reject modern technologies.</li> </ul>	<b>Weak to Medium</b>
<p><i>Environmental Concerns</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that expressly prohibit the contamination of the environment.</li> </ul>	<b>Weak to Medium</b>
<p><b>Strategic/Tactical Operational Objectives</b></p> <p><i>Exclusive IT Infrastructure Targeting</i></p> <ul style="list-style-type: none"> <li>Actors which exclusively target the IT infrastructure of their enemies.</li> </ul>	<b>Strong</b>
<p><i>Targeting of Critical Infrastructure</i></p> <ul style="list-style-type: none"> <li>Actors which seek the physical destruction of their enemy’s critical infrastructure and key resources (CIKR) – including but not limited to: power grids and water filtration plants, national monuments and government facilities, telecommunications and transportation systems, etc.<sup>401</sup></li> </ul>	<b>Medium</b>
<p><b>Organizational Dynamics</b></p> <p><i>Lack of Innovation</i></p> <ul style="list-style-type: none"> <li>Actors which have displayed little or no interest in innovating, especially in the area of weapons selection.</li> </ul>	<b>Strong</b>
<p><i>Leader Aversion</i></p> <ul style="list-style-type: none"> <li>Actors with a leader/key decision-maker that exhibits a disproportionate fear of chemical contamination.</li> </ul>	<b>Medium to Strong</b>

<sup>401</sup> Department of Homeland Security; “CIKR,” DHS blog entry, November 19, 2009, accessed August 21, 2013, <http://www.dhs.gov/blog/2009/11/19/cikr>.

Negative Chemical Motivational Indicators	
INDICATOR	Estimated Strength of Indicator
<p><i>Recruitment Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which deliberately seek to avoid/shun potential recruits who are likely to possess a scientific and/or technical education or background in chemistry, chemical agents, chemical engineering, etc.</li> </ul>	<b>Strong</b>
<p><i>Low Risk Threshold</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated a low risk threshold, in terms of member casualties, potential retaliatory actions, etc.</li> </ul>	<b>Strong</b>
<p><b>Expressive Factors</b></p> <p><i>Immediate Gratification</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated the need to achieve immediate gratification – in terms of recognition, public attention, etc. – for their attacks.</li> </ul>	<b>Weak</b>
<p><b>Relations with External Actors</b></p> <p><i>Constituencies</i></p> <ul style="list-style-type: none"> <li>Actors for which the use of chemical weapons/agents are inconsistent with the tolerance of their constituent base.</li> </ul>	<b>Strong</b>
<p><i>State Sponsorship</i></p> <ul style="list-style-type: none"> <li>Actors which enjoy the strong sponsorship of a state and are thus subject to constraints on the use of means.</li> </ul>	<b>Weak</b>
<p><b>Prior Behavior and Historical Context</b></p> <p><i>Prior Rejection of Chemical Weapons/Agents</i></p> <ul style="list-style-type: none"> <li>Actors which have previously had - and rejected - the opportunity to acquire and/or utilize chemical weapons/agents.</li> </ul>	<b>Medium</b>
<p><i>Objectives Conventionally Met</i></p> <ul style="list-style-type: none"> <li>Actors which have historically been able to achieve their operational objectives through ‘tried and true’ conventional methods/weapons (e.g. firearms, explosives, etc.).</li> </ul>	<b>Weak</b>
<p><i>Prior Failure</i></p> <ul style="list-style-type: none"> <li>Actors which have experienced prior failure in acquiring, producing, weaponizing, and/or using chemical weapons/agents.</li> </ul>	<b>Weak</b>

**POSITIVE CHEMICAL CAPABILITY INDICATORS**

Capabilities (and opportunities) found in individuals and groups that may indicate an increased chemical threat.

<b>Positive Chemical Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<b>Operational Capabilities</b>	
<p><i>Ability to Successfully Perpetrate Sophisticated Large-Scale Attacks</i></p> <ul style="list-style-type: none"> <li>Actors which have previously demonstrated the capability to carry out successful, sophisticated attacks on a large-scale.</li> </ul>	<b>Medium</b>
<p><i>Experience</i></p> <ul style="list-style-type: none"> <li>Actors which have a demonstrated history of carrying out multiple attacks.</li> </ul>	<b>Weak</b>
<p><i>Size of Organization</i></p> <ul style="list-style-type: none"> <li>Actors which are considered to be 'large' (e.g. those composed of more than 25 members).</li> </ul>	<b>Medium</b>
<p><i>Demonstrated Ability to Successfully Reconnoiter Facilities</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated the ability to obtain sought-after information by reconnoitering facilities similar to those that house chemical agents (e.g., industry facilities) utilizing covert or seemingly normal activities.</li> </ul>	<b>Medium</b>
<p><i>Specialized Skills - Forgery</i></p> <ul style="list-style-type: none"> <li>Actors which are capable of forging counterfeit licenses, documents, credentials, etc.; for example, individuals capable of successfully posing as legitimately licensed chemical buyers.</li> </ul>	<b>Weak</b>
<p><i>Specialized Skills – Front Companies</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated experience establishing and operating front/shell companies.</li> </ul>	<b>Medium</b>
<p><i>Access to Restricted Materials</i></p> <ul style="list-style-type: none"> <li>Actors which, through members, supporters, etc., possess the institutional credentials (university, laboratory, etc.) necessary to order/purchase restricted chemical materials or equipment.</li> </ul>	<b>Medium to Strong</b>
<p><i>Ancillary Resources</i></p> <ul style="list-style-type: none"> <li>Actors which are known to have sought plume simulation and analysis software.</li> </ul>	<b>Weak</b> <sup>402</sup>
<b>Organizational Resources</b>	
<p><i>Financial Resources</i></p> <ul style="list-style-type: none"> <li>Actors which have access to a high level of monetary funds.</li> </ul>	<b>Medium to Strong</b>
<p><i>Safe Haven</i></p> <ul style="list-style-type: none"> <li>Actors which have access to areas (either physical facilities or isolated</li> </ul>	<b>Medium</b>

<sup>402</sup> However, this indicator is strong for motivation to acquire CBRN in general.

<b>Positive Chemical Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
geographical areas) where they are able to operate without significant threat or pressure from enemies and/or authorities.	
<i>Storage Facilities</i> <ul style="list-style-type: none"> <li>Actors which are known to have access to warehouses and/or storage facilities.</li> </ul>	<b>Weak</b>
<i>Heavy Machinery</i> <ul style="list-style-type: none"> <li>Actors which are known to have access to heavy machinery.</li> </ul>	<b>Weak</b>
<i>Technical Expertise</i> <ul style="list-style-type: none"> <li>Actors which have members who possess formal background, i.e. training and/or expertise, in chemistry.</li> </ul>	<b>Medium</b>
<i>Technical Expertise (continued)</i> <ul style="list-style-type: none"> <li>Actors which have members who have been formally trained as chemical engineers.</li> </ul>	<b>Medium to Strong</b>
<i>Technical Expertise (continued)</i> <ul style="list-style-type: none"> <li>Actors which possess a 'chemical cadre' – members with background/expertise in both chemistry and chemical engineering.</li> </ul>	<b>Strong</b>
<i>Technical Expertise (continued)</i> <ul style="list-style-type: none"> <li>Actors which have experience with illicit drug production, particularly synthetic drugs such as methamphetamine ('meth'), temazepam ('jellies'), methylenedioxymethamphetamine (MDMA or 'Ecstasy').</li> </ul>	<b>Weak to Medium</b>
<i>Technical Expertise (continued)</i> <ul style="list-style-type: none"> <li>Actors with members who have experience in handling, transporting, and working with hazardous materials.</li> </ul>	<b>Medium</b>
<i>Technical Expertise (continued)</i> <ul style="list-style-type: none"> <li>Actors with members who have experience and expertise in handling and using explosives.</li> </ul>	<b>Weak to Medium (depending on sophistication)</b>
<i>Technical Expertise (continued)</i> <ul style="list-style-type: none"> <li>Actors with members who have experience in producing explosives.</li> </ul>	<b>Medium to Strong</b>
<i>Charismatic Members</i> <ul style="list-style-type: none"> <li>Actors with members who are charismatic 'smooth talkers' and have demonstrated the ability to gain the trust of or access to those who can facilitate the acquisition of chemical agents and/or materials.</li> </ul>	<b>Weak</b>
<b>Access to Relevant Facilities</b>	
<i>Location</i> <ul style="list-style-type: none"> <li>Actors which are headquartered and/or have camps/facilities located close to chemically relevant facilities (e.g. chemical plants, laboratories, etc.).</li> </ul>	<b>Strong</b>
<i>Security of Chemical Facilities</i> <ul style="list-style-type: none"> <li>The presence of unsecured chemical plants/facilities, especially commercial</li> </ul>	<b>Medium to Strong</b>



<b>Positive Chemical Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
plants/facilities within the actor's regular area of operations.	
<i>Industrial Plants</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of plants/facilities that produce or house toxic industrial chemicals (TICs), including chlorine and pesticides.</li> </ul>	<b>Strong</b>
<i>Research Labs</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of chemical research labs.</li> </ul>	<b>Medium</b>
<i>Textiles</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of textile plants/facilities.</li> </ul>	<b>Medium</b>
<i>Plastics</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of plastics producing plants/facilities.</li> </ul>	<b>Medium</b>
<i>Pharmaceutical Industry</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of pharmaceutical companies (including plants/facilities).</li> </ul>	<b>Weak to Medium</b>
<i>Water Treatment Facilities</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of water purification plants/facilities.</li> </ul>	<b>Medium to Strong</b>
<i>Transportation Companies</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of transportation companies (e.g. trucking, railroad, etc.).</li> </ul>	<b>Medium to Strong</b>
<i>Chemical Equipment Companies</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of companies that sell chemical equipment (e.g. laboratory equipment, protective equipment).</li> </ul>	<b>Medium</b>
<i>Agricultural Facilities</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of agricultural facilities that handle large amounts of chemicals (e.g. pesticides).</li> </ul>	<b>Weak</b>
<i>Food Production Facilities</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of food production facilities.</li> </ul>	<b>Medium</b>
<i>Commercial Aviation</i> <ul style="list-style-type: none"> <li>Actors which have members who are employed in the aviation sector (e.g. access to small planes, crop dusters, etc.).</li> </ul>	<b>Medium</b>
<i>Consumer Product Production</i> <ul style="list-style-type: none"> <li>Actors which have members who are employees of consumer product production facilities.</li> </ul>	<b>Medium</b>
<i>Maritime</i> <ul style="list-style-type: none"> <li>Actors which have members who are employed in the maritime sector.</li> </ul>	<b>Weak to Medium</b>
<b>Production/Weaponization/Delivery Equipment</b>	<b>Medium</b>

<b>Positive Chemical Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><i>General Lab Equipment</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess general lab equipment relevant to chemistry, etc.</li> </ul>	
<p><i>Corrosion Resistant Equipment</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess corrosion resistant lab equipment relevant to chemistry, etc.</li> </ul>	<b>Medium</b>
<p><i>Solvents</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess chemical solvents.</li> </ul>	<b>Medium</b>
<p><i>Stabilizing Chemicals</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess stabilizing chemicals.</li> </ul>	<b>Medium to Strong</b>
<p><i>Personal Protective Equipment</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess personal protective equipment (PPE), specifically chemical protective equipment.</li> </ul>	<b>Medium</b>
<p><i>Microreactor/s</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess microreactor/s (e.g. miniaturized chemical production devices).</li> </ul>	<b>Medium to Strong</b>
<p><i>Mark I Kit/s</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess Mark I Kits, which contain antidotes for exposure to a nerve or organophosphate agent.</li> </ul>	<b>Medium</b>
<p><i>Explosive-related Materials</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess explosive-related materials (e.g., TNT, C4, etc.) that can be used as a delivery mechanism for chemical agents.</li> </ul>	<b>Medium</b>
<p><i>Crop Duster/Sprayer</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess crop dusters and/or sprayers that can be used as a delivery mechanism for chemical agents.</li> </ul>	<b>Medium</b>
<p><b>Relations with External Actors</b></p> <p><i>Criminal Organizations</i></p> <ul style="list-style-type: none"> <li>Actors which have ties to or are actively engaged with transnational criminal organizations, especially when the latter closely identify with the ideology and/or doctrines of the former.</li> </ul>	<b>Weak to Medium</b>
<p><i>Violent Groups</i></p> <ul style="list-style-type: none"> <li>Actors who have many alliances with other violent groups.</li> </ul>	<b>Weak to Medium</b>
<p><i>Former State-Level Chemical Weapons Scientists</i></p> <ul style="list-style-type: none"> <li>Actors which are known to have or have sought contact with former state-level chemical weapons scientist/s.</li> </ul>	<b>Medium to Strong</b>
<p><b>International Climate</b></p> <p><i>Unstable Chemical Weapons States</i></p>	<b>Medium</b>

<b>Positive Chemical Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<ul style="list-style-type: none"> <li>Significant political instability (civil war, disputed elections, extreme natural disaster, etc.) in a state known to possess, or suspected of possessing, chemical weapons.</li> </ul>	
<p><i>Scientist 'Proliferation'</i></p> <ul style="list-style-type: none"> <li>The 'proliferation' of chemical weapons scientists previously employed in state-level chemical weapons programs.</li> </ul>	<b>Weak</b>
<p><b>Prior Behavior and Historical Context</b></p> <p><i>Successful Poisonings</i></p> <ul style="list-style-type: none"> <li>Actors which have previously demonstrated the ability to execute successful poisoning/s.</li> </ul>	<b>Weak</b>
<p><i>Acquisition Attempts</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess or have sought to acquire technical and/or instructional manuals or other material related to the production or weaponization of chemical weapons/agents.</li> </ul>	<b>Weak to Medium</b>
<p><i>Acquisition Attempts (continued)</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess or have sought to acquire the 'raw materials' (precursor chemicals) necessary for the production or weaponization of chemical weapons/agents.</li> </ul>	<b>Medium to Strong</b>
<p><i>Travel</i></p> <ul style="list-style-type: none"> <li>Actors which have engaged in 'field-trips' to chemically-relevant location/s (including facilities).</li> </ul>	<b>Weak to Medium</b>
<p><i>Trafficking in Animals</i></p> <ul style="list-style-type: none"> <li>Actors which have been observed overseeing a large influx of animals that or of species that could potentially be used for testing of chemical agents.</li> </ul>	<b>Weak to Medium</b>
<p><i>Environmental Indicators</i></p> <ul style="list-style-type: none"> <li>The presence of odd odors emanating from areas around group camps and/or facilities.</li> </ul>	<b>Medium</b>
<p><i>Environmental Indicators (continued)</i></p> <ul style="list-style-type: none"> <li>The presence of sick or dead animals, potentially from chemical contamination and/or poisoning, in areas around group camps and/or facilities.</li> </ul>	<b>Weak to Strong</b>
<ul style="list-style-type: none"> <li></li> </ul>	
<p><i>Environmental Indicators (continued)</i></p> <ul style="list-style-type: none"> <li>The presence of sick or dead civilians, potentially displaying symptoms associated with chemical contamination and/or poisoning, in areas around group camps and/or facilities.</li> </ul>	<b>Medium to Strong</b>
<p><i>Environmental Indicators (continued)</i></p> <ul style="list-style-type: none"> <li>Actors with members who display illnesses or symptoms associated with chemical contamination and/or poisoning.</li> </ul>	<b>Medium to Strong</b>

**NEGATIVE CHEMICAL CAPABILITY INDICATORS**

Capabilities (including opportunities) related to individuals and groups that argue against them posing a chemical threat.

<b>Negative Chemical Capability Indicators</b>	
INDICATOR	Estimated Strength of Indicator
<p><b>Operational Capabilities/Dynamics</b></p> <p><i>Low Operational Ability</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated low levels of operational capabilities.</li> </ul>	<b>Strong</b>
<p><i>Existential Threats</i></p> <ul style="list-style-type: none"> <li>Actors which are ‘on-the-run’, lacking a secure base of operations and facing existential threats from enemies and/or authorities.</li> </ul>	<b>Medium</b>
<p><i>Demonstrated Ignorance</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated evidence of ignorance concerning chemical weapons/agents.</li> </ul>	<b>Medium to Strong</b>
<p><i>Factionalization</i></p> <ul style="list-style-type: none"> <li>Actors in which there is in-fighting, a lack of solidarity or a lack of cohesiveness between group members.</li> </ul>	<b>Weak to Medium</b>
<p><b>Organizational Resources</b></p> <p><i>Lack of Technical Expertise</i></p> <ul style="list-style-type: none"> <li>Actors which lack members with any sort of technical background or expertise in either chemistry or chemical engineering.</li> </ul>	<b>Strong</b>
<p><i>Location</i></p> <ul style="list-style-type: none"> <li>Actors which are based in states where there is no chemical infrastructure (e.g. plants, facilities, research labs, etc.).</li> </ul>	<b>Medium</b>
<p><i>Lack of Infrastructure for Production/Weaponization</i></p> <ul style="list-style-type: none"> <li>Actors which lack basic infrastructure to produce and/or weaponize chemical agents.</li> </ul>	<b>Weak to Medium</b>
<p><i>Lack of Consistent Access to Electricity</i></p> <ul style="list-style-type: none"> <li>Actors which do not have access/consistent access to electricity, either via a traditional electrical grid or generators.</li> </ul>	<b>Weak to Medium</b>
<p><i>Lack of Access to Communication Technologies</i></p> <ul style="list-style-type: none"> <li>Actors which lack access to modern communication technologies, especially the internet.</li> </ul>	<b>Weak to Medium</b>
<p><i>Lack of Financial Resources</i></p> <ul style="list-style-type: none"> <li>Actors which have restricted or limited access to liquid financial resources.</li> </ul>	<b>Weak</b>
<p><b>Prior Behavior and Historical Context</b></p> <p><i>Prior Chemical Hoaxes</i></p> <ul style="list-style-type: none"> <li>Actors which have previously orchestrated hoaxes related to chemical</li> </ul>	<b>Weak</b>

## Negative Chemical Capability Indicators

INDICATOR	Estimated Strength of Indicator
weapons/agents. <i>Prior Unsuccessful Chemical Attempts</i> <ul style="list-style-type: none"> <li>• Actors which have previously attempted – and failed – to acquire, produce, and/or weaponize chemical weapons/agents.</li> </ul>	<b><i>Weak to Medium</i></b>

**APPENDIX I-B: BIOLOGICAL INDICATORS**

*POSITIVE BIOLOGICAL MOTIVATIONAL INDICATORS*

Motivations found in individuals, cells and established violent organizations that may indicate an increased biological threat.

<b>Positive Biological Motivational Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><b>Ideological</b>  <i>Biological Proclivities</i></p> <ul style="list-style-type: none"> <li>Actors which have produced and/or subscribe to a manifesto or other doctrines expressly endorsing the use of biological weapons/agents.</li> </ul>	<b>Very Strong</b>
<p><b>Doctrines</b>  <i>Manichean</i></p> <ul style="list-style-type: none"> <li>Manichean - Actors whose doctrines differentiate starkly between “good” and “evil” and explicitly advocate or encourage the “terrorizing” of their demonized and therefore dehumanized enemies, the causing of mass casualties, the extermination of “evildoers,” or the total destruction of the “corrupt” existing world order, all of which may serve to encourage them to violate normal moral taboos against mass murder and, consequently, to make the use of biological weapons/agents appear more attractive.</li> </ul>	<b>Weak</b>
<p><i>Violent Millenarianism</i></p> <ul style="list-style-type: none"> <li>Actors with apocalyptic millenarian doctrines which mandate that believers take violent action themselves in order to bring about the prophesied “end times” (as opposed to passively awaiting the outcome of ongoing cosmic clashes between “good” and “evil” supernatural beings).</li> </ul>	<b>Medium</b>
<p><i>Proscription Against Killing</i></p> <ul style="list-style-type: none"> <li>Actors whose ideology proscribes killing in general, but only allows incapacitating or wounding their enemies.</li> </ul>	<b>Medium</b>
<p><b>Strategic/Tactical/Operational Objectives</b>  <i>Assassination</i></p> <ul style="list-style-type: none"> <li>Actors which seek to carry out assassinations through methods that may be undetectable, untraceable, and/or deniable, thus generating less reaction from the groups’ enemies, the public, etc.</li> </ul>	<b>Strong</b>
<p><i>Incapacitation</i></p> <ul style="list-style-type: none"> <li>Actors with operational objections which prioritize attacks in which victims are incapacitated, rather than killed, in order to generate less reaction – either from the groups’ enemies, the public, etc.</li> </ul>	<b>Medium</b>

## Positive Biological Motivational Indicators

INDICATOR	Estimated Strength of Indicator
<p><i>Covert/Delayed Effects</i></p> <ul style="list-style-type: none"> <li>Actors which seek to carry out attacks without drawing the immediate attention of victims, the public, authorities, etc.</li> </ul>	<b>Strong</b>
<p><i>Contamination/Area Denial</i></p> <ul style="list-style-type: none"> <li>Actors which seek to force humans/human activity to withdraw from a particular geographic area.</li> </ul>	<b>Strong</b>
<p><i>Preservation of Infrastructure/Environment</i></p> <ul style="list-style-type: none"> <li>Actors which seek to preserve the infrastructure and/or biosphere of a particular geographic area.</li> </ul>	<b>Strong</b>
<p><i>Psychological Impact</i></p> <ul style="list-style-type: none"> <li>Actors which, as a strategic/tactical goal, seek to magnify the psychological impact of an attack in order to generate disproportionate fear amongst their enemies.</li> </ul>	<b>Medium</b>
<p><i>Publicity</i></p> <ul style="list-style-type: none"> <li>Actors which, as a strategic/tactical goal, seek to obtain maximum publicity for an attack through the use of unconventional weapons.</li> </ul>	<b>Weak</b>
<p><i>Mass Casualty</i></p> <ul style="list-style-type: none"> <li>Actors which explicitly, in manifestos, public statements, etc., state that conducting mass casualty attacks is a strategic/tactical goal.</li> </ul>	<b>Medium</b>
<p><i>Mass Casualty – Specific Number</i></p> <ul style="list-style-type: none"> <li>Actors which explicitly, in manifestos, public statements, etc., state that conducting mass casualty attacks, with a specific and high number of casualties sought, is a strategic/tactical goal.</li> </ul>	<b>Strong</b>
<p><i>Disruption of Agriculture</i></p> <ul style="list-style-type: none"> <li>Actors which seek to cause economic disruption specifically through attacking agriculture.</li> </ul>	<b>Strong</b>
<p><i>Disruption of Critical Infrastructure</i></p> <ul style="list-style-type: none"> <li>Actors which seek to cause economic disruption by targeting the critical infrastructure of their enemy.</li> </ul>	<b>Weak</b>
<p><i>Deterrence and/or Coercion</i></p> <ul style="list-style-type: none"> <li>Actors which seek to remedy the imbalance in capabilities between themselves and an avowed enemy, which possesses CBRN weapons.</li> </ul>	<b>Weak</b>
<p><i>Rivals</i></p> <ul style="list-style-type: none"> <li>Actors which are competing against rival groups.</li> </ul>	<b>Medium</b>
<p><i>Status Building</i></p> <ul style="list-style-type: none"> <li>Actors which feel that that in order to enhance or elevate their status, there is an imperative to escalate their attacks, casualty counts, etc.</li> </ul>	<b>Medium</b>

## Positive Biological Motivational Indicators

INDICATOR	Estimated Strength of Indicator
<p><b>Desire to Increase Operational Capabilities</b></p> <p><i>Propensity to Innovate</i></p> <ul style="list-style-type: none"> <li>Actors which have consistently displayed innovation in their use of weapons and/or tactics</li> </ul>	<b>Medium to Strong</b>
<p><i>Recruitment Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which undertake conscious efforts to recruit people with relatively advanced technical or scientific skills in the realms of biological/life sciences (e.g. microbiology, virology, synthetic biology, biotechnology, genetic engineering).</li> </ul>	<b>Strong</b>
<p><i>Educational Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which seek advanced education for their members in the realms of biological/life sciences (e.g. microbiology, virology, synthetic biology, biotechnology, genetic engineering).</li> </ul>	<b>Medium</b>
<p><i>Employment Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which seek employment opportunities for their members in the realms of biological/life sciences (e.g. microbiology, virology, synthetic biology, biotechnology, genetic engineering).</li> </ul>	<b>Very Strong</b>
<p><b>Organizational Dynamics</b></p> <p><i>Social Isolation</i></p> <ul style="list-style-type: none"> <li>Actors which are socially isolated, do not seriously aim to appeal to—much less claim to represent—a broader constituency, and are thus relatively unconcerned about the negative “blowback” resulting from their actions.</li> </ul>	<b>Medium</b>
<p><i>Factionalization</i></p> <ul style="list-style-type: none"> <li>Actors with challenger faction/s within an organization that display a desire to usurp the mantle of leadership from existing leaders who are perceived to be too passive or insufficiently aggressive, or leaders who seek to repel a challenge to their authority and power.</li> </ul>	<b>Weak</b>
<p><i>Leadership Background</i></p> <ul style="list-style-type: none"> <li>Actors with a leader/key decision-maker who possesses a technical background in the biological/life sciences (e.g. microbiology, virology, synthetic biology, biotechnology, genetic engineering).</li> </ul>	<b>Medium</b>
<p><i>High Self-Casualty Threshold</i></p> <ul style="list-style-type: none"> <li>Actors which have a high threshold for the number of casualties suffered by members of the group, either in an attack or in a retaliatory strike.</li> </ul>	<b>Weak</b>
<p><b>Expressive Factors</b></p> <p><i>Fetishism</i></p> <ul style="list-style-type: none"> <li>Actors with a leader who is obsessed with biological agents and/or weapons.</li> </ul>	<b>Strong</b>
<p><i>Delusional Goals</i></p> <ul style="list-style-type: none"> <li>Actors which profess delusional, utopian agendas that cannot possibly be realized.</li> </ul>	<b>Weak</b>



## Positive Biological Motivational Indicators

INDICATOR	Estimated Strength of Indicator
<p><i>Language, Symbols and/or Tropes</i></p> <ul style="list-style-type: none"> <li>Actors which display or express—in any form—positive interest, sentiments, images, and/or symbols in biological weapons/agents.</li> </ul>	<b>Medium to Strong</b>
<p><i>Narcissism/Self-Glorification</i></p> <ul style="list-style-type: none"> <li>Actors in which the leader/key decision-makers displays a ‘Mastermind Complex’</li> </ul>	<b>Weak to Medium</b>
<p><i>High-Technology Fascination</i></p> <ul style="list-style-type: none"> <li>Actors where the leader/key decision-makers have displayed a predilection for high-technology weapons or other operational equipment.</li> </ul>	<b>Weak to Medium</b>
<p><i>Sadism</i></p> <ul style="list-style-type: none"> <li>Actors which have previously demonstrated sadism and/or sadistic tendencies, either within the group or against enemies.</li> </ul>	<b>Weak</b>
<p><i>Revenge</i></p> <ul style="list-style-type: none"> <li>Actors which claim past use of biological weapons/agents against themselves or their constituency by enemies.</li> </ul>	<b>Medium to Strong</b>
<p><b>Ease of Acquisition</b></p> <p><i>Potential for Easy Acquisition</i></p> <ul style="list-style-type: none"> <li>Actors which have their headquarters/main operations in an area where there are high opportunities for acquiring biological weapons/agents.</li> </ul>	<b>Weak</b>
<p><i>Serendipitous Acquisition</i></p> <ul style="list-style-type: none"> <li>Actors which serendipitously – through fortuitous discovery or other unsought means – are known to have come across biological weapons/agents.</li> </ul>	<b>Medium</b>
<p><i>Direct Acquisition</i></p> <ul style="list-style-type: none"> <li>Actors which are directly provided with biological weapons/agents by an outside actor.</li> </ul>	<b>Medium</b>
<p><b>Prior Behavior and Historical Context</b></p> <p><i>Escalating Casualty Count</i></p> <ul style="list-style-type: none"> <li>Actors which have an attack history that demonstrates a pattern of escalating casualty counts.</li> </ul>	<b>Weak to Medium</b>
<p><i>Prior History of Mass Killing</i></p> <ul style="list-style-type: none"> <li>Actors which have engaged in mass killing in the past</li> </ul>	<b>Weak</b>
<p><i>Prior Acquisition Attempts</i></p> <ul style="list-style-type: none"> <li>Actors which have previously attempted to acquire biological weapons/agents or the materials necessary to fabricate such weapons/agents (including plume simulation software).</li> </ul>	<b>Very Strong</b>
<p><i>Prior Threats</i></p> <ul style="list-style-type: none"> <li>Actors which have previously explicitly threatened to use biological weapons/agents</li> </ul>	<b>Medium</b>
<p><i>Prior Demonstration of Ability</i></p>	<b>Very Strong</b>

## Positive Biological Motivational Indicators

INDICATOR	Estimated Strength of Indicator
<ul style="list-style-type: none"> <li>Actors which have exhibited explicit evidence that they possess the capability to acquire biological weapons/agents.</li> </ul>	
<i>Prior Usage</i> <ul style="list-style-type: none"> <li>Actors which have previously used biological weapons/agents successfully.</li> </ul>	<b><i>Very Strong</i></b>
<i>Group Relocation</i> <ul style="list-style-type: none"> <li>Actors which relocate their headquarters/main operations to an area where there are high opportunities for acquiring biological weapons/agents.</li> </ul>	<b><i>Medium to Strong</i></b>
<i>Suspicious Behavior</i> <ul style="list-style-type: none"> <li>Actors with members who have displayed odd or suspicious behavior at or near biological facilities.</li> </ul>	<b><i>Strong</i></b>
<i>Unexplained Illness/Deaths</i> <ul style="list-style-type: none"> <li>Actors with members who display unexplained symptoms of illness and/or death associated with biological weapons/agents, especially exotic diseases (i.e., those which are non-native to the region in which the group is based).</li> </ul>	<b><i>Medium to Strong</i></b>

*NEGATIVE BIOLOGICAL MOTIVATIONAL INDICATORS*

Group and individual motivations that argue against them posing a biological threat.

Negative Biological Motivational Indicators	
INDICATOR	Estimated Strength of Indicator
<p><b>Ideological/Doctrinal</b></p> <p><i>Proscribe Mass Killing</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that explicitly proscribe killing or incapacitating large numbers of people.</li> </ul>	<b>Medium</b>
<p><i>Repudiation of the Use of Biological Weapons</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that explicitly prohibit the use of biological weapons/agents.</li> </ul>	<b>Strong</b>
<p><i>Rejection of Modern Technologies</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that explicitly reject modern technologies.</li> </ul>	<b>Weak to Medium</b>
<p><i>Environmental Concerns</i></p> <ul style="list-style-type: none"> <li>Actors which adhere to doctrines and/or manifestos that expressly prohibit the contamination of the environment.</li> </ul>	<b>Weak</b>
<p><b>Strategic/Tactical Operational Objectives</b></p> <p><i>Exclusive IT Infrastructure Targeting</i></p> <ul style="list-style-type: none"> <li>Actors which exclusively target the IT infrastructure of their enemies.<sup>403</sup></li> </ul>	<b>Strong</b>
<p><i>Targeting of Critical Infrastructure</i></p> <ul style="list-style-type: none"> <li>Actors which seek the physical destruction of their enemy’s critical infrastructure and key resources (CIKR) – including but not limited to: power grids and water filtration plants, national monuments and government facilities, telecommunications and transportation systems, etc.</li> </ul>	<b>Medium</b>
<p><b>Organizational Dynamics</b></p> <p><i>Lack of Innovation</i></p> <ul style="list-style-type: none"> <li>Actors which have displayed little or no interest in innovating, especially in the area of weapons selection.</li> </ul>	<b>Strong</b>

<sup>403</sup> This excludes the highly unlikely case of a group that specifically seeks to employ silicon-eating microbes.

<b>Negative Biological Motivational Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><i>Leader Aversion</i></p> <ul style="list-style-type: none"> <li>Actors with a leader/key decision-maker that exhibits a disproportionate fear of disease and/or biological contamination</li> </ul>	<i>Medium to Strong</i>
<p><i>Recruitment Objectives</i></p> <ul style="list-style-type: none"> <li>Actors which deliberately seek to avoid/shun potential recruits who are likely to possess a scientific and/or technical education or background in biological/life sciences (e.g. microbiology, virology, biotechnology).</li> </ul>	<i>Strong</i>
<p><i>Low Risk Threshold</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated a low risk threshold, in terms of member casualties, potential retaliatory actions, etc.</li> </ul>	<i>Strong</i>
<p><b>Expressive Factors</b></p> <p><i>Immediate Gratification</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated the need to achieve immediate gratification – in terms of recognition, public attention, etc. – for their attacks.</li> </ul>	<i>Weak</i>
<p><b>Relations with External Actors</b></p> <p><i>Constituencies</i></p> <ul style="list-style-type: none"> <li>Actors for which the use of biological weapons/agents are inconsistent with the tolerance of their constituent base.</li> </ul>	<i>Strong</i>
<p><i>State Sponsorship</i></p> <ul style="list-style-type: none"> <li>Actors which enjoy the strong sponsorship of a state and are thus subject to constraints on the use of means.</li> </ul>	<i>Weak</i>
<p><b>Prior Behavior and Historical Context</b></p> <p><i>Prior Rejection of Biological Weapons/Agents</i></p> <ul style="list-style-type: none"> <li>Actors which have previously had - and rejected - the opportunity to acquire and/or utilize biological weapons/agents.</li> </ul>	<i>Medium</i>
<p><i>Objectives Conventionally Met</i></p> <ul style="list-style-type: none"> <li>Actors which have historically been able to achieve their operational objectives through 'tried and true' conventional methods/weapons (e.g. firearms, explosives, etc.).</li> </ul>	<i>Weak</i>
<p><i>Prior Failure</i></p> <ul style="list-style-type: none"> <li>Actors which have experienced prior failure in acquiring, producing, weaponizing, and/or using biological weapons/agents.</li> </ul>	<i>Weak</i>

**POSITIVE BIOLOGICAL CAPABILITY INDICATORS**

Capabilities (and opportunities) found in individuals and groups that may indicate an increased biological threat.

<b>Positive Biological Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<b>Operational Capabilities</b>	
<p><i>Ability to Successfully Perpetrate Sophisticated Large-Scale Attacks</i></p> <ul style="list-style-type: none"> <li>Actors which have previously demonstrated the capability to carry out successful, sophisticated attacks on a large-scale.</li> </ul>	<b>Medium</b>
<p><i>Experience</i></p> <ul style="list-style-type: none"> <li>Actors which have a demonstrated history of carrying out multiple attacks.</li> </ul>	<b>Weak</b>
<p><i>Size of Organization</i></p> <ul style="list-style-type: none"> <li>Actors which are considered to be 'large' (e.g. those composed of more than 25 members).</li> </ul>	<b>Medium</b>
<p><i>Demonstrated Ability to Successfully Reconnoiter Facilities</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated the ability to obtain sought-after information by reconnoitering facilities similar to those that house biological agents (e.g. industry facilities) utilizing covert or seemingly normal activities.</li> </ul>	<b>Medium</b>
<p><i>Specialized Skills - Forgery</i></p> <ul style="list-style-type: none"> <li>Actors which are capable of forging counterfeit licenses, documents, credentials, etc.; for example, individuals capable of successfully posing as legitimately licensed chemical buyers.</li> </ul>	<b>Weak</b>
<p><i>Specialized Skills – Front Companies</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated experience establishing and operating front/shell companies.</li> </ul>	<b>Medium</b>
<p><i>Access to Restricted Materials</i></p> <ul style="list-style-type: none"> <li>Actors which, through members, supporters, etc., possess the institutional credentials (university, laboratory, etc.) necessary to order/purchase restricted biological materials or equipment.</li> </ul>	<b>Medium to Strong</b>
<p><i>Ancillary Resources</i></p> <ul style="list-style-type: none"> <li>Actors which are known to have sought plume simulation and analysis software.</li> </ul>	<b>Weak</b>
<b>Organizational Resources</b>	
<p><i>Financial Resources</i></p> <ul style="list-style-type: none"> <li>Actors which have access to a high level of monetary funds.</li> </ul>	<b>Strong</b>
<p><i>Safe Haven</i></p> <ul style="list-style-type: none"> <li>Actors which have access to areas (either physical facilities or isolated geographical areas) where they are able to operate without significant threat or pressure from enemies and/or authorities.</li> </ul>	<b>Medium</b>

<b>Positive Biological Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><i>Health Facilities</i></p> <ul style="list-style-type: none"> <li>Actors which run or are closely connected to hospitals, clinics, and/or other healthcare facilities.</li> </ul>	<b>Strong</b>
<p><i>Storage Facilities</i></p> <ul style="list-style-type: none"> <li>Actors which are known to have access to storage facilities with the refrigeration units, coolant devices or materials, etc. necessary to store and/or transport biological agents/weapons.</li> </ul>	<b>Weak to Medium</b>
<p><i>Technical Expertise</i></p> <ul style="list-style-type: none"> <li>Actors which have members who possess formal background, i.e., training and/or expertise in biological/life sciences.</li> </ul>	<b>Medium</b>
<p><i>Technical Expertise (continued)</i></p> <ul style="list-style-type: none"> <li>Actors which have members with formal training in mechanical/environmental engineering.</li> </ul>	<b>Medium</b>
<p><i>Technical Expertise (continued)</i></p> <ul style="list-style-type: none"> <li>Actors which possess a 'biological cadre' - members with extensive background/expertise in multiple aspects of biological/life sciences (e.g. microbiology, virology, synthetic biology, biotechnology, genetic engineering).</li> </ul>	<b>Strong</b>
<p><i>Technical Expertise (continued)</i></p> <ul style="list-style-type: none"> <li>Actors which have experience with illicit drug production, particularly synthetic drugs such as methamphetamine ('meth'), temazepam ('jellies'), methylenedioxymethamphetamine (MDMA or 'Ecstasy').</li> </ul>	<b>Weak</b>
<p><i>Technical Expertise (continued)</i></p> <ul style="list-style-type: none"> <li>Actors with members who have experience in handling, transporting, and working with hazardous materials.</li> </ul>	<b>Medium</b>
<p><i>Technical Expertise (continued)</i></p> <ul style="list-style-type: none"> <li>Actors with members who have experience and expertise in handling and explosives.</li> </ul>	<b>Weak to Medium (depending on sophistication)</b>
<p><i>Charismatic Member/s</i></p> <ul style="list-style-type: none"> <li>Actors with members who are charismatic 'smooth talkers' and have demonstrated the ability to gain the trust of or access to those who can facilitate the acquisition of biological agents and/or materials.</li> </ul>	<b>Weak</b>
<p><b>Access to Biological Materials</b></p> <p><i>Raw Agents</i></p> <ul style="list-style-type: none"> <li>Actors which have access to the raw materials necessary for biological agent production.</li> </ul>	<b>Strong</b>
<p><i>Research Labs</i></p> <ul style="list-style-type: none"> <li>Actors with members who are employees of biological research labs.</li> </ul>	<b>Strong</b>

<b>Positive Biological Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><i>Medical Facilities</i></p> <ul style="list-style-type: none"> <li>Actors which have members who are employees of hospitals, clinics, and/or other healthcare facilities.</li> </ul>	<b>Weak to Medium</b>
<p><i>Bio-pesticides</i></p> <ul style="list-style-type: none"> <li>Actors which have members who are employees of plants/facilities that produce biologically-based pesticides.</li> </ul>	<b>Medium</b>
<p><i>Biotechnology</i></p> <ul style="list-style-type: none"> <li>Actors which have members who are employees of biotechnology companies/labs.</li> </ul>	<b>Medium</b>
<p><i>Pharmaceutical Industry</i></p> <ul style="list-style-type: none"> <li>Actors which have members who are employees of pharmaceutical companies (including plants/facilities).</li> </ul>	<b>Medium</b>
<b>Production/Weaponization/Delivery Equipment</b>	
<p><i>Laboratory Equipment</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess general lab equipment relevant to biology, virology, etc, especially that used for culturing microorganisms.</li> </ul>	<b>Medium</b>
<p><i>Gene Synthesizers</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess gene synthesizers.</li> </ul>	<b>Medium</b>
<p><i>Polymerase Chain Reaction/ DNA Sequencers</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess Polymerase Chain Reaction (PCR) or Reverse Transcription Polymerase Chain Reaction (RT-PCR) devices or kits. Also includes actors which possess or have access to equipment used to automate the DNA sequencing process.</li> </ul>	<b>Medium</b>
<p><i>Lyophilizers</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess lyophilizers or other lyophilization (freeze-drying) equipment used in the conversion of biological agents into dry powders for aerosol dissemination.</li> </ul>	<b>Medium</b>
<p><i>Nebulizer</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess nebulization equipment used for aerosol dissemination of biological agents.</li> </ul>	<b>Medium</b>
<p><i>Growth Media and Reagents</i></p> <ul style="list-style-type: none"> <li>Actors which possess nutrient media, agar plates used to cultivate biological materials/agents. Also includes high-purity reagents for use in microbiological research and testing processes.</li> </ul>	<b>Medium</b>
<p><i>Batch Fermenters</i></p> <ul style="list-style-type: none"> <li>Actors which possess the equipment specifically designed for the fermentation of biological materials/agents.</li> </ul>	<b>Medium</b>
<p><i>Milling Equipment</i></p>	<b>Medium</b>

<b>Positive Biological Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<ul style="list-style-type: none"> <li>Actors which possess milling equipment that can convert biological agents into dry powders for aerosol dissemination.</li> </ul>	
<p><i>Glove Boxes and Related Safety Equipment</i></p> <ul style="list-style-type: none"> <li>Actors which have access to glove-boxes or similar items enabling protected manipulation of pathogens.</li> </ul>	<b>Medium</b>
<p><i>3-D Printer</i></p> <ul style="list-style-type: none"> <li>Actors which possess, or have attempted to acquire, 3-D printer technology.</li> </ul>	<b>Weak</b>
<p><i>Respirators</i></p> <ul style="list-style-type: none"> <li>Actors which possess or have access to positive pressure respirators.</li> </ul>	<b>Medium</b>
<p><i>Aerosolization Testing Equipment</i></p> <ul style="list-style-type: none"> <li>Actors which possess aerosolization testing equipment, including aerosol generators (electrospray or vibrator), small scale powder dispersers, atomizers, fluidized bed aerosol generators, aerosol testing chambers, etc.</li> </ul>	<b>Medium</b>
<p><i>High Levels of Disinfectant</i></p> <ul style="list-style-type: none"> <li>Actors which possess high levels of disinfectants beyond those necessary for legitimate purposes.</li> </ul>	<b>Medium</b>
<p><i>Vaccines</i></p> <ul style="list-style-type: none"> <li>Actors which are known to have stockpiled vaccines (e.g. DryVax, Imvamune, Anthrax Vaccine Absorbed (AVA), <i>F. tularensis</i> LVS, Bacille Calmette Guerin-based vaccines (BCG-TB)) known to provide protection against illnesses/diseases caused by biological agents/weapons.</li> </ul>	<b>Medium</b>
<p><i>Antibiotics</i></p> <ul style="list-style-type: none"> <li>Actors which have stockpiled antibiotics (e.g. ciprofloxacin, doxycycline, streptomycin, etc.) known to counteract illnesses/ diseases caused by biological agents/weapons.</li> </ul>	<b>Medium</b>
<p><i>Antiviral Drugs</i></p> <ul style="list-style-type: none"> <li>Actors which are known to have stockpiled antiviral drugs (e.g. oseltamivir, ribavirin, cidofovir, etc.) known to counteract illnesses/ diseases caused by biological agents/weapons.</li> </ul>	<b>Medium</b>
<p><i>Personal Protective Equipment</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess personal protective equipment (PPE), specifically biological protective equipment.</li> </ul>	<b>Medium</b>
<p><i>Crop Duster/Sprayer</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess crop dusters and/or sprayers that can be used as a delivery mechanism for biological agents.</li> </ul>	<b>Medium</b>
<p><b>Relations with External Actors</b></p> <p><i>Criminal Organizations</i></p>	<b>Weak to Medium</b>



<b>Positive Biological Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<ul style="list-style-type: none"> <li>Actors which have ties to or are actively engaged with transnational criminal organizations, especially when the latter closely identify with the ideology and/or doctrines of the former.</li> </ul>	
<p><i>Violent Groups</i></p> <ul style="list-style-type: none"> <li>Actors who have alliance with other violent groups.</li> </ul>	<b>Weak to Medium</b>
<p><i>Former State-Level Biological Weapons Scientists</i></p> <ul style="list-style-type: none"> <li>Actors which are known to have or have sought contact with former state-level biological weapons scientist/s.</li> </ul>	<b>Medium</b>
<p><b>International Climate</b></p> <p><i>Unstable Biological Weapons States</i></p> <ul style="list-style-type: none"> <li>Significant political instability (civil war, disputed elections, extreme natural disaster, etc.) in a state known to possess, or suspected of possessing, biological weapons.</li> </ul>	<b>Medium</b>
<p><i>Scientist 'Proliferation'</i></p> <ul style="list-style-type: none"> <li>The 'proliferation' of chemical weapons scientists previously employed in state-level biological weapons programs.</li> </ul>	<b>Weak</b>
<p><b>Prior Behavior and Historical Context</b></p> <p><i>Successful Poisonings</i></p> <ul style="list-style-type: none"> <li>Actors which have previously demonstrated the ability to execute successful poisoning/s.</li> </ul>	<b>Weak</b>
<p><i>Acquisition Attempts</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess or have sought to acquire technical and/or instructional manuals or other material related to the production or weaponization of biological weapons/agents.</li> </ul>	<b>Weak to Medium</b>
<p><i>Acquisition Attempts (continued)</i></p> <ul style="list-style-type: none"> <li>Actors which are known to possess or sought to acquire the 'raw materials' necessary for the production or weaponization of biological weapons/agents.</li> </ul>	<b>Medium to Strong</b>
<p><i>Travel</i></p> <ul style="list-style-type: none"> <li>Actors which have engaged in travel or excursions to areas where there are outbreaks of endemic diseases with bioweapons potential.</li> </ul>	<b>Weak</b>
<p><i>Trafficking in Animals</i></p> <ul style="list-style-type: none"> <li>Actors which have been observed overseeing a large influx of animals (e.g. mice, rabbits, etc.) that could potentially be used for testing of biological agents.</li> </ul>	<b>Weak to Medium</b>
<p><i>Environmental Indicators</i></p> <ul style="list-style-type: none"> <li>The presence of odd odors emanating from areas around group camps and/or facilities.</li> </ul>	<b>Weak</b>
<p><i>Environmental Indicators (continued)</i></p> <ul style="list-style-type: none"> <li>The presence of sick or dead animals and/or plants in areas around group camps</li> </ul>	<b>Weak to Medium</b>

<b>Positive Biological Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
and/or facilities.	
<i>Environmental Indicators (continued)</i> <ul style="list-style-type: none"> <li>Actors with members, or local civilians, exhibiting symptoms of exotic diseases non-native to the region in which the group is based.</li> </ul>	<b><i>Medium to Strong</i></b>

**NEGATIVE BIOLOGICAL CAPABILITY INDICATORS**

Capabilities related to individuals and groups that argue against them posing a biological threat.

<b>Negative Biological Capability Indicators</b>	
<b>INDICATOR</b>	<b>Estimated Strength of Indicator</b>
<p><b>Operational Capabilities/Dynamics</b></p> <p><i>Low Operational Ability</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated low levels of operational capabilities.</li> </ul>	<b>Strong</b>
<p><i>Existential Threat</i></p> <ul style="list-style-type: none"> <li>Actors which are ‘on-the-run’, lacking a secure base of operations and face existential threats from enemies and/or authorities.</li> </ul>	<b>Medium</b>
<p><i>Demonstrated Ignorance</i></p> <ul style="list-style-type: none"> <li>Actors which have demonstrated evidence of ignorance concerning biological weapons/agents.</li> </ul>	<b>Medium to Strong</b>
<p><i>Factionalization</i></p> <ul style="list-style-type: none"> <li>Actors in which there is in-fighting, a lack of solidarity or a lack of cohesiveness between group members.</li> </ul>	<b>Weak to Medium</b>
<p><b>Organizational Resources</b></p> <p><i>Lack of Technical Expertise/Personnel</i></p> <ul style="list-style-type: none"> <li>Actors which lack members with any sort of technical background or expertise in biological/life sciences (e.g. microbiology, virology, synthetic biology, biotechnology, genetic engineering).</li> </ul>	<b>Strong</b>
<p><i>Lack of Infrastructure for Production/Weaponization</i></p> <ul style="list-style-type: none"> <li>Actors which lack basic infrastructure to produce and/or weaponize biological agents.</li> </ul>	<b>Medium to Strong</b>
<p><i>Lack of Consistent Access to Electricity</i></p> <ul style="list-style-type: none"> <li>Actors which do not have access/consistent access to electricity, either via a traditional electrical grid or generators.</li> </ul>	<b>Medium to Strong</b>
<p><i>Lack of Access to Communication Technologies</i></p> <ul style="list-style-type: none"> <li>Actors which lack access to modern communication technologies, especially the internet.</li> </ul>	<b>Weak to Medium</b>
<p><i>Lack of Financial Resources</i></p> <ul style="list-style-type: none"> <li>Actors which have restricted or limited access to liquid financial resources.</li> </ul>	<b>Weak</b>
<p><b>Prior Behavior and Historical Context</b></p> <p><i>Prior Biological Hoaxes</i></p> <ul style="list-style-type: none"> <li>Actors which have previously orchestrated hoaxes related to biological</li> </ul>	<b>Weak</b>

## Negative Biological Capability Indicators

INDICATOR	Estimated Strength of Indicator
weapons/agents. <i>Prior Unsuccessful Biological Attempts</i> <ul style="list-style-type: none"> <li>• Actors which have previously attempted – and failed – to acquire, produce, and/or weaponize biological weapons/agents.</li> </ul>	<b><i>Weak to Medium</i></b>

## Appendix II: Background Information on CB Weapons<sup>404</sup>

### APPENDIX II-A: ISSUES SPECIFIC TO CHEMICAL TERRORISM

Chemical terrorism poses unique concerns with regards to identification of an attack, the speed of symptom onset following exposure, response time, and environmental contamination.

An incident of chemical terrorism would almost certainly be detected promptly, due to the rapid onset of symptoms following exposure. The effects of nerve agents are apparent within minutes, while choking and blood agents may take up to several hours for symptoms to manifest. Of the many chemical warfare agents, only white phosphorus has the potential to take days for symptom onset. Many agents also have distinctive odors, making it more likely that those exposed would be alerted that something was amiss. For more detailed information on the presentation of symptoms following exposure, as well as the smells associated with each see Figure II.1.<sup>405</sup>

**Figure II.1**

Chemical Agent	Agent Type	Physical Properties	Persistence/ Odor	Average Onset of Symptoms	Treatment
<b>Chlorine (Cl<sub>2</sub>)</b>	Choking	Medium volatility. Liquid for transport; gas at room temperature.	Not very persistent. Pungent odor similar to bleach.	Minutes to hours	Supportive
<b>Phosgene (CG)</b>	Choking	Medium volatility. Liquid for transport; gas at room temperature. High density.	Not very persistent, but high density can concentrate gas in low lying areas. Musty hay smell.	Minutes to hours	Supportive
<b>Diphosgene (DP)</b>	Choking	Clear, colorless liquid. Similar to	Moderately persistent, and volatile.	Minutes to hours	Supportive

<sup>404</sup> This Appendix was written by Mila Johns and Justin Ludgate.

<sup>405</sup> Information in this chart was compiled after consulting a number of authoritative sources, including “Toxnet – Toxicology Data Network,” United States National Library of Medicine, <http://toxnet.nlm.nih.gov/>; “Acute Exposure Guideline Levels (AEGs),” United States Environmental Protection Agency, <http://www.epa.gov/oppt/aegl/pubs/chemlist.htm>; “The Emergency Response Safety and Health Database,” Centers for Disease Control and Prevention, <http://www.cdc.gov/niosh/ershdb/>; “Drug Information,” Mayo Clinic, <http://www.mayoclinic.com/health/drug-information/>.

		phosgene, but more conveniently handled due to liquid state.	Odor similar to phosgene (musty hay).		
<b>Chloropicrin (PS)</b>	Choking	High volatility. Colorless, to pale yellow oily liquid.	Extremely high persistency. Odorless.	Minutes to hours	Supportive. May use bronchodilators and steroids for treatment.
<b>Sulfur Mustard (HD)</b>	Vesicant/Blister	Low volatility. Oily liquid.	Extremely high persistency. Smells like garlic.	Hours	Supportive
<b>Nitrogen Mustard (HN)</b>	Vesicant/Blister	Low volatility.	Unknown, lower persistency than HD. Can smell fishy, musty, soapy, or fruity.	Hours	Supportive
<b>Phosgene oxime (CX)</b>	Vesicant/Blister	Highly reactive/volatile.	Non-persistent. Odor of musty hay.	Minutes to hours	Supportive
<b>Lewisite (L)</b>	Vesicant/Blister	Low volatility. Oily black liquid.	High persistency. Smell of geraniums.	Minutes	BAM (dimercaprol)
<b>Hydrogen Cyanide (HCN or AC)</b>	Blood	Extremely high volatility.	Unstable with heat and water, not persistent. Bitter almonds smell.	Minutes to hours	Amyl nitrite, sodium nitrite, and sodium thiosulfate
<b>Tabun (GA)</b>	Nerve	Clear or colorless-to-brown liquid.	Intermediate persistence, Faint, fruity odor.	Minutes to hours	Atropine / 2-PAM chloride. (pralidoxime salts).
<b>Sarin (GB)</b>	Nerve	High volatility and water soluble.	Stable, but not very persistent. Odorless.	Minutes	Atropine/2 PAM Chloride. (pralidoxime salts)
<b>Soman (GD)</b>	Nerve	Somewhat volatile. Highly toxic through the skin.	Stable, but not persistent. Smell of camphor.	Minutes	Atropine/2 PAM Chloride. (pralidoxime salts)
<b>VX</b>	Nerve	Thick/oily appearance. Low volatility/not water soluble	Highly persistent. Odorless.	Minutes	Atropine/2 PAM Chloride. (pralidoxime salts)

Chemical terrorism has the potential to cause not only significant numbers of casualties, but also extreme levels of fear amongst the public. Aum’s release of sarin on the Tokyo subway system serves as a prime example of the physical, as well as psychological, impact of such attack. Group members ruptured nine

bags containing the nerve agent during the morning rush hour and within twenty-one minutes, the fire department received the first report of the incident. The call center was soon inundated with panicked calls from multiple subway stations.<sup>406</sup> By the time ambulances arrived at the various stations, many victims had already rushed to the closest hospitals.<sup>407</sup> The first emergency medical technicians (EMTs) who responded to the scene were not wearing proper protective equipment, resulting in many experiencing the effects of secondary exposure.<sup>408</sup> Similarly, the hospitals possessed neither the time nor the resources to decontaminate the hundreds of patients walking through their doors; in one local hospital, almost a quarter of the staff “suffered acute poisoning symptoms due to the secondary exposure to sarin”.<sup>409</sup> The attack killed 12 people<sup>410</sup> and injured over 1,000 (with several thousand more people displaying psychogenic symptoms).

A similar, if not greater, level of disruption can potentially be achieved through an attack, or act of sabotage, at a chemical plant which produces toxic industrial chemicals (TICs), as illustrated by the infamous 1984 release of 40 tons of methyl isocyanate gas (MIC) from United Carbide Corporation’s pesticide plant in the Indian city of Bhopal.<sup>411</sup> The immediate death toll was 3,800, with at least 15,000 more injured.<sup>412</sup> Those who survived the initial release were rushed to the local hospital, which was soon overwhelmed by the sheer number of victims requiring treatment. The situation was made worse by a lack of information as to what chemical had been released, delaying the implementation of the most appropriate treatment.<sup>413</sup> Thus, a timely, well-coordinated, and informed reaction by first responders and public health personnel to an incident of chemical terrorism is of the utmost importance.

A final issue of specific relevance to chemical terrorism is environmental contamination, and the requirement for decontamination, which could potentially accompany such an attack. Although some agents dissipate rapidly others may result in contamination that renders an area inaccessible for significant periods of time. The physical properties of a given chemical agent, in combination with its persistency and volatility, determine the level of environmental contamination that first responders would need to be prepared to address.

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<sup>406</sup> Amy E. Smithson, “Rethinking the Lessons of Tokyo,” In *Ataxia: The Chemical and Biological Terrorism Threat and the US Response*, ed. Leslie-Anne Levy and Amy E. Smithson, 91.

<sup>407</sup> Yasuharu Tokuda, Makiko Kikuchi, Osamu Takahashi, and Gerald H. Stein, “Prehospital management of sarin nerve gas terrorism in urban settings: 10 years of progress after the Tokyo subway sarin attack,” *Resuscitation* 68, no. 2 (2006), 193-202.

<sup>408</sup> Yasuharu Tokuda, Makiko Kikuchi, Osamu Takahashi, and Gerald H. Stein, “Prehospital management of sarin nerve gas terrorism in urban settings: 10 years of progress after the Tokyo subway sarin attack,” *Resuscitation* 68, no. 2 (2006), 193-202.

<sup>409</sup> Yasuharu Tokuda, Makiko Kikuchi, Osamu Takahashi, and Gerald H. Stein, “Prehospital management of sarin nerve gas terrorism in urban settings: 10 years of progress after the Tokyo subway sarin attack,” *Resuscitation* 68, no. 2 (2006), 193-202.

<sup>410</sup> Yasuharu Tokuda, Makiko Kikuchi, Osamu Takahashi, and Gerald H. Stein, “Prehospital management of sarin nerve gas terrorism in urban settings: 10 years of progress after the Tokyo subway sarin attack,” *Resuscitation* 68, no. 2 (2006), 193-202.

<sup>411</sup> Edward Broughton, “The Bhopal disaster and its aftermath: a review,” *Environmental Health: A Global Access Science Source* 4, no. 6 (2005): Doi: 10.1186/1476-069X-4-6.

<sup>412</sup> Bhopal Working Group, “The public health implications of the Bhopal disaster,” Report to the Program Development Board, American Public Health Association, *American Journal of Public Health* 77, no. 2 (1987): 230-236. Doi: 10.2105/AJPH.77.2.230, 230

<sup>413</sup> Edward Broughton, “The Bhopal disaster and its aftermath: a review,” *Environmental Health: A Global Access Science Source* 4, no. 6 (2005), accessed April 11, 2013. Doi:10.1186/1476-069X-4-6.

## APPENDIX II-B: ISSUES SPECIFIC TO BIOLOGICAL TERRORISM

In the case of biological terrorism, unique issues include the lag in detection time due to delayed onset of symptoms, variations in the transmissibility and contagiousness of the agent, public health responses, and the potential for modification of existing disease causing organisms.

The detection of biological agents, in the environment and from clinical data, is a relatively difficult, time-consuming and expensive process and the validity of such methods is often questionable. Passive detection devices, or 'biosensors', such as the Department of Homeland Security's BioWatch system, face a number of significant problems.<sup>414</sup> To be effective, the sensors must be agent-specific, in order to decrease the frequency of false positive readings. This increases the expense of the system because, due to the limitations of current technology, each potential biological agent will require specific detection equipment.<sup>415</sup> Another hurdle is that by the time such a system detects the presence of a biological agent, it may well already be too late to be preventative. In the best-case scenarios, detection may take ten minutes, though in practice it is usually closer to thirty.<sup>416</sup> The filters of the system are changed every twenty-four hours, producing an even longer delay; thus, there will already be the potential for infections before the sensors go off. Sensors also require constant maintenance for maximum efficiency.<sup>417</sup> Finally, sensors are limited in detection capabilities by the particle size necessary to trigger an alarm; a threshold which may potentially be impossible to calibrate in a truly effective manner.<sup>418</sup>

Syndromic surveillance systems, largely automated-based computer systems that transmit a variety of data sources to local, state, or federal public health offices for analysis and follow up, add an additional level of monitoring beyond programs such as Biowatch.<sup>419</sup> The Amerithrax attacks of 2001 generated significant public and governmental interest in syndromic surveillance systems as a method for detecting the consequences of a bioterrorist incident at an early stage. An assortment of health-care indicators, including chief complaint data, lab tests ordered by doctors and those results, and sales of over the counter (OTC) drugs, are monitored for changes so as to detect an anomalous cluster indicative of an outbreak. Early detection can enable the mobilization of an appropriate public health response, as well as

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<sup>414</sup> For past problems with Biowatch see David Willman, "The biodefender that cries wolf," *LA Times*, July 8, 2012, <http://articles.latimes.com/2012/jul/08/nation/la-na-biowatch-20120708>. For an assessment of proposed procurement and expansion plans see *Biosurveillance: DHS Should Reevaluate Mission Need and Alternatives before Proceeding with BioWatch Generation-3 Acquisition*, Government Accountability Office, September 2012, <http://www.gao.gov/assets/650/648026.pdf>

<sup>415</sup> David Franz, "Bioterrorism Defense: Controlling the Unknown," in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill: New York, 2008): 184–197.

<sup>416</sup> David Franz, "Bioterrorism Defense: Controlling the Unknown," in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill: New York, 2008): 184–197.

<sup>417</sup> David Franz, "Bioterrorism Defense: Controlling the Unknown," in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill: New York, 2008): 184–197.

<sup>418</sup> David Franz, "Bioterrorism Defense: Controlling the Unknown," in *Weapons of Mass Destruction and Terrorism*, ed. Russell D. Howard and James J.F. Forest. (McGraw-Hill: New York, 2008): 184–197.

<sup>419</sup> Tara Kirk Sell, "Understanding Infectious Disease Surveillance: Its Uses, Sources, and Limitations," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 8, no. 4 (2010): 305-309. Doi: 10.1089/bsp.2010.0054



providing officials and policy makers with enhanced situational awareness.<sup>420</sup>

While studies determining the efficacy of syndromic surveillance systems for more general public health emergencies remain ongoing, the literature is in general agreement that their usefulness in detecting an incident of biological terrorism is likely to be limited.<sup>421</sup> Due to the initial, non-specific symptoms of most biological agents, it is questionable whether such systems would be useful in capturing the event in time within the ‘window of opportunity’ for treatment, short of a mass casualty attack. The cluster, if it appeared at all, would likely be lost in ambient ‘noise’. The epidemiologist or analyst would have to be actively looking for such symptoms.<sup>422</sup> These shortcomings could potentially be ameliorated though a partnership with a program such as BioWatch, though that appears unlikely in the near-term so that syndromic surveillance systems are unlikely to be the key tool to detect a biological terrorist attack.<sup>423</sup>

One of the more significant concerns surrounding biological terrorism is the transmissibility and contagiousness of certain agents. Contagiousness refers to a biological agent’s ability to spread from person to person via a variety of contact forms. This is often referred to in scientific literature as aerosol-based person to person transmission. Figure II.2, which contains those agents considered by the Centers for Disease Control and Prevention (CDC) as Category A (high-risk for bioterrorism),<sup>424</sup> indicates how each of these top priority biological agents is transmitted and its contagiousness.

**Figure II.2**

Agent	Disease	Mode of Transmission	Contagious?
<b><i>Bacillus anthracis</i></b>	Anthrax	Aerosol, contaminated meat or hides, contact with spores in the ground.	No
<b><i>Yersinia pestis</i></b>	Plague	Fleas, person to person.	Yes, pneumonic form can be spread by air-borne droplets. Bodily fluids for other forms.
<b><i>Francisella tularensis</i></b>	Tularemia	Ticks, deer fly bites. Contaminated aerosols in nature. Lab accidents with hot strains.	No

<sup>420</sup> Tara Kirk Sell, “Understanding Infectious Disease Surveillance: Its Uses, Sources, and Limitations,” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 8, no. 4 (2010): 305-309. Doi: 10.1089/bsp.2010.0054

<sup>421</sup> Daniel M. Sosin, “Syndromic Surveillance: The Case for Skillful Investment,” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 1, no. 4 (2003): 247-253.

<sup>422</sup> Arthur Reingold, “If Syndromic Surveillance Is the Answer, What Is the Question?” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 1, no. 2 (2003): 77-81. <http://www.idready.org/pubs/reingold2003.pdf>

<sup>423</sup> Tara Kirk Sell, “Understanding Infectious Disease Surveillance: Its Uses, Sources, and Limitations,” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 8, no. 4 (2010): 305-309.

<sup>424</sup> Centers for Disease Control, *Bioterrorism Agents/Diseases*, “Emergency Preparedness and Response,” April 19, 2013. <http://www.bt.cdc.gov/agent/agentlist-category.asp>.

<b><i>Variola major</i></b>	Smallpox	Eradicated. Previously, person to person only. No natural reservoir.	Yes, airborne droplets from the lungs.
<b><i>Ebola Virus</i></b>	Ebola Hemorrhagic Fever	Contact with infected primates, eating bushmeat, and close contact with bodily fluids of infected persons.	Yes, contact with bodily fluids only.
<b><i>Marburg Virus</i></b>	Marburg Hemorrhagic Fever	Contact with infected primates, eating bushmeat, and close contact with bodily fluids of infected persons.	Yes, contact with bodily fluids only.

\*Toxins are not included as they are intrinsically non-contagious

The federal public health response to any large-scale incident of biological terrorism would fall under the purview of the Assistant Secretary for Preparedness and Response (ASPR), within the Department of Health and Human Services (HHS). While the Department of Homeland Security (DHS) and the Centers for Disease Control (CDC) would most assuredly play significant roles, it is the ASPR which is primarily responsible for the maintenance and distribution plans associated with the Strategic National Stockpile (SNS). The SNS consists of a huge network of warehouses across the United States where medical countermeasures and medical supplies are stored. Projected public health responses to a biological terrorist attack are frequently based on the experiences of the Amerithrax attacks, previous influenza pandemics, or a smallpox scenario, including the noted “Dark Winter” simulation of 2001.<sup>425</sup>

Depending on population density factors, urban or rural environments, and the severity of the attack, local hospitals could face surge capacity issues following a bioterrorist incident. Several agents likely to be used in bioterrorism have treatments that can prove effective, provided a patient falls within the prescribed time window for treatment. However, again depending on the severity and location, shortages of antibiotics/treatments could potentially occur. In the case of anthrax, ciprofloxacin is the drug of choice for treatment, but doxycycline can also be used. Following the Amerithrax attacks, there were concerns about ciprofloxacin’s availability as demand skyrocketed. To address this problem, DHS/HHS, in conjunction with local partners, was tasked with creating, maintaining, and distributing the SNS.

<sup>425</sup> Martin Rees, *Our Final Hour: A Scientist’s Warning*. (New York, NY: Basic Books, 2003): 51.

## **Appendix III: Indicator Application Illustration<sup>426</sup>**

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<sup>426</sup> This Appendix was prepared by Mila Johns.

**Positive Motivational Indicators**

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
<b>Groups which have produced and/or subscribe to a manifesto or other doctrines expressly endorse the use of chemical/biological weapons/agents.</b>	Very Strong	5	Yes	Unknown	No	No
<b>Manichean - Groups whose doctrines explicitly advocate or encourage the "terrorizing" of their demonized and therefore dehumanized enemies, the causing of mass casualties, the extermination of "evildoers," or the total destruction of the "corrupt" existing world order, all of which may serve to encourage them to violate normal moral taboos against mass murder and, consequently, to make the use of chemical weapons/agents appear more attractive.</b>	Weak	1	Yes	Yes	Yes	Yes
<b>Groups with apocalyptic millenarian doctrines which mandate that believers take violent action themselves in order to bring about the prophesied "end times" (as opposed to passively awaiting the outcome of ongoing cosmic clashes between "good" and "evil" supernatural beings).</b>	Medium	2	No	Yes	No	Yes
<b>Groups which seek to carry out assassinations through methods that may be undetectable, untraceable, and/or deniable, thus generating less reaction from the groups' enemies, the public, etc.</b>	Strong	3	No	Yes	No	Unknown

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups with operational objections which prioritize attacks in which victims are incapacitated, rather than killed, in order to generate less reaction – either from the groups’ enemies, the public, etc.	Medium	2	No	No	Unknown	No
Groups which seek to carry out attacks without drawing the immediate attention of victims, the public, authorities, etc.	Strong	3	No	Unknown	Unknown	Unknown
Group which seek to force humans/human activity to withdraw from a particular geographic area.	Strong	3	No	Unknown	No	No
Groups which seek to preserve the infrastructure and/or biosphere of a particular geographic area.	Strong	3	No	Unknown	No	No
Groups which, as a strategic/tactical goal, seek to magnify the psychological impact of an attack through the use of unconventional weapons in order to generate disproportionate fear amongst their enemies.	Medium	2	Yes	Unknown	Yes	Yes
Groups which, as a strategic/tactical goal, seek to obtain maximum publicity for an attack through the use of unconventional weapons.	Weak	1	Yes	Unknown	Yes	Yes
Groups which explicitly, in manifestos, public statements, etc., state that conducting mass casualty attacks are a strategic/tactical goal.	Medium	2	Yes	Yes	No	No

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which explicitly, in manifestos, public statements, etc., state that conducting mass casualty attacks, with a specific number of casualties sought, are a strategic/tactical goal.	Strong	3	Yes	Yes	No	No
Groups which seek to cause economic disruption, specifically through the use of 'agroterrorism'	Strong	3	No	No	No	Unknown
Groups which seek to cause economic disruption by targeting the critical infrastructure of their enemy.	Weak	1	Yes	Unknown	Yes	Yes
Group which seek to remedy the imbalance in capabilities between themselves and an avowed enemy, which possesses CBRN weapons.	Weak	1	Yes	Yes	Yes	Yes
Group which seek to remedy the imbalance in capabilities between themselves and an avowed enemy, which possesses CBRN weapons.	Weak	1	Yes	Yes	Yes	Yes
Groups which seek to enhance or elevate their status amongst rival groups.	Medium	2	No	Unknown	Yes	No
Group which feel that in order to enhance or elevate their status, there is an imperative to escalate their attacks, casualty counts, etc.	Medium	2	Unknown	Unknown	Yes	No

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
<b>Groups which have consistently displayed innovation in their use of weapons and/or tactics.</b>	Medium to Strong	2.5	Yes	Unknown	Yes	Yes
<b>Groups which undertake conscious efforts to recruit people with relatively advanced technical or scientific skills in the realms of chemistry, chemical agents, chemical engineering, etc or biological/life sciences (e.g. microbiology, virology, synthetic biology), biotechnology, genetic engineering, etc.</b>	Strong	3	Unknown	Yes	Unknown	Unknown
<b>Groups which seek advanced education for their members in the realms of chemistry, chemical agents, chemical engineering, etc. or biological/life sciences (e.g. microbiology, virology, synthetic biology), biotechnology, genetic engineering, etc.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which seek employment opportunities for their members in the realm of chemistry, chemical agents, chemical engineering, etc or biological/life sciences (e.g. microbiology, virology, synthetic biology), biotechnology, genetic engineering, etc.</b>	Very Strong	5	Unknown	Unknown	Unknown	Unknown

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which are socially isolated, do not seriously aim to appeal to—much less claim to represent—a broader constituency, and are thus relatively unconcerned about the negative “blowback” resulting from their actions.	Medium	2	No	Yes	No	No
Groups with challenger faction/s within an organization that display a desire to usurp the mantle of leadership from existing leaders who are perceived to be too passive or insufficiently aggressive, or leaders who seek to repel a challenge to their authority and power.	Weak	1	No	Unknown	Yes	No
Groups with a leader/decision-maker who possesses a technical background in chemistry, chemical agents, chemical engineering, etc or biological/life sciences (e.g. microbiology, virology, synthetic biology), biotechnology, genetic engineering, etc.	Medium	2	Yes	Unknown	Unknown	No
Group which have a high threshold for the number of casualties suffered by members of the group, either in an attack or in a retaliatory strike.	Weak	1	Yes	Yes	Yes	Yes
Groups with a leader who is obsessed with chemical/biological agents and/or weapons.	Strong	3	No	Yes	Unknown	No



Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which profess delusional, utopian agendas that cannot possibly be realized may also be prone to adopt extreme and measures to pursue such unachievable goals.	Weak	1	Yes	Yes	No	No
Groups which display or express—in any form— positive interest, sentiments, images, and/or symbols in chemical/biological weapons/agents.	Medium to Strong	2.5	No	Unknown	No	No
Groups in which the leader/decision-makers displays a 'Mastermind Complex'	Weak to Medium	1.5	Unknown	Yes	No	Yes
Groups which have previously demonstrated sadism and/or sadistic tendencies, either within the group or against enemies.	Weak	1	Yes	Yes	Yes	No
Group which claim past use of chemical/biological weapons/agents against themselves or their constituency by enemies.	Medium to Strong	2.5	Unknown	Unknown	Unknown	Unknown
Groups which have their headquarters/main operations in an area where there are high opportunities for acquiring chemical/biological weapons/agents.	weak	1	No	Yes	Unknown	Yes
Groups which serendipitously - through fortuitous discovery or other unsought means -acquire chemical/biological weapons/agents.	medium	2	Unknown	No	Unknown	Unknown
Groups which are directly provided with chemical/biological weapons/agents.	medium	2	No	No	Unknown	Yes

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
<b>Groups which have an attack history that demonstrates a pattern of escalating casualty counts.</b>	Weak to Medium	1.5	No	No	Unknown	No
<b>Groups which have previously attempted to acquire chemical/biological weapons/agents or the materials necessary to fabricate such weapons/agents.</b>	Very Strong	5	Yes	Unknown	Unknown	Yes
<b>Groups which have previously explicitly threatened to use chemical/biological weapons/agents.</b>	Medium	2	Yes	Unknown	Unknown	Unknown
<b>Groups which have exhibited explicit evidence that they possess the capability to acquire chemical/biological weapons/agents.</b>	Very Strong	5	Yes	Unknown	Unknown	Unknown
<b>Groups which have previously used chemical/biological weapons/agents successfully.</b>	Very Strong	5	No	Unknown	Unknown	Unknown
<b>Groups which have relocated their headquarters/main operations to an area where there are high opportunities for acquiring chemical/biological weapons/agents.</b>	Medium to Strong	2.5	Yes	Unknown	Unknown	Yes
<b>Group with members who have displayed odd or suspicious behavior at or near chemical/biological facilities.</b>	Strong	3	Unknown	Unknown	Unknown	Unknown

<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups with members who display unexplained symptoms of illness and/or death associated with chemical/biological weapons/agents.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups with members who exhibit symptoms of poisoning, specifically of an unusual or particularly toxic nature or exotic diseases, specifically those which are non-native to the region in which the group is based.</b>	Strong	3	Unknown	Unknown	Unknown	Unknown

### Negative Motivational Indicators

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which adhere to doctrines and/or manifestos that explicitly proscribe killing.	Medium	-2	No	No	No	No
Groups which adhere to doctrines and/or manifestos that explicitly prohibit the use of chemical/biological weapons/agents.	Strong	-3	No	No	No	No
Groups which adhere to doctrines and/or manifestos that explicitly reject modern technologies.	Weak to Medium	-1.5	No	No	No	No
Groups which adhere to doctrines and/or manifestos that expressly prohibit the contamination of the environment.	Weak to Medium	-1.5	No	Unknown	Yes	No
Groups which exclusively target the IT infrastructure of their enemies (excluding groups which specifically employ or seek to employ silicon-eating microbes).	Strong	-3	No	No	No	No
Groups which seek the physical destruction of their enemy's critical infrastructure and key resources (CIKR) - including but not limited to: power grids and water filtration plants, national monuments and government facilities, telecommunications and transportation systems, chemical facilities, etc.	Medium	-2	Yes	Unknown	Yes	No

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which have displayed little or no interest in innovating, especially in the area of weapons selection.	Strong	-3	No	Unknown	No	No
Groups with a leader/decision-maker that exhibits a disproportionate fear of chemical/biological contamination.	Medium to Strong	-2.5	Unknown	Unknown	Unknown	Unknown
Groups which deliberately seek to avoid/shun potential recruits who possess a scientific and/or technical education or background in chemistry, chemical agents, chemical engineering, etc or in biological/life sciences (e.g. microbiology, virology), biotechnology, etc.	Strong	-3	No	Unknown	No	No
Groups which have demonstrated a low risk threshold, in terms of member casualties, potential retaliatory actions, etc.	Strong	-3	No	No	No	No
Groups which have demonstrated the need to achieve immediate gratification – in terms of recognition, public attention, etc. – for their attacks.	Weak	-1	No	Unknown	No	No
Groups which for the use of chemical/biological weapons/agents are inconsistent with the tolerance of their constituent base.	Strong	-3	No	No	Unknown	No
Groups which enjoy the strong sponsorship of a state and are thus subject to constraints on the use of unconventional means.	Weak	-1	No	No	No	Yes

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
<b>Groups which have previously had - and rejected - the opportunity to acquire and/or utilize chemical/biological weapons/agents.</b>	Medium	-2	No	Unknown	No	No
<b>Groups which have historically been able to achieve their operational objectives through 'tried and true' conventional methods/weapons (e.g. firearms, explosives, etc.).</b>	Weak	-1	Unknown	No	Yes	Unknown
<b>Groups which have experienced prior failure in acquiring, producing, weaponizing, and/or using chemical/biological weapons/agents.</b>	Weak	-1	Yes	Unknown	No	No
<b>Total Motivational Scores</b>			<b>35</b>	<b>25.5</b>	<b>8</b>	<b>22.5</b>

### Positive Chemical Capability Indicators

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which have previously demonstrated the capability to carry out successful, sophisticated attacks on a large-scale.	Medium	2	Yes	Unknown	Yes	Yes
Groups which have a demonstrated history of carrying out multiple attacks.	Weak	1	Yes	No	Yes	Yes
Groups which are considered to be 'large' (e.g. those composed of more than 25 members).	Medium	2	Yes	Unknown	Yes	Yes
Groups which have demonstrated the ability to obtain sought-after information by reconnoitering chemical-related facilities utilizing covert or seemingly normal activities.	Medium	2	Unknown	Unknown	Yes	Yes
Groups which are capable of forging counterfeit licenses, documents, credentials, etc.; for example, individuals capable of successfully posing as legitimately licensed chemical buyers.	Weak	1	Unknown	Unknown	Unknown	Yes
Groups which have demonstrated experience establishing and operating front/shell companies.	Medium	2	Yes	Yes	Yes	Yes
Groups which, through members, supporters, etc., possess the institutional credentials (university, laboratory, etc.) necessary to order/purchase restricted materials or equipment.	Medium to Strong	2.5	Unknown	Unknown	Unknown	Yes

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which are known to have sought plume simulation and analysis software.	Weak	1	Unknown	Unknown	Unknown	Unknown
Groups which have access to a high level of monetary funds.	Medium to Strong	2.5	Unknown	Yes	Unknown	Yes
Groups which have access to areas (either physical facilities or isolated geographical areas) where they are able operate without threat or pressure from enemies and/or authorities.	Medium	2	Yes	Yes	Yes	Yes
Groups which are known to have warehouses and/or storage facilities.	Weak	1	Yes	Unknown	Yes	Yes
Groups which have members who possess formal background training and/or expertise in chemistry.	Medium	2	Yes	Unknown	Unknown	Yes
Groups which have members who have been formally trained as chemical engineer/s.	Medium to Strong	2.5	Unknown	Unknown	Unknown	Unknown
Groups which possess a 'chemical cadre' - members with background/expertise in both chemistry and chemical engineering.	Strong	3	Unknown	Unknown	Unknown	Unknown
Groups which have experience with illicit drug production, particularly synthetic drugs such as methamphetamine ('meth'), temazepam ('jellies'), methylenedioxymethamphetamine (MDMA or 'Ecstasy').	Weak to Medium	1.5	No	Unknown	Unknown	Unknown
Groups with members who have experience in handling, transporting, and working with hazardous material/s.	Medium	2	Unknown	Unknown	Unknown	Unknown



Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups with members who have experience and expertise in explosives.	Weak to Medium	1.5	Yes	Unknown	Yes	Yes
Groups with member/s who are charismatic 'smooth talkers' who are able to gain the trust of or access to those who can facilitate the acquisition of chemical agents and/or materials.	Weak	1	Unknown	Unknown	Yes	Yes
Groups which are headquartered and/or have camps/facilities located close to chemically relevant facilities (e.g. chemical plants, labs, etc.).	Strong	3	No	Unknown	Unknown	Unknown
The presence of unsecured chemical plants/facilities, especially commercial plants/facilities.	Medium to Strong	2.5	Yes	Unknown	Unknown	Yes
Groups which have members who are employees of plants/facilities that produce toxic industrial chemicals (TICs).	Strong	3	Unknown	Unknown	Unknown	Yes
Groups which have members who are employees of chemical research labs.	Medium	2	Unknown	Unknown	Unknown	Yes
Groups which have members who are employees of plants/facilities that produce pesticides.	Strong	3	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of textile plants/facilities.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of plastics plants/facilities.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of chlorine plants/facilities.	Strong	3	Unknown	Unknown	Unknown	Unknown

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which have members who are employees of pharmaceutical companies (including plants/facilities).	Weak to Medium	1.5	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of water purification plants/facilities.	Medium to Strong	2.5	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of transportation companies (e.g. trucking, railroad, etc.).	Medium to Strong	2.5	Unknown	Unknown	Unknown	Yes
Groups which have members who are employees of companies that sell chemical equipment (e.g. laboratory equipment, protective equipment).	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of agricultural facilities that handle large amounts of chemicals (e.g. pesticides).	Weak	1	Unknown	Unknown	Unknown	No
Groups which have members who are employees of food production facilities (e.g. ability to contaminate food supply).	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employed in the aviation sector (e.g. access to small planes, crop dusters, etc.).	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of consumer product production (e.g. ability to contaminate consumer products).	Medium	2	Yes	Unknown	Unknown	Yes
Groups which have members who are employed in the maritime sector (e.g. access to chemical cargo, etc.).	Weak to Medium	1.5	Unknown	Unknown	Unknown	Yes

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which are known to possess general lab equipment relevant to chemistry, etc.	Medium	2	Yes	Unknown	Unknown	Yes
Groups which are known to possess corrosion resistant lab equipment relevant to chemistry, etc.	Medium	2	Unknown	Unknown	No	Unknown
Groups which are known to possess chemical solvents.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which are known to possess stabilizing chemicals.	Strong	3	Unknown	Unknown	Unknown	Unknown
Groups which are known to possess personal protective equipment (PPE), specifically chemical protective equipment.	Medium	2	Unknown	Unknown	Unknown	Yes
Groups which are known to possess microreactor/s (e.g. miniaturized chemical production devices).	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which are known to possess Mark I Kit/s, which contain antidotes for exposure to a nerve or organophosphate agent.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which are known to possess explosive-related materials (e.g TNT, C4, etc.) that can be used a delivery mechanism for chemical agents.	Medium	2	Yes	Unknown	Yes	Yes
Groups which are known to possess crop dusters and/or sprayers that can be used as a delivery mechanism for chemical agents.	Medium	2	No	Unknown	Unknown	Unknown

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which have ties to or are actively engaged with criminal cartels, especially when the latter closely identifies with the ideology and/or doctrines of the former.	Weak to Medium	1.5	Yes	Unknown	Yes	Yes
The 'proliferation' of chemical weapons scientists previously employed in state-level chemical weapons programs.	Weak	1	Yes	Unknown	Unknown	Yes
Significant political instability (civil war, disputed elections, extreme natural disaster, etc.) in a state known to, or suspected to, possess chemical weapons.	Medium	2	Yes	Unknown	Unknown	Yes
Groups which are known to have or have sought contact with former state-level chemical weapons scientist/s.	Medium to Strong	2.5	Unknown	Unknown	Unknown	Unknown
Groups which have a previously demonstrated the ability to execute successful poisoning/s.	Weak	1	No	Unknown	No	Unknown
Groups which are known to possess or sought to acquire technical materials related to the production or weaponization of chemical weapons/agents.	Medium	2	Yes	Unknown	Unknown	Yes
Groups which are known to possess or have sought to acquire technical and/or instructional manuals related to the production or weaponization of chemical weapons/agents.	Weak	1	Yes	Unknown	Unknown	Yes
Groups which are known to possess or sought to acquire the 'raw materials' (precursor chemicals) necessary for the production or weaponization of chemical weapons/agents.	Medium to Strong	2.5	Yes	Unknown	Unknown	Yes

<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which have engaged in 'field-trips' to chemically-relevant location/s.</b>	Weak	1	Unknown	Unknown	Unknown	Unknown
<b>Groups which have engaged in 'field-trips' to chemically-relevant facility/ies.</b>	Medium	1	Unknown	Unknown	Unknown	Unknown
<b>Group which have a large influx of animals that could potentially be used for testing of chemical agents.</b>	Weak to Medium	1.5	Unknown	Unknown	Unknown	Unknown
<b>The presence of odd odors emanating from areas around group camps and/or facilities.</b>	Medium	2	Unknown	Unknown	No	Unknown
<b>The presence of sick animals, likely from chemical contamination and/or poisoning, in areas around group camps and/or facilities.</b>	Weak to Medium	1.5	Unknown	Unknown	No	Unknown
<b>The presence of dead animals, likely from chemical contamination and/or poisoning, in areas around group camps and/or facilities.</b>	Weak to Medium	1.5	Unknown	Unknown	No	Unknown
<b>Groups with members who display illnesses or symptoms of chemical contamination and/or poisoning.</b>	Medium to Strong	2.5	Unknown	Unknown	Unknown	Unknown
<b>The presence of sick civilians, likely from chemical contamination and/or poisoning, in areas around group camps and/or facilities.</b>	Medium to Strong	2.5	Unknown	Unknown	Unknown	Unknown

### Negative Chemical Capability Indicators

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which have demonstrated low levels of operational capabilities.	Strong	-3	No	Unknown	No	No
Groups which are 'on-the-run', lacking a secure base of operations and face existential threats from enemies and/or authorities.	Weak to Medium	-1.5	Yes	Unknown	No	No
Groups which have demonstrated evidence of ignorance concerning chemical weapons/agents.	Medium to Strong	-2.5	No	Unknown	Unknown	No
Groups in which there is a lack of solidarity or cohesiveness or in-fighting between group members.	Weak to Medium	-1.5	No	Unknown	Unknown	No
Groups which lack members with any sort of technical background or expertise in either chemistry or chemical engineering.	Strong	-3	No	Unknown	Yes	No
Groups which are based in states where there is no chemical infrastructure (e.g. plants, facilities, research labs, etc.).	Medium	-2	No	Yes	No	No
Groups which lack basic infrastructure to produce and/or weaponize chemical agents.	Weak to Medium	-1.5	Yes	Unknown	No	No
Groups which do not have access/consistent access to electricity, either via a traditional electrical grid or generators.	Weak to Medium	-1.5	Yes	Unknown	No	No
Groups which lack access to modern communication technologies, especially the internet.	Weak to Medium	-1.5	Yes	Unknown	No	No
Groups which have restricted or limited access to liquid financial resources.	Weak	1	No	No	Unknown	No

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
<b>Groups which have previously orchestrated hoaxes related to chemical weapons/agents.</b>	Weak	-1	No	Unknown	Unknown	No
<b>Groups which have previously attempted - and failed - to acquire, produce, and/or weaponize chemical weapons/agents.</b>	Weak to Medium	-1.5	Yes	Unknown	Unknown	No
<b>Total Chemical Capability Scores</b>			<b>21</b>	<b>6.5</b>	<b>19</b>	<b>52</b>

### Positive Biological Capability Indicators

Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups which have previously demonstrated the capability to carry out successful, sophisticated attacks on a large-scale.	Medium	2	Yes	Unknown	Yes	Yes
Groups which have a demonstrated history of carrying out multiple attacks.	Weak	1	Yes	No	Yes	Yes
Groups which are considered to be 'large' (e.g. those composed of more than 25 members).	Medium	2	Yes	Unknown	yes	Yes
Groups which have demonstrated the ability to obtain sought-after information by reconnoitering biological-related facilities utilizing covert or seemingly normal activities.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which are capable of forging counterfeit licenses, documents, credentials, etc.; for example, individuals capable of successfully posing as legitimately licensed biological buyers.	Weak	1	Unknown	Unknown	Unknown	Yes
Groups which have demonstrated experience establishing and operating front/shell companies.	Medium	2	Yes	Yes	Yes	Yes
Groups which, through members, supporters, etc., possess the institutional credentials (university, laboratory, etc.) necessary to order/purchase restricted materials or equipment.	Medium to Strong	2.5	Unknown	Unknown	Unknown	Yes
Groups which are known to have sought plume simulation and analysis software.	Weak	1	Unknown	Unknown	Unknown	Unknown



<b>Groups which have access to a high level of monetary funds.</b>	Strong	3	Yes	Yes	Unknown	Yes
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<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which have access to areas (either physical facilities or isolated geographical areas) where they are able operate without threat or pressure from enemies and/or authorities.</b>	Medium	2	Yes	Yes	Yes	Yes
<b>Groups which run or are closely connected to hospitals, clinics, and/or other healthcare facilities.</b>	Strong	3	No	Unknown	Unknown	Yes
<b>Groups which are known to have storage facilities with the refrigeration units, coolant devices or materials, Freon, etc. necessary to store and/or transport biological agents/weapons.</b>	Weak to medium	1.5	Unknown	Unknown	Unknown	Unknown
<b>Groups which have members who possess formal background training and/or expertise in biological/life sciences.</b>	Medium	2	Yes	Unknown	Unknown	Yes
<b>Groups which have members with formal training in mechanical/environmental engineering.</b>	Medium	2	Unknown	Unknown	Unknown	Yes
<b>Groups which possess a 'biological cadre' - members extensive with background/expertise in biological/life sciences (e.g. microbiology, virology, synthetic biology), biotechnology, genetic engineering, etc.</b>	Strong	3	Unknown	Unknown	Unknown	Unknown
<b>Groups which have experience with illicit drug production, particularly synthetic drugs such as methamphetamine ('meth'), temazepam ('jellies'), methylenedioxymethamphetamine (MDMA</b>	Weak to Medium	1.5	Unknown	Unknown	Unknown	Unknown

or 'Ecstasy').						
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Indicator	Indicator Strength	Scoring Weights	al-Qa'ida central	Apocalyptic Millenarian Cult	R/CIRA/Oghliaghi	Hizballah
Groups with members who have experience in handling, transporting, and working with hazardous material/s.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups with members who have experience and expertise in explosives.	Weak to Medium	1.5	Yes	Unknown	Yes	Yes
Groups with member/s who are charismatic 'smooth talkers' who are able to gain the trust of or access to those who can facilitate the acquisition of biological agents and/or materials.	Weak	1	Unknown	Unknown	Yes	Yes
Groups which have access to the raw materials necessary for biological agent production.	Weak to medium	1.5	Unknown	Unknown	Unknown	Unknown
Groups with members who are employees of biological research labs.	Strong	3	Unknown	Unknown	Unknown	Yes
Groups which have members who are employees of hospitals, clinics, and/or other healthcare facilities.	Weak to medium	1.5	Unknown	Unknown	Unknown	Yes
Groups which have members who are employees of plants/facilities that produce pesticides.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of biotechnology companies/labs.	Medium	2	Unknown	Unknown	Unknown	Unknown
Groups which have members who are employees of pharmaceutical companies (including plants/facilities).	Medium	2	Unknown	Unknown	Unknown	Unknown

<b>Groups which are known to possess general lab equipment relevant to biology, virology, etc.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
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<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which are known to possess gene synthesizers.</b>	Medium	2	No	Unknown	Unknown	Unknown
<b>Groups which are known to possess Polymerase Chain Reaction (PCR) devices or kits.</b>	Medium	2	No	Unknown	Unknown	Unknown
<b>Groups which are known to possess Reverse Transcription Polymerase Chain Reaction (RT-PCR) devices or kits.</b>	Medium	2	No	Unknown	Unknown	Unknown
<b>Groups which are known to possess lyophilizers or other lyophilization (freeze-drying) equipment used in the conversion of biological agents into dry powders for aerosol dissemination.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which are known to possess nebulization equipment used for aerosol dissemination of biological agents.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess the necessary scientific equipment to culture biological materials/agents</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess nutrient media necessary for the growth and maintenance of biological materials/agents.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess agar plates, used in conjunction with growth media, to cultivate biological materials/agents.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess the equipment necessary for fermentation of biological materials/agents.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown

<b>Groups which possess milling equipment that can convert biological agents into dry powders for aerosol dissemination.</b>	Medium	2	Yes	Unknown	Unknown	Yes
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<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which have access to glove-boxes or similar items enabling protected manipulation of pathogens.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess, or have attempted to acquire, 3-D printer technology.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess or have access to equipment used to automate the DNA sequencing process.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess or have access to high-purity reagents for use in microbiological research and testing processes.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess or have access to positive pressure respirators.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess aerosolization testing equipment, including aerosol generators (electrospray or vibrator), small scale powder dispersers, atomizers, fluidized bed aerosol generators, aerosol testing chambers, etc.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which possess high levels of disinfectants not necessary for legitimate purposes.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which are known to have stockpiled vaccines (e.g. DryVax, Imvamune, BioThrax (Anthrax Vaccine Absorbed (AVA), <i>F. tularensis</i> LVS, Bacille Calmette Guerin-based vaccines (BCG-TB), etc.) known to provide</b>	Medium	2	Unknown	Unknown	Unknown	Yes

<b>protection against illnesses/diseases caused by biological agents/weapons.</b>						
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<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which have stockpiled antibiotics (e.g. ciprofloxacin, doxycycline, streptomycin, etc.) known to counteract illnesses/ diseases caused by biological agents/weapons.</b>	Medium	2	Unknown	Unknown	Unknown	Yes
<b>Groups which are known to have stockpiled antiviral drugs (e.g. oseltamivir, ribavirin, cidofovir, etc.) known to counteract illnesses/ diseases caused by biological agents/weapons.</b>	Medium	2	Unknown	Unknown	Unknown	Yes
<b>Groups which are known to possess personal protective equipment (PPE), specifically biological protective equipment.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which are known to possess crop dusters and/or sprayers that can be used as a delivery mechanism for biological agents.</b>	Medium	2	Unknown	Unknown	Unknown	Unknown
<b>Groups which have ties to or are actively engaged with criminal cartels, especially when the latter closely identifies with the ideology and/or doctrines of the former.</b>	Weak to Medium	1.5	Yes	Unknown	Yes	Yes
<b>Groups which are known to have or have sought contact with former state-level</b>	Medium	2	Unknown	Unknown	Unknown	Yes

<b>biological weapons scientist/s.</b>						
<b>Significant political instability (civil war, disputed elections, extreme natural disaster, etc.) in a state known, or suspected to, possess biological weapons.</b>	Medium	2	Yes	No	Yes	Yes
<b>The ‘proliferation’ of biological weapons scientists previously employed in state-level biological weapons programs.</b>	Weak	1	Unknown	Unknown	Unknown	Unknown

<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which have a previously demonstrated the ability to execute successful poisoning/s.</b>	Weak	1	Unknown	Unknown	No	No
<b>Groups which are known to possess or have sought to acquire technical and/or instructional manuals related to the production or weaponization of biological weapons/agents.</b>	Weak to medium	1.5	Yes	Unknown	Unknown	Yes
<b>Groups which are known to possess or sought to acquire the ‘raw materials’ necessary for the production or weaponization of biological weapons/agents.</b>	Weak to medium	1.5	Yes	Unknown	Unknown	Unknown
<b>Groups which have engaged in travel or excursions to areas where there are outbreaks of endemic diseases.</b>	Weak	1	Yes	Unknown	Unknown	Unknown
<b>Group which have a large influx of animals (e.g. mice, rabbits, etc.) that</b>	Weak to medium	1.5	Unknown	Unknown	Unknown	Unknown

<b>could potentially be used for testing of biological agents.</b>						
<b>The presence of odd odors emanating from areas around group camps and/or facilities.</b>	Weak	1	Unknown	Unknown	Unknown	Unknown
<b>The presence of dead animals and/or plants in areas around group camps and/or facilities.</b>	Weak to medium	1.5	Unknown	Unknown	Unknown	Unknown
<b>Groups with members, or local civilians, exhibiting symptoms of exotic diseases non-native to the region in which the group is based.</b>	Medium to strong	2.5	Unknown	Unknown	Unknown	Unknown

**Negative Biological Capabilities Indicators**

<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which have demonstrated low levels of operational capabilities.</b>	Strong	-3	No	Unknown	No	No
<b>Groups which are 'on-the-run', lacking a secure base of operations and face existential threats from enemies and/or authorities.</b>	Medium	-2	Yes	Unknown	No	No
<b>Groups which have demonstrated evidence of ignorance concerning biological weapons/agents.</b>	Medium to strong	-2.5	No	Unknown	Unknown	No
<b>Groups in which there is a lack of solidarity or cohesiveness or in-fighting between group members.</b>	Weak to medium	-1.5	No	Unknown	Unknown	No
<b>Groups which lack members with any sort of technical background or expertise in background/expertise in biological/life sciences (e.g. microbiology, virology, synthetic biology), biotechnology, genetic engineering, etc.</b>	Strong	-3	Unknown	Unknown	No	No
<b>Groups which lack basic infrastructure to produce and/or weaponize chemical agents.</b>	Medium to strong	-2.5	Yes	No	No	No
<b>Groups which do not have access/consistent access to electricity, either via a traditional electrical grid or generators.</b>	Medium to strong	-2.5	Yes	No	No	No



<b>Groups which lack access to modern communication technologies, especially the internet.</b>	Weak to Medium	-1.5	No	Unknown	No	Unknown
<b>Groups which have restricted or limited access to liquid financial resources.</b>	Weak	-1	No	No	Unknown	No

<b>Indicator</b>	<b>Indicator Strength</b>	<b>Scoring Weights</b>	<b>al-Qa'ida central</b>	<b>Apocalyptic Millenarian Cult</b>	<b>R/CIRA/Oghliaghi</b>	<b>Hizballah</b>
<b>Groups which have previously orchestrated hoaxes related to biological weapons/agents.</b>	Weak	-1	No	Unknown	No	No
<b>Groups which have previously attempted – and failed – to acquire, produce, and/or weaponize biological weapons/agents.</b>	Medium	-2	Yes	Unknown	No	No
<b>Total Biological Capability Scores</b>			<b>4</b>	<b>5</b>	<b>7.5</b>	<b>37.5</b>

## **Appendix IV: Non-State Adversary Rankings<sup>427</sup>**

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<sup>427</sup> This appendix was prepared by Mila Johns.

**APPENDIX IV-A: CHEMICAL NON-STATE ADVERSARIES RANKINGS**

**Table IV.1: Overall Rank (Rank Multiplication)**

<b>Rank</b>	<b>Non-State Adversary</b>
1	al-Nusra Front
2	Hizballah
3	al-Qa'ida Central
4	Islamic State of Iraq and the Levant (ISIS)
5	al-Qa'ida in the Arabian Peninsula (AQAP)
6	Apocalyptic Millenarian Cult
7	Revolutionary Armed Forces of Colombia (FARC)
8	al-Qa'ida in the Islamic Maghreb (AQIM)
9	Hindu Extremists
10	D-Company
11	Lashkar-e Taiba (LeT)
12	Haqqani Network
13	Right Wing Militias
14	Ethnic Chinese Triads
15	Lashkar-e Jhangvi (LeJ)
16	Los Zetas
17	Jemaah Islamiyah (JI)
18	La Familia Michoacan/Knight Templar
19	Christian Identity Groups
20	Caucasus Emirate (CE)
21	White Supremacists
22	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
23	al-Shaabab
24	Tehrik-e-Taliban Pakistan (TTP)
25	Islamic Movement of Uzbekistan (IMU)
26	Hamas
27	Palestinian Islamic Jihad (PIJ)
28	Indian Mujahideen (IM)
29	Kurdistan Workers Party (PKK)
30	Abu Sayyaf
31	Domestic U.S. Tax Protesters
32	Boko Haram
33	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
34	Anarchists
35	Aleph (Aum Shinrikyo)
36	Salafia Jihadia
37	Mojahedin-e-Khalq (MEK)
38	ETA

39	Anti-Abortion Extremists
40	National Liberation Front of Corsica (FLNC)
41	Jewish Extremists
42	Buddhist Extremists
43	Sikh Extremists

**Table IV.2: Overall Rank (Rank Addition)**

Rank	Non-State Adversary
1	al-Nusra Front
2	Hizballah
3	al-Qa'ida Central
4	Islamic State of Iraq and the Levant (ISIS)
5	al-Qa'ida in the Arabian Peninsula (AQAP)
6	Apocalyptic Millenarian Cult
7	al-Qa'ida in the Islamic Maghreb (AQIM)
8	Revolutionary Armed Forces of Colombia (FARC)
9	Lashkar-e Taiba (LeT)
10	Haqqani Network
11	Lashkar-e Jhangvi (LeJ)
12	Jemaah Islamiyah (JI)
13	Right Wing Militias
14	Los Zetas
15	Caucasus Emirate (CE)
16	Hindu Extremists
17	D-Company
18	Ethnic Chinese Triads
19	La Familia Michoacan/Knight Templar
20	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
21	Tehrik-e-Taliban Pakistan (TTP)
22	Christian Identity Groups
23	Islamic Movement of Uzbekistan (IMU)
24	White Supremacists
25	al-Shaabab
26	Hamas
27	Palestinian Islamic Jihad (PIJ)
28	Kurdistan Workers Party (PKK)
29	Indian Mujahideen (IM)
30	Domestic U.S. Tax Protesters
31	Aleph (Aum Shinrikyo)
32	Abu Sayyaf
33	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
34	Anarchists
35	Salafia Jihadia

36	Boko Haram
37	Mojahedin-e-Khalq (MEK)
38	ETA
39	Anti-Abortion Extremists
40	National Liberation Front of Corsica (FLNC)
41	Jewish Extremists
42	Buddhist Extremists
43	Sikh Extremists

**Table IV.3: Overall Rank (Score Multiplication)**

Rank	Non-State Adversary
1	Hizballah
2	al-Nusra Front
3	al-Qa'ida Central
4	Revolutionary Armed Forces of Colombia (FARC)
5	Islamic State of Iraq and the Levant (ISIS)
6	La Familia Michoacan/Knight Templar
7	Earth Liberation Front (ELF)/Animal Liberation Front (ALF)
8	D-Company
9	Los Zetas
10	Hindu Extremists
11	Kurdistan Workers Party (PKK)
12	Right Wing Militias
13	Lashkar-e Jhangvi (LeJ)
14	Lashkar-e Taiba (LeT)
15	Islamic Movement of Uzbekistan (IMU)
16	al-Qa'ida in the Arabian Peninsula (AQAP)
17	Tehrik-e-Taliban Pakistan (TTP)
18	Domestic U.S. Tax Protesters
19	al-Shaabab
20	White Supremacists
21	Christian Identity Groups
22	al-Qa'ida in the Islamic Maghreb (AQIM)
23	Haqqani Network
24	Anti-Abortion Extremists
25	Apocalyptic Millenarian Cult
26	Ethnic Chinese Triads
27	Indian Mujahideen (IM)
28	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
29	Aleph (Aum Shinrikyo)
30	Jemaah Islamiyah (JI)
31	Hamas
32	Caucasus Emirate (CE)

33	Mojahedin-e-Khalq (MEK)
34	Salafia Jihadia
35	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
36	Palestinian Islamic Jihad (PIJ)
37	National Liberation Front of Corsica (FLNC)
38	Sikh Extremists
39	ETA
40	Buddhist Extremists
41	Jewish Extremists
42	Abu Sayyaf
43	Boko Haram

**Table IV.4: Overall Rank (Score Addition)**

<b>Rank</b>	<b>Non-State Adversary</b>
1	Hizballah
2	al-Nusra Front
3	al-Qa'ida Central
4	Hindu Extremists
5	Revolutionary Armed Forces of Colombia (FARC)
6	Right Wing Militias
7	Islamic State of Iraq and the Levant (ISIS)
8	La Familia Michoacan/Knight Templar
9	Earth Liberation Front (ELF)/Animal Liberation Front (ALF)
10	D-Company
11	Los Zetas
12	Kurdistan Workers Party (PKK)
13	Lashkar-e Taiba (LeT)
14	Lashkar-e Jhangvi (LeJ)
15	Islamic Movement of Uzbekistan (IMU)
16	Domestic U.S. Tax Protesters
17	al-Qa'ida in the Arabian Peninsula (AQAP)
18	Tehrik-e-Taliban Pakistan (TTP)
19	White Supremacists
20	Anti-Abortion Extremists
21	Apocalyptic Millenarian Cult
22	Ethnic Chinese Triads
23	al-Shaabab
24	Christian Identity Groups
25	al-Qa'ida in the Islamic Maghreb (AQIM)
26	Haqqani Network
27	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
28	Indian Mujahideen (IM)

29	Aleph (Aum Shinrikyo)
30	Jemaah Islamiyah (JI)
31	Hamas
32	Mojahedin-e-Khalq (MEK)
33	Caucasus Emirate (CE)
34	Salafia Jihadia
35	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
36	National Liberation Front of Corsica (FLNC)
37	ETA
38	Palestinian Islamic Jihad (PIJ)
39	Abu Sayyaf
40	Buddhist Extremists
41	Boko Haram
42	Jewish Extremists
43	Sikh Extremists

**APPENDIX IV-B: BIOLOGICAL NON-STATE ADVERSARIES RANKINGS**

**Table IV.5: Overall Rank (Rank Multiplication)**

Rank	Non-State Adversary
1	Hizballah
2	al-Qa'ida in the Arabian Peninsula (AQAP)
3	al-Qa'ida Central
4	al-Nusra Front
5	Apocalyptic Millenarian Cult
6	Lashkar-e Taiba (LeT)
7	Earth Liberation Front (ELF)/Animal Liberation Front (ALF)
8	Islamic State of Iraq and the Levant (ISIS)
9	al-Qa'ida in the Islamic Maghreb (AQIM)
10	Revolutionary Armed Forces of Colombia (FARC)
11	Right Wing Militias
12	Lashkar-e Jhangvi (LeJ)
13	Hindu Extremists
14	Hamas
15	Haqqani Network
16	Jemaah Islamiyah (JI)
17	D-Company
18	Caucasus Emirate (CE)
19	Christian Identity Groups
20	White Supremacists
21	Tehrik-e-Taliban Pakistan (TTP)
22	Islamic Movement of Uzbekistan (IMU)
23	Ethnic Chinese Triads

24	La Familia Michoacan/Knight Templar
25	Los Zetas
26	Kurdistan Workers Party (PKK)
27	al-Shaabab
28	Indian Mujahideen (IM)
29	Domestic U.S. Tax Protesters
30	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
31	Palestinian Islamic Jihad (PIJ)
32	Aleph (Aum Shinrikyo)
33	Boko Haram
34	Abu Sayyaf
35	Salafia Jihadia
36	Anti-Abortion Extremists
37	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
38	Mojahedin-e-Khalq (MEK)
39	Buddhist Extremists
40	ETA
41	Jewish Extremists
42	National Liberation Front of Corsica (FLNC)
43	Sikh Extremists

**Table IV.6: Overall Rank (Rank Addition)**

<b>Rank</b>	<b>Non-State Adversary</b>
1	Hizballah
2	al-Qa'ida in the Arabian Peninsula (AQAP)
3	al-Qa'ida Central
4	al-Nusra Front
5	Apocalyptic Millenarian Cult
6	Lashkar-e Taiba (LeT)
7	Earth Liberation Front (ELF)/Animal Liberation Front (ALF)
8	Islamic State of Iraq and the Levant (ISIS)
9	al-Qa'ida in the Islamic Maghreb (AQIM)
10	Revolutionary Armed Forces of Colombia (FARC)
11	Right Wing Militias
12	Lashkar-e Jhangvi (LeJ)
13	Hindu Extremists
14	Hamas
15	Haqqani Network
16	Jemaah Islamiyah (JI)
17	D-Company
18	Caucasus Emirate (CE)
19	Christian Identity Groups
20	White Supremacists
21	Tehrik-e-Taliban Pakistan (TTP)



22	Islamic Movement of Uzbekistan (IMU)
23	Ethnic Chinese Triads
24	La Familia Michoacan/Knight Templar
25	Los Zetas
26	Kurdistan Workers Party (PKK)
27	al-Shaabab
28	Indian Mujahideen (IM)
29	Domestic U.S. Tax Protesters
30	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
31	Palestinian Islamic Jihad (PIJ)
32	Aleph (Aum Shinrikyo)
33	Boko Haram
34	Abu Sayyaf
35	Salafia Jihadia
36	Anti-Abortion Extremists
37	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
38	Mojahedin-e-Khalq (MEK)
39	Buddhist Extremists
40	ETA
41	Jewish Extremists
42	National Liberation Front of Corsica (FLNC)
43	Sikh Extremists

**Table IV.7: Overall Rank (Score Multiplication)**

Rank	Non-State Adversary
1	Hizballah
2	Revolutionary Armed Forces of Colombia (FARC)
3	Lashkar-e Taiba (LeT)
4	La Familia Michoacan/Knight Templar
5	D-Company
6	Lashkar-e Jhangvi (LeJ)
7	Hindu Extremists
8	Islamic State of Iraq and the Levant (ISIS)
9	Los Zetas
10	al-Nusra Front
11	al-Qa'ida in the Arabian Peninsula (AQAP)
12	Islamic Movement of Uzbekistan (IMU)
13	Earth Liberation Front (ELF)/Animal Liberation Front (ALF)
14	Tehrik-e-Taliban Pakistan (TTP)
15	al-Qa'ida Central
16	Apocalyptic Millenarian Cult
17	Haqqani Network

18	Hamas
19	Aleph (Aum Shinrikyo)
20	al-Shaabab
21	al-Qa'ida in the Islamic Maghreb (AQIM)
22	Ethnic Chinese Triads
23	Caucasus Emirate (CE)
24	Jemaah Islamiyah (JI)
25	Indian Mujahideen (IM)
26	Mojahedin-e-Khalq (MEK)
27	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
28	Kurdistan Workers Party (PKK)
29	Sikh Extremists
30	Palestinian Islamic Jihad (PIJ)
31	Buddhist Extremists
32	National Liberation Front of Corsica (FLNC)
33	ETA
34	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
35	Abu Sayyaf
36	Boko Haram
37	Jewish Extremists
38	Christian Identity Groups
39	White Supremacists
40	Domestic U.S. Tax Protesters
41	Salafia Jihadia
42	Anti-Abortion Extremists
43	Right Wing Militias

**Table IV.8: Overall Rank (Score Addition)**

Rank	Non-State Adversary
1	Hizballah
2	Lashkar-e Taiba (LeT)
3	Revolutionary Armed Forces of Colombia (FARC)
4	al-Qa'ida Central
5	Islamic State of Iraq and the Levant (ISIS)
6	al-Nusra Front
7	Hindu Extremists
8	La Familia Michoacan/Knight Templar
9	Right Wing Militias
10	Lashkar-e Jhangvi (LeJ)
11	D-Company
12	Earth Liberation Front (ELF)/Animal Liberation Front (ALF)
13	Los Zetas

14	Apocalyptic Millenarian Cult
15	al-Qa'ida in the Arabian Peninsula (AQAP)
16	Islamic Movement of Uzbekistan (IMU)
17	Tehrik-e-Taliban Pakistan (TTP)
18	Kurdistan Workers Party (PKK)
19	Anti-Abortion Extremists
20	Haqqani Network
21	al-Shaabab
22	Aleph (Aum Shinrikyo)
23	Hamas
24	Domestic U.S. Tax Protesters
25	White Supremacists
26	Ethnic Chinese Triads
27	Indian Mujahideen (IM)
28	Christian Identity Groups
29	al-Qa'ida in the Islamic Maghreb (AQIM)
30	Caucasus Emirate (CE)
31	Jemaah Islamiyah (JI)
32	Mojahedin-e-Khalq (MEK)
33	Real Irish Republican Army (RIRA)/ Continuity IRA (CIRA)/ Óglaigh na hÉireann
34	Salafia Jihadia
35	Palestinian Islamic Jihad (PIJ)
36	ETA
37	Buddhist Extremists
38	National Liberation Front of Corsica (FLNC)
39	Palestine Liberation Organization (PLO)/ al-Aqsa Martyrs' Brigades
40	Abu Sayyaf
41	Boko Haram
42	Jewish Extremists
43	Sikh Extremists

## Appendix V: CABNSAD Codebook<sup>428</sup>

### 1: PLOT ID

#### Auto ID

*Numeric variable*

This field automatically generates a unique, sequential identifier.

#### Profile Name

*String variable*

This field provides a quick reference name for the profile. Profiles are titled first by the organization that is involved in the incident(s), if an organization is unavailable, this field records either “Lone Actor(s)” or “Unknown” and a sequential identifier.

#### Perpetrator Type

*Numeric variable*

This field identifies one of four possible perpetrator types associated with the profile.

The value labels for this field are as follows:

- **Lone Actor**
- **Small Unaffiliated Cell:** defined in CABNSAD as a group not operationally part of any larger formal organization. In addition, such a cell often does not seek to establish an enduring identity, and may operate for only a brief time; for example, only the length of time to plan, manage and (attempt to) carry-out a single attack.
- **Formal Organization:** defined in CABNSAD as one with a codified structure (even if extremely loose) that is intended to persist over some period of time. Such an organization can self-identify as such and thus usually takes a name, but not in all cases.
- **Unknown**

#### Organization Affiliation

*String variable*

This field records the organization with which the listed perpetrator is affiliated. In the case of a formal organization, the organization’s name is listed. If the profile is of a lone actor or small (unnamed)

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<sup>428</sup> The CABNSAD Codebook was written by Lauren Pinson.

unaffiliated cell, this field is should be coded N/A. (Ideological links are coded in the following ‘Influenced By?’ variable.) If the profile is of an incident in which the perpetrator is unknown, this field is “Unknown.”

### Organization Type

#### *Numeric variable*

This field records whether the organization or unaffiliated cell is generally traditionally regarded as a terrorist organization, a criminal organization or, in the event the type is uncertain, an “Unknown.” For lone actor entries, this field is “N/A”.

The value labels for this field are as follows:

- **Recognized Terrorist Organization:** Organization must be listed within the Global Terrorism Database if CB pursuit/use is after 1970. If prior to 1970, RTOs will be discussed on a case-by-case basis.
- **Unaffiliated Terrorist Cell**
- **Criminal Organization**
- **Unaffiliated Criminal Cell**
- **Hybrid Criminal/Terrorist Organization**
- **Hybrid Criminal/Terrorist Cell**
- **Other Type of Organization or Unaffiliated Cell:** Type of organization or unaffiliated cell is known but is not criminal or terrorist (i.e., a government authority or company).
- **N/A:** (Not applicable) Use for lone actor entries.
- **Unknown:** Type of organization or unaffiliated cell cannot be discerned from sources.

### Ideology & Ideology Sub-Type (must select for both!)

#### *Numeric variables*

The ideology field provides a categorical description of the general ideology to which the organization or perpetrator adheres. In cases where an actor’s ideology falls into more than one category, the dominant ideological category is recorded. Where the ideology is unidentifiable this field is “Unidentifiable.”

This ideology sub-type field provides a further categorization of the organization’s or perpetrators primary ideology. In cases where an actor’s sub-type falls into more than one category, the dominant sub-type is recorded. Where the ideology was recorded as “Unidentifiable”, or there is no sub-type this field is recorded as N/A. Where the sub-type is unknown, this field is “Unknown.”

The value labels for this field are as follows:

- **Criminal**
- **Cult**
  - **Cult (Buddhist)**
  - **Cult (Christian)**
  - **Cult (Hindu)**
  - **Cult (Islamic)**
  - **Cult (Jewish)**
  - **Cult (Pagan)**
  - **Cult (UFO)**
- **Ethno-Nationalist**
- **Personal/Idiosyncratic**
- **Pro-Regime/Counter-Revolutionary**
- **Religious:**
  - **Buddhist (Ultrationalist, Apocalyptic)**
  - **Christian – Other or Unknown**
  - **Christian – Catholic Ultratraditionalist**
  - **Christian – Christian Reconstructionist**
  - **Christian - Eastern Orthodox**
  - **Christian – Protestant**
  - **Hindu (Hindu Nationalist, Fundamentalist)**
  - **Islamic – Other or Unknown**
  - **Islamic - Islamist (Shi'a)**
  - **Islamic - Islamist (Sunni)**
  - **Islamic (Shi'a)**
  - **Islamic (Sunni)**
  - **Jewish – Other or Unknown**
  - **Jewish – Orthodox**
  - **Occult (including Satanist)**
  - **“Pacifist” / Anti-War**
  - **Pagan/Polytheist (Odinist, etc)**
  - **Protestant Evangelical**
  - **Sikh (Fundamentalist)**
  -
- **Right Wing (Religious)**
  - **Christian – Christian Identity**
  - **Anti-Abortion**
  - **Anti-Catholics**
  - **Anti-Communist**
  - **Anti-Ecology/Pro-Development**
  - **Gun Rights**

- **Racial Supremacist/Racial Separatist**
- **Tax Protest**
- **Xenophobic/Nativist/Anti-Immigrant**
- **Secular Right-Wing:**
  - **Anti-Communist**
  - **Anti-Ecology/Pro-Development**
  - **Ecological/Anti-Technology/Primitivist/Animal Liberation**
  - **Fascist/Neo-Fascist**
  - **Generic (Non-Religious) Anti-Government/Secular Militia**
  - **Gun Rights**
  - **Libertarian**
  - **Racial Supremacist/Racial Separatist**
  - **Tax Protest**
  - **Xenophobic/Nativist/Anti-Immigrant**
- **Secular Left-Wing:**
  - **Anarchist**
  - **Ecological/Anti-Technology/Primitivist/Animal Liberation**
  - **“Pacifist”/Anti-War**
  - **Radical Nationalist**
  - **Socialist/Communist/Marxist/Leninist/Stalinist/Maoist**
- **Single Issue**
- **State Sponsored**
- **Identifiable but Outside Existing Categories**
- **Unidentifiable**

#### Influence By?

*String variable*

This field lists any organizations that influence the ideology of lone actors or small, unaffiliated cells. In the case of formal organizations this field should list “N/A.”

#### Alleged/Suspected Identity?

*Numeric variable*

The value labels for this field are as follows:

- **Yes:** Indicates either that (1) the incident(s) discussed in the profile has not been corroborated by an external source and, thus, there are no available open-source reports confirmations that it definitely occurred or (2) there is some doubt that the perpetrator listed in the profile is definitively responsible for perpetrating the incident.

- **No:** Indicates a high degree of confidence that the incident occurred and that the listed perpetrator is the most probable culprit.

### Outside Introduction

*String variable*

This field explains whether the initial awareness of any of the CB technologies used or pursued came from outside of the group. Any indication of potential state sponsorship leading to CB use or pursuit is also detailed. If no information is available the coder should enter “unknown” into this field.

### **Perpetrator Demographics**

The profile allows multiple perpetrators per incident and all demographics questions are asked for each of the possible perpetrators.

The perpetrators coded must be operationally and/or directly involved in the decision(s), production, and/or operations to use and pursue CB weapons and technologies. This includes all such individuals throughout the group’s history of CB pursuit and/or use. This generally includes scientists/lab technicians, operatives, decision makers, and group leaders.

### **Perpetrator 1**

#### Perpetrator 1 - Name

*String variable*

This field records the name of the perpetrator if it is known. If a name was not provided by available open-sources, the coder should enter “Unknown” into this field.

#### Perpetrator 1 – Chemical and/or Biological Uncertainty

*Numeric variable*

This field records the inherent uncertainty as to whether the individual was directly involved in the CB pursuit or use in any way. Code yes if you're uncertain whether or not this individual was directly involved in the CB pursuit/use. If an individual is not involved in CB use/pursuit in any potential way, he/she should not be coded at all.

The value labels for this field are as follows:

- **Yes:** There is uncertainty that this individual was involved in the CB pursuit and/or use in any way.
- **No:** The individual was involved in the CB pursuit and/or use in some way.



### Perpetrator 1 - Gender

#### *Numeric variable*

This field records whether the perpetrator involved was male or female. If a gender was not provided by available open-sources, this field records “Unknown.”

### Perpetrator 1 - Age

#### *Numeric variable*

This field records the age of the perpetrator at the time of the incident with which they were involved. If they were involved in more than one incident, the age at the beginning of the first incident in which they were involved is given. If the age was not provided by available open-sources, the coder should enter “-99” into this field.

### Perpetrator 1 - Education Level

#### *Numeric variable*

This field records the highest known education level of the perpetrator. [Note: If the perpetrator has a Ph.D., this is noted as well in ‘Education Details.’]

The value labels for this field are as follows:

- **High School:** High school refers to completion of basic education prior to college.
- **Undergraduate College:** Undergraduate college refers to a four-year degree of a baccalaureate nature.
- **Postgraduate College:** Postgraduate college refers to the completion of a Master’s or Ph.D. program. If a source specifies that the perpetrator has a Ph.D., the observation is noted in the Education Details field.
- **Unknown:** If the perpetrator’s level of education was not provided by available open-sources, the Education Level field records “Unknown.”

### Perpetrator 1 - Education Discipline

#### *String variable*

This field records the subject area to which the perpetrator concentrated on during his/her studies. Especially note if the perpetrator had any concentration in chemistry, chemical engineering, biotechnology, microbiology, metallurgy, microelectronics, computer programming, aerosols, food production/preparation, or engineering.

### Perpetrator 1 - Education Details

#### *String variable*

This field records any further details that might be pertinent to understanding the perpetrator's education level; for instance, whether he/she performed or engaged in studies of a given subject without pursuing a specific degree program.

#### Perpetrator 1 - Experience Details

*String variable*

This field records whether the individual attended any training camps (particularly with a formal terrorist organization and/or related to CB), trained others in any CB related activities, procured/developed any agent personally, or was directly involved in different types of attacks (CB or conventional). Note: Training may include training specific to the production, handling, and/or delivery of the agent and/or delivery mechanism. Examples can include working directly with specialists to develop the capabilities or taking related legitimate courses. Training can even include remote interaction through email; however, the correspondence must carry on beyond a few initial questions and essentially involve a relationship with the trainer. If no information is provided by available open-sources, the coder should enter "Unknown" into this field.

#### Perpetrator 1 – CB Role

*String variable*

This field records the role of the perpetrator in the overall plot. For instance, detailing whether the individual decided the organization should pursue CB, actively acquired or produced the agent and/or delivery mechanism, and/or perpetrated attacks involving CB. If no information is provided by available open-sources, the coder should enter "Unknown" into this field.

#### Perpetrator 1 – CB Decision Maker

*Numeric variable*

The value labels for this field are as follows:

- **Yes:** Perpetrator was involved in the decision to pursue/use CB. In the case of an organization, this may include organizational leaders.
- **No:** There is no evidence of the perpetrator's involvement in the decision to pursue/use CB.
- **Unknown:** There is insufficient information available to determine the level of the perpetrator's involvement in the decision to pursue/use CB.

#### Perpetrator 1 – CB Logistics

*Numeric variable*

The value labels for this field are as follows:

- **Yes:** Perpetrator was involved in the logistics of CB pursuit. This includes ordering, purchasing, or transporting components of or actual agents and/or delivery mechanisms during the weapon pursuit.
- **No:** There is no evidence of the perpetrator’s involvement in the logistics of CB pursuit.
- **Unknown:** There is insufficient information available to determine the level of the perpetrator’s involvement in the decision to pursue/use CB.

Perpetrator 1 – CB Producer

*Numeric variable*

The value labels for this field are as follows:

- **Yes:** Perpetrator was involved in the production of the CB agent and/or delivery mechanism. This includes but is not limited to scientists and engineers.
- **No:** There is no evidence of the perpetrator’s involvement in the production of the CB agent or delivery mechanism.
- **Unknown:** There is insufficient information available to determine the level of the perpetrator’s involvement in the decision to pursue/use CB.

Perpetrator 1 – CB Operative

*Numeric variable*

The value labels for this field are as follows:

- **Yes:** Perpetrator was involved in the operations of the attack or attempted use of the CB weapon.
- **No:** There is no evidence of the perpetrator serving or indicated to serve as an operative in an attack or attempted attack involving the CB weapon.

Perpetrator 1 - Country of Origin

*Numeric variable*

This field records the country from which the perpetrator originated (was a national of). If no originating country was provided by available open-sources, this field records “Unknown.”

The value labels for this field are as follows:

- |            |   |               |   |        |   |
|------------|---|---------------|---|--------|---|
| •          | A | •             | A | •      | A |
| fghanistan |   | lgeria        |   | ndorra |   |
| •          | A | •             | A | •      | A |
| lbania     |   | merican Samoa |   | ngola  |   |

• Antigua and Barbuda	A	• Brunei Darussalam	B	• Cyprus	C
• Argentina	A	• Bulgaria	B	• Czech Republic	C
• Armenia	A	• Burkina Faso	B	• Democratic Republic of Congo	D
• Australia	A	• Burundi	B		
• Austria	A	• Cambodia	C	• Denmark	D
• Azerbaijan	A	• Cameroon	C	• Djibouti	
• Bahamas	B	• Canada	C	• Dominica	
• Bangladesh	B	• Central African Republic	C	• Dominican Republic	
• Barbados	B	• Chad	C	• Ecuador	
• Belarus	B	• Chile	C	• Egypt	
• Belgium	B	• China	C	• El Salvador	
• Belize	B	• Colombia	C	• Equatorial Guinea	
• Benin	B	• Congo	C	• Eritrea	
• Bhutan	B	• Cook Islands	C	• Estonia	
• Bolivia	B	• Costa Rica	C	• Ethiopia	
• Bosnia and Herzegovina	B	• Cote D'Ivoire	C	• Micronesia	
• Botswana	B	• Croatia	C	• Fiji	
• Brazil	B	• Cuba	C	• Finland	
				• France	
				• French Polynesia	
				• Gabon	
				• Gambia	
				• Georgia	
				• Germany	
				• Germany (East)	
				• Germany (West)	
				• Ghana	
				• Greece	
				• Grenada	
				• Guatemala	
				• Guinea	

- Guinea-Bissau
- Guyana
- Haiti
- Holy See
- Honduras
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Israel
- Italy
- Jamaica
- Japan
- Jordan
- Kazakhstan
- Kenya
- Kiribati
- Kuwait
- Kyrgyzstan
- Laos
- Latvia
- Lebanon
- Lesotho
- Liberia
- Libya
- Liechtenstein
- Lithuania
- Luxembourg
- Macedonia
- Madagascar
- Malawi
- Malaysia
- Maldives
- Mali
- Marshall Islands
- Mauritania
- Mauritius
- Mexico
- Moldova
- Monaco
- Mongolia
- Morocco
- Mozambique
- Myanmar
- Namibia
- Nauru
- Nepal
- Netherlands
- New Zealand
- Nicaragua
- Niger
- Nigeria
- North Korea
- Northern Ireland
- Norway
- Oman
- Palestine
- Pakistan
- Panama
- Papua New Guinea
- Paraguay
- Peru
- Philippines
- Poland
- Portugal
- Qatar
- Romania
- Russian Federation
- Rwanda
- San Marino
- Sao Tome and Principe
- Saudi Arabia
- Senegal
- Serbia and Montenegro
- Seychelles
- Sierra Leone
- Singapore
- Slovakia
- Slovenia
- Solomon Islands
- Somalia
- South Africa
- South Korea
- South Sudan
- Spain
- Sri Lanka
- St Kitts and Nevis
- St Lucia
- Sudan
- Suriname
- Swaziland
- Sweden
- Switzerland
- Syria
- Taiwan
- Tajikistan
- Tanzania
- Thailand
- Timor-Leste
- Togo
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey

- Turkmenistan
- Tuvalu
- Uganda
- Ukraine
- Union of Soviet  
Socialist
- Republics
- United Arab  
Emirates
- United Kingdom
- United States of  
America
- Uruguay
- Uzbekistan
- Vanuatu
- Venezuela
- Vietnam
- Western Samoa
- Yemen
- Yugoslavia
- Zambia
- Zimbabwe
- Unknown
- Worldwide

### Perpetrator 1 - Residence

*String variable*

If indicated in the available open-sources, this field records the location (to the city/village level if possible) where the perpetrator was residing at the time of his/her involvement with CB agents. If the perpetrator was involved in various locations, list all locations separated by a semicolon. If no information is provided by available open-sources, the coder should enter “Unknown” into this field.

### Perpetrator 1 - Vocation Type

*Numeric Variable*

This field distinguishes between those actors for whom criminal or violent actions are routine and those who are involved in “one-off” criminal or violent action. This field records whether the perpetrator’s violent or criminal actions were his/her full-time or part-time activity. [Note: If the perpetrator had an additional civilian job while working for the terrorist or criminal organization, his/her other position is recorded in the ‘Vocation Details.’]

The value labels for this field are as follows:

- **Full-time terrorist**
- **Full-time criminal**
- **Part-time terrorist**
- **Part-time criminal**
- **Sporadic:** The CB event in question was the perpetrator’s one-off violent or criminal action.
- **Unknown**

### Perpetrator 1 - Vocation Details

*String variable*

This field records the perpetrator’s specific vocation. If no information is provided by available open-sources, the coder should enter “Unknown” into this field.

### Perpetrator 1 - Explosives

*Numeric variable*

This field records if the perpetrator possesses knowledge, experience, or expertise with explosives. The value labels for this field are as follows:

- **Yes**
- **No**
- **Unknown**

### Perpetrator 1 - Metis

*String variable*

This field describes the types of experiences (previous attacks, practical instruction, etc.) that increased the perpetrator's ability to better to produce or field any CB agent/weapon/technology. If no information is provided by available open-sources, the coder should enter "Unknown" into this field.

### Perpetrator 1 - Techne (Beginning)

*String variable*

This field describes the amount and type of technical knowledge the perpetrator had at the beginning of the CB pursuit. If no information is provided by available open-sources, the coder should enter "Unknown" into this field.

### Perpetrator 1 - Techne (End)

*String variable*

This field describes amount and type of technical knowledge the perpetrator had at the end of the CB pursuit. If no information is provided by available open-sources, the coder should enter "Unknown" into this field.

### Perpetrator 1 - Other Information

*String variable*

This field is reserved for any available, additional open-source information pertaining to the specific perpetrator that is not captured in other fields and might offer a better understanding of the perpetrator's role in the particular incidents. If there is no additional information to record in this field the coder should enter "N/A."

## **2: LOGISTICS**

### Type of Agent(s) Used

*Numeric variable*

This field records the type of agent(s) with which the actor(s) involved themselves.

The value labels for this field are as follows:

- **Chemical:** A chemical agent is a gaseous, liquid, or solid matter that produces chemical reactions and toxic effects. Chemical agents include military grade or highly toxic industrial



chemicals. Also, all poisons are considered “chemical” unless sources provide evidence to the contrary. The chemical designation includes plans and components that lead to the creation of chemical agents.

- **Biological:** This field records if the actor(s) were involved with any biological agent. The event reportedly involved a biological agent. A biological agent is a cultivated micro-organism (or product thereof) that causes damage to biological material. Agents can include bacteria, viruses, prions, fungi, and biological toxins. The biological designation includes plans and components that lead to the creation of biological agents. Note: Under this schema, ricin is biological.
- **Chemical and Biological**
- **Indeterminate:** refers to situations in which it was not possible to discern whether a chemical agent or a biological agent was involved.

### Chemical?

#### *Numeric variable*

This field records if the actor(s) were involved with any chemical agent. A chemical agent is a gaseous, liquid, or solid matter that produces chemical reactions and toxic effects. Chemical agents include military grade or highly toxic industrial chemicals. Also, all poisons are considered “chemical” unless sources provide evidence to the contrary. The chemical designation includes plans and components that lead to the creation of chemical agents.

Note: In reference to a gas/propane/petroleum/liquid explosive bomb: If the substance is being used for purposes of ignition, explosion, incendiary, etc, (i.e. for any reason other than to have toxic physiological effects on victims) it is not considered CB.

The value labels for this field are as follows:

- **Yes**
- **Yes, but all involved chemical agents are unknown poisons.**
- **No**
- **Unknown**

### Biological?

#### *Numeric variable*

This field records if the actor(s) were involved with any biological agent. The event reportedly involved a biological agent. A biological agent is a cultivated micro-organism (or product thereof) that causes damage to biological material. Agents can include bacteria, viruses, prions, fungi, and biological toxins. The biological designation includes plans and components that lead to the creation of biological agents.

The value labels for this field are as follows:

- **Yes**

- **Yes, but all involved biological agents are toxins.**
- **No**
- **Unknown**

#### Indeterminate?

##### *Numeric variable*

This field records if the actor(s) were involved with any undetermined agent.

The value labels for this field are as follows:

- **Yes**
- **No**
- **Unknown**

#### Specific Agent Used 1, 2, ...

##### *String variable*

This field names the first (second, third, etc.) specific type of CB agent connected to the incident(s).

#### Amount of Agent 1, 2, ...

##### *String variable*

This field contains the numerical amount of the agent in addition to the weight or volume (i.e. ounces, pounds, grams or kilograms). If no other information is available, measures such as “5 vials” or “2 barrels” should be included if available. This includes cases where the agent was not acquired but sources indicate the amount the perpetrator aimed to acquire. If the agent is acquired over multiple incidents, this field should list the total and then the amounts should be broken down in the agent details category.

#### CB Activity Start Date

##### *Date variable*

This field records the earliest known date on which the perpetrator became involved with CB materials or weapons, according to available open-sources. All dates should be recorded in the MM/DD/YYYY format. If only a partial date is available (for example, month and year, but not day), enter zeros as fillers for any unknown portions of the date. If no date is ascertainable, enter zeros in the date format (eg: 00/00/0000).

#### CB Activity End Date

##### *Date variable*

This field records the latest known date, according to available open-source reports, on which the perpetrator showed involvement with CB materials or weapons. All dates should be recorded in the

MM/DD/YYYY format. Separate fields are provided for month, day, and year. If only a partial date is available (for example, month and year, but not day), enter zero as fillers for any unknown portions of the date. If no date is ascertainable, enter zero in all of the date fields. If a perpetrator is taken into custody and there are no reports of further activity, the End Date is recorded as the date of the arrest.

### Highest Activity Type

*Numeric variable*

This field records the highest level of CB activity attained by the perpetrator. The value labels for this field are as follows:

- **Protoplot:** refers to incidences when the sources do not present any evidence of an actual plot but rather mention events that may lay the groundwork for an actual plot. For instance, the discovery of a chemical weapons manual or knowledge of a terrorist group hiring a scientist with a weapons' specialty would be coded a protoplot.
- **Plot only:** refers to perpetrators who were arrested or abandoned the activity before they were able to carry out an attack. This value is used if the perpetrator(s) seriously considered acquiring and using CB materials as a weapon, but when those involved in the plot have not made an attempt to acquire the agent and do not have the agent in their possession at the time of reporting.
- **Attempted Acquisition of Material:** refers to perpetrators who were interdicted before they acquired any material, either because they voluntarily abandoned the plot or because they were discovered. This value is used when there is evidence to suggest that the perpetrator(s) attempted to acquire a CBRN substance for use as a weapon but is not reported to have succeeded. "Attempted acquisition" includes the attempted (but unsuccessful or abandoned) acquisition of raw materials or an intact CB weapon. If a perpetrator has the components needed for an agent, but has not made or historically used that agent, the event is attempted acquisition. If the sole terrorist organization involved an event is the intended recipient of an agent/weapon that was intercepted en route, the case may need to be coded as "attempted acquisition" and framed with the terrorist organization as the perpetrator.
- **Acquisition of Material/Possession of a Non-Weaponized Agent:** refers to perpetrators who were successful, at least in part, in acquiring the CB material(s) in question. This value is used if the perpetrator(s) succeeds in possessing a CB agent but this agent does not constitute a weapon (in most cases, it will not be in a deliverable form, i.e. will lack an effective delivery mechanism for the intended attack). If a perpetrator has the needed components to produce an agent the group/individual has historically used, in many contexts it can be possession of a non-weaponized agent if no delivery mechanism is apparent.
- **Possession of a Weapon:** refers to perpetrator(s) that possess both the agent and delivery mechanism in a form that either constitutes a viable weapon or can easily be assembled into such a weapon at the time of reporting. The completed weapon may be quite crude, such as radioactive material the perpetrator plans to leave in a building, as long as there is evidence

the perpetrator intends to use the weapon in this crude form. In cases where a perpetrator intends to release an agent from an existing facility/storage/transport, there must be evidence the perpetrator possesses the knowledge and materials to capably attempt the attack. For example, if an actor with plans to attack a chemical plant possesses conventional explosives, the case would only be coded as a “possession of a weapon” if there is evidence, such as building plans or a security guard schedule, that shows the attack is feasible for the perpetrator to undertake.

- **Threat with Possession:** refers to perpetrator(s) that both threatened to use a CB substance and actually had the weapon in his or her possession at the time of the threat. “Possession of a weapon” is explained above. Sources must present at least some implicit evidence of the threat. In those cases where an agent is distributed in such a way that it was clearly not meant to cause harm (e.g., a sealed vial of a chemical in the mail is sent to lend credibility to a perpetrator’s threat), they are coded as “threat with possession.” Even in the absence of an explicit threat, the distribution to a particular target of an agent in such a way that harm is clearly not intended can constitute an implied threat and be coded as “threat with possession”. In cases of threat with possession involving water supply as the delivery mechanism, the decision between plot, possession of a non-weaponized agent, and threat with possession is based on the level of event development.

**Attempted Use of Material:** refers to perpetrators who were interdicted before they employ any material. This value is used if the perpetrator(s) attempted to employ or disseminate a CBRN substance but no agent was actually released.

- **Use of Agent:** refers to perpetrators who were able to utilize the material in some nefarious fashion before escaping or being apprehended.
- **Unknown:** refers to an unknown highest CB activity level by the perpetrator. This value is used only if the perpetrator(s) employed or disseminated a CB substance in the commission of an attack. If a small amount of agent was used, even if no harm was caused, it should be coded as “use of agent” unless there is proof the event was not meant to cause harm (See “threat with possession” above).

### Facility Attack?

*Numeric variable*

This field records if any of the CB incidents were facility plots or attacks. The value labels for this field are as follows:

- **Yes:** indicates that the specific incident represented an attack on a facility containing significant amounts of chemical or biological material, e.g., a chemical processing plant or research facility.
- **No:** indicates that the incident did not involve an attack on a facility containing significant amounts of chemical or biological material.
- **Unknown**

### Activity Details

#### *String variable*

This field provides a description of the CB incident(s) with which the perpetrator is associated. If indicated in the available open-sources, this field lists the date, intended target, and intended delivery method for each attack/plot. Each discrete plot/attack is listed consecutively in this field. [Note: 'Results Type' ---'Specific Motive' variables are listed under sub-field Results and Objectives.]

### Perpetrator's General Capability

#### *String variable*

If ascertainable, this field records the general capability of the perpetrator in committing acts of violence or sophisticated operations and is not restricted to considerations of expertise associated with CB materials alone. If no information is available enter "Unknown."

### Perpetrator Has Knowledge of Explosives?

#### *Numeric variable*

This field records if the group (not limited to the coded individual perpetrators) had any knowledge of explosives

The value labels for this field are as follows:

- **Yes:** If it appears likely that the group or individuals had such knowledge, the value is recorded as "Yes."
- **No:** In cases where knowledge of explosives seems unlikely, the value is recorded as "No."
- **Unknown:** In instances when a definitive determination could not be made, the value is recorded as "Unknown."

### Perpetrator's CB Capability

#### *String variable*

This field provides any pertinent details specifically associated with the perpetrator's demonstrated or suspected capability to acquire, work with, deploy and/or employ CB materials.

### Type of (Intended) Acquisition

#### *Numeric Variable*

This field records all of the methods and sources of CB acquisition or, in the case of interdicted or abandoned plots, the *intended* acquisition source and method. If the entity that provided or was to provide the material is not indicated in the available open-sources this field records "Unknown."

Select “Yes” or “No” for each of the binary fields detailed below:

- **Barter:** Based on source information, the perpetrator bartered nonmonetary items or services to acquire the agent.
- **Bribery/Coercion:** Based on source information, the perpetrator bribed or coerced an individual/organization outside of the group for access to the agent. Bribery is based on paying for the ability to acquire an agent. For example, the perpetrator pays off a security guard at a chemical plant. Coercion is using intimidation to create the opportunity to acquire an agent.
- **Gift:** Based on source information, the perpetrator received the agent from another party outside of the group without using payment or coercion.
  - **from State**
  - **from Terrorist Group**
  - **from Criminal Organization**
  - **from Other**
- **Production:** Based on source information, the event involves the perpetrator producing some level of the agent or weapon in house.
- **Purchase:** Based on source information, the perpetrator bought the agent through a black or white market channel. Includes previously set up illicit networks.
  - **from State**
  - **from Terrorist Group**
  - **from Criminal Organization**
  - **from Other**
- **Serendipity:** Based on source information, the event involves the perpetrator acquiring the weapon or weapon components through an unplanned or unexpected opportunity.
- **Theft:** Based on source information, theft includes instances where the perpetrator acquired the agent through theft, not including a bribe.
  - **from State**
  - **from Terrorist Group**
  - **from Criminal Organization**
  - **from Other**
- **Unknown**

#### Type of (Intended) Ultimate Use

##### *Numeric Variable*

This field records the manner in which the CB material was utilized or, in the case of interdicted or abandoned plots, *intended* to be utilized. If no available open-source information indicates by which method the perpetrator intended to use the material, this field records “Unknown.”

The value labels for this field are as follows:

- **Not intended for delivery:** refers to perpetrators where evidence shows the perpetrator(s) never actually intended to deliver the agent.
- **Aerosol/Spray:** refers to perpetrators who intended to or did deliver an agent in the form of either an aerosol or some form of spray. This includes a crop duster spraying an agent over a field.
- **Casual/Personal/Direct Contact:** refers to perpetrators who intended to deliver or did deliver the agent intentionally through close proximity or touch. “Casual/personal/direct contact” would include a perpetrator purposefully coughing towards a target while infected with plague, spraying a chemical at a target with a Windex bottle, or leaving a non-volatile agent on a door knob.
- **Consumer Product Tampering:** refers to perpetrators who put (or planned to put) CB materials into consumer products (incl. food/drink purchased in a store so long as the product packaging is apparently intact). Consumer product tampering includes cases where tampering takes place in the production facility. For example, yogurt injected with a chemical falls into this category if it is purchased in a seemingly sealed package. Consumer product tampering includes bottled water, if sealed.
- **Explosive Device:** refers to perpetrators who used or planned to use an explosive as the primary delivery device. Also includes agents that form an aerosol after the use of explosives.
- **Food/Drink:** refers to perpetrators who intentionally put (or planned to put) CB materials into the victim’s food or drink, but excludes cases categorized as consumer product tampering (see above). Includes poisoning in restaurants. If the packaging / seal on a consumer product is obviously broken when presented to the intended victim (for instance, a previously opened bottle of soda served in a restaurant), it is regarded as “food/drink.” An office water cooler would also be included.
- **Injection/Projectile:** refers to perpetrators who actually or intend to deliver by controlled trajectory that forcefully inserts an agent into a person. For example, a target is struck by a cyanide bullet.
- **Latent:** refers to perpetrators who actually or intend to attack by employing a latent delivery system - includes any agent that is left out without forcing direct contact. For instance, leaving breakable vials of an agent on the floor intending for the target to step on the vials and release the agent.
- **Mail/Letter/Package:** refers to perpetrators who actually or intend to deliver any agent by mail, letter, or package.
- **Reaction Device:** refers to perpetrators who intend or actually employ a device designed to produce a chemical or biological reaction in order to release a harmful agent. For instance, an agent-filled vial left on top of a door will react with gravity with the door is moved, or a canister of acid set to rupture into a container of cyanide salt.
- **Ventilation System:** refers to perpetrators who intend or actually employ a ventilation system to disperse an agent. Ventilation system include incidents where victims would be

indiscriminate and therefore excludes dispersing an agent through the air-conditioning system of a car, which is more accurately categorized as direct contact.

**Water Supply:** refers to perpetrators who intend or actually use a water supply as a delivery mechanism. Water supply includes facilities of any size involving plumbing, from apartment buildings to cities, and wells. Can include bottled water if the source of the bottled water is a municipal water supply, which is contaminated before bottling. Generally, if water supply is the delivery mechanism it should not also be the target of the attack; the target would be the individuals exposed to the tainted water.

- **Multiple:** refers to any perpetrators who intend or actually used multiple different delivery mechanisms. List all types in 'Use/Acquisition Details' field.
- **Unknown**

### Possible Smuggling Only?

*Numeric variable*

This field indicates whether the perpetrator was solely involved in smuggling the CB material.

The value labels for this field are as follows:

- **Yes:** refers to those instances where there is a significant likelihood that the perpetrator was involved in smuggling CB materials *only*, rather than being an end-user. While clear cases of CB smuggling are not included in CABANSAD, in instances where researchers believed there to be at least a minimal likelihood of the perpetrator being an end-user, the actor is included, and this box is checked to indicate that the suspected smuggling incident is involved.
- **No:** refers to instances where the perpetrator was the end user.
- **Unknown**

### Use/Acquisition Details

*String variable*

This field records how the perpetrator was able to obtain the material. If 'Type of (Intended) Ultimate Use' is coded as 'Multiple', this field records all of the relevant categories. If no information is provided by available open-sources, the coder should enter "Unknown" into this field.

### Target Type

*Numeric variable*

This field records what category of target the perpetrator was intending to affect through his/her actions. If multiple actions are directed to multiple targets, the entity most commonly targeted is listed with additional entities described in the 'Target Details' field. If the intended target was not indicated in



the available open-sources, this field records “Unknown.”

The value labels for this field are as follows:

- **Government**
- **Ethnic/Religious/National Group**
- **Commercial Entity**
- **Individual**
- **Other**
- **Unknown**

#### Target Details

*String variable*

This field provides additional pertinent information about a perpetrator’s intended target(s).

### 3: RESULTS AND OBJECTIVES

#### Results Type

*Numeric variable*

This field records the extent to which a perpetrator was able to carry out his/her plot. When multiple plots/attacks occurred, the highest level of success attained is listed.

The value labels for this field are as follows:

- **Plot Terminated:** Used to indicate a plot that ends prior to completion because the perpetrators voluntarily abandon their plans.
- **Plot Interdicted:** Used to indicate a plot that is interdicted or was otherwise involuntarily halted before perpetrators were able to carry it out (i.e., authorities intervened).
- **Failed Use Attempt:** Used to indicate an attempt where the perpetrators endeavored to use the material in an attack but were unsuccessful in this attempt.
- **Successful Use:** Used to indicate an attack where the perpetrators were successful in carrying out their plot; this includes attacks that are only partially successful.
- **Unknown:** Used to indicate that open-sources did not provide information as to the conclusion of the plot(s) / attack(s).

### Number of Fatalities

#### *Numeric variables*

This field records the number of people recorded by available open-sources that died from the perpetrator's use of CB materials. This number only includes target fatalities— not perpetrator fatalities. Zero ("0") is recorded if there were no fatalities. If no information is provided by available open-sources, the coder should enter "-99" into this field.

### Number of Non-Fatal Injuries

#### *Numeric variables*

This field records the number of people recorded by available open-sources that were injured but did not die from the perpetrator's use of CB materials. This number only includes target injuries—not perpetrator injuries. Zero ("0") is recorded if there were no injuries. If no information is provided by available open-sources, the coder should enter "-99" into this field.

### Disruption Level

#### *Numeric variable*

This field provides a broad, subjective estimate of the degree of disruption that the actor(s) have collectively caused through all the CB incidents with which they have been associated. It includes consideration of economic, social and infrastructural disruption caused by the perpetrator(s).

The value labels for this field are as follows:

- **None**
- **Unknown**
- **Mild**
- **Moderate**
- **Severe**
- **Catastrophic**

### Apprehended?

#### *Numeric variable*

This field records whether the perpetrator(s) were apprehended and details whether it was as a consequence of their involvement with CB materials.

The value labels for this field are as follows:

- **Yes – CB:** Apprehended as consequence of involvement with CB materials. Indicates that

one or more suspects were apprehended based on their involvement with CB materials.

- **Yes – Other:** Apprehended for other reasons
- **No**
- **Unknown**

### Charged?

*Numeric variable*

This field records whether the perpetrator(s) were charged with one or more counts related to their involvement with CB materials.

The value labels for this field are as follows:

- **Yes – CB:** Charged directly as consequence of involvement with CB materials. Indicates that one or more suspects were charged with one or more counts related to their involvement with CB materials.
- **Yes – Other:** Charged for other reasons
- **No**
- **Unknown**

### Sentence (Penal)

*String variable*

This field records any specific legal actions, if there were any, that were taken against the perpetrators—including any charges that were laid against the perpetrator(s), whether the perpetrator(s) was indicted, and, finally, if any sentences were levied.

### Results Details

*String variable*

This field provides a narrative description of the effects and results of the incident(s), if there were any. If available open-sources did not provide any relevant information, this field is blank.

### General Goals

*String variable*

This field provides a narrative regarding the perpetrator's broader reasons for action and strategic objectives. It also provides further information about his/her ideology and how those goals relate to his/her overall motivation. If no information is provided by available open-sources, the coder should enter "unknown" into this field.

### Specific Motive

*String variable*

This field records the perpetrator's specific motive for involving (or attempting to involve) CB materials in their activities. It differs from the general goals narrative in that it focuses on why CB materials were selected rather than other weapons/means of harm. If no information is provided by available open-sources, the coder should enter "unknown" into this field.

## **4: NOTES**

### Additional notes

*String variable*

This field records any additional notes researchers assessed as pertinent to understanding the case. It also may provide a list of additional perpetrator demographics

### Further Research Needed

*Numeric variable*

This field indicates whether further research is needed for the specific case.

The value labels for this field are as follows:

- **Yes**
- **No**

## **5: REFERENCE**

### Sources

*String variable*

This field provides a list of citations and sources used to build the profile. The letter in brackets refers to the letter cited as the source in the narrative portions of the profile. Citations should follow Chicago Author/Date format. In the reference column, begin each citation with the letter that corresponds to how it had been saved in the source folder [A], [B], [C], etc.

### Type of Source

*Numeric variable*

The value labels for this field are applied to each source.

The value labels for this field are as follows:

- **Unknown**
- **Personal:** blogs, personal blogs or websites, etc
- **Think Tank:** including associated blogs and websites, etc.
- **Media:** including associated blogs and websites, etc.
- **Academic/Scholarly:** Peer-reviewed academic journals, books, conference papers
- **Military**
- **Government:** Reports and press releases from government agencies such as CRS, OMB, State Department

### Institutional and Author Objectivity

#### *Numeric variable*

Ranking the objectivity of a source provides a measure of whether the provided information shows bias. If either one of the author or the institutional publisher is biased, we regard the source as biased. This variable will be coded for each source in every case. Intrinsic evaluation will be conducted based on the document itself, while extrinsic evaluation will be drawn from the abovementioned cumulative library of source reputations.

Note: If terrorist communiqué gives details on a purported attack, it is likely only of potential objectivity.

#### **-99= INHERITED**

If the source is not independent, objectivity is based on the original source.

#### **-88= ORIGINAL SOURCE UNAVAILABLE**

If the original source is not found, it will not be rated.

#### **0= LOW**

Author and/or institution have a commonly-known or consistently demonstrated bias (extrinsic evaluation) or the source document clearly reflects a lack of objectivity (intrinsic evaluation), signified by such characteristics as overly emotive writing. Examples include: a newspaper with a widely-known reputation for representing a left-wing or right-wing agenda; a reporter with a history of advocating for or against a particular group; or a passage overtly sanitizing or exaggerating certain actions.

#### **1= POTENTIAL**

Author and/or institution have demonstrated bias in some cases, but not others. For example, a

newspaper that is generally measured in its approach to reporting but is known on occasion to take a very pro-Israeli (or pro-Palestinian) stance on the Israeli-Palestinian issue.

## **2= HIGH**

Neither the author nor the institution has a known or documented bias. To code 'HIGH' without prior knowledge of the author/publisher, coder must research the history and reputation of the author and institution. Furthermore, the document itself shows no overt or easily recognizable signs of bias.

The text variable should provide an explanation of why the coder rated the source at the current level.

### Institutional and Author Competence

#### *Numeric variable*

Competence assesses the level of capability for accurate recording and reporting of information that an author/publisher brings to the event subject. This variable will be coded for each source in every case, and will either be drawn from a cumulative library of source competences (extrinsic evaluation) or determined from analysis of the document itself (intrinsic evaluation).

## **-99= INHERITED**

If the source is not independent, objectivity is based on the original source.

## **-88= ORIGINAL SOURCE UNAVAILABLE**

If the original source is not found, it will not be rated.

## **0= LOW**

Author and/or institution: a) have had serious and widespread questions raised about their reporting skills; b) obviously do not have the resources to adequately report on the event; or c) the source document reveals substantial inconsistencies. Coding is based jointly on the quality of the article or website (intrinsic evaluation), and research regarding the source (extrinsic evaluation).

## **1= QUESTIONABLE**

While the institutional publisher / author is not generally known for high quality output (extrinsic evaluation), the source document itself shows a prima facie level of competence

(intrinsic evaluation). Or, the institutional publisher / author is generally known for high quality output, but the source document itself shows prima facie indications of lower quality.

## **2= GENERAL**

Generally, the author/institution is regarded as competent (extrinsic evaluation) and the source document itself shows a prima facie level of competence (intrinsic evaluation). However, the author/institution does not cover the subject matter area on a regular basis.

## **3= FULL**

Author and institution have proven or researched competence in the geographical and substantive domain on which they are reporting. It is usually either a primary source or a secondary source with extensive details. If it is a new source/author, coder must consider the history and reputation of the author and institution.

The text variable should provide an explanation of why the coder rated the source at the current level.

## **6: UNCERTAINTY**

### Perpetrator Uncertainty - Chemical

*Numeric variable*

For all of the chemical events the perpetrator(s) was potentially involved in, how many of the events have inherent uncertainty that the perpetrator was actually involved?

- **All**
- **Almost all**
- **Some**
- **A few**
- **None**
- **No potential chemical events**

### Perpetrator Uncertainty - Biological

*Numeric variable*

For all of the biological events the perpetrator(s) was potentially involved in, how many of the events have inherent uncertainty that the perpetrator was actually involved?

- **All**

- **Almost all**
- **Some**
- **A few**
- **None**
- **No potential biological events**

#### Event Uncertainty - Chemical

*Numeric variable*

For all of the chemical events the perpetrator(s) was potentially involved in, how many of the events have inherent uncertainty that the event actually involved a chemical agent?

- **All**
- **Almost all**
- **Some**
- **A few**
- **None**
- **No potential chemical events**

#### Event Uncertainty - Biological

*Numeric variable*

For all of the biological events the perpetrator(s) was potentially involved in, how many of the events have inherent uncertainty that the event actually involved a biological agent?

- **All**
- **Almost all**
- **Some**
- **A few**
- **None**
- **No potential biological events**

### **7: PERPETRATOR OF INTEREST**

#### Perpetrator of Interest?

*Numeric variable*

Based on the available sources, the coder is 80% sure that this perpetrator (organization or individual) validly pursued or used a CB agent.

The value labels for this field are as follows:



- **Yes**
- **No**

## **Appendix VI: Elicitation Information**

**APPENDIX VI-A: FINAL WORKSHOP AGENDA**

A CENTER OF EXCELLENCE OF THE U.S. DEPARTMENT OF HOMELAND SECURITY BASED AT THE UNIVERSITY OF MARYLAND

**Anatomizing the Behavior of Chemical and Biological  
Non-State Adversaries Elicitation Workshop**

Location: Room 2110 in the UMUC Conference Center

*Monday, March 4*

8:30-9: Breakfast and Computer Setup

9-9:30: Welcome, Introductions, Background (including parameters)

9:30-9:45: Motivating Exercise: "Abrin in the Pastries"

9:45-10:15: Structuring/Priming: Presentation on probabilities and elicitation biases

10:15-10:25: Break

10:25-10:50: Brainstorming Exercise 1 (Initial Swing – Rapid-fire)

10:50-11:15: Brainstorming Exercise 2 (Stretching the Limit – Rapid-fire)

11:15-11:40: Discussion in Plenary (and Clustering in Categories)

11:40-11:50: Break

11:50-12:20: Implicit Categories Elicitation (Poker-chip Grids: Chemical and Biological)

12:20-12:40: Ranking Exercise (Chemical Adversaries) (Top 20)

12:40-13:20: Lunch and Selection of Final Set of Chemical Adversaries

12:50-13:15: Presentation of Elicitation List and Quick Overview of Current Study Efforts

13:15-13:25: Introduction to Elicitation

13:25-14:10: Ideology Elicitation (Chemical Adversaries)

14:10-15:05: Future Backwards Exercise

15:05-15:15: Break

15:15-16:25: Elicitation Session 1 (Chemical Adversaries)

16:25-16:30: Break

16:30-17:00: Red-team Introduction and Brief Role-playing Session

18:00: Dinner

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*Tuesday, March 5*

8:30-9:00 Breakfast and Computer Setup

9:00-9:05: Morning Introduction

9:05-9:55: Red Team Role-playing (cont.)

9:55-10:35: Elicitation Session 2: (Chemical Adversaries)

10:35-10:50: Ranking Exercise (Biological Adversaries)

10:50-11:00: Break

11:00-11:30: Ideology Elicitation (Biological Adversaries)

11:30-12:00: Elicitation Session 3: (Biological Adversaries)

12-12:45: Lunch

12:45-13:15: Elicitation Session 3: (Biological Adversaries) (cont.)

13:15-13:20: Break

13:20-14:15: Stone Soup Red-Teaming Exercise

14:15-14:20: Break

14:20-15:20: Elicitation Session 4: (Biological Adversaries)

15:20-15:30: Break

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15:30-15:55: Roundtable Discussion and Feedback

15:55-16:00 Wrap up

## APPENDIX VI-B: RED TEAM GROUP PROFILES

### SONS OF JIHAD (SOJ)

**Brief History:** The Sons of Jihad was founded in February 2013 by a pair of brothers, Mahmoud and Ali Sayala, originally hailing from Libya. It was established as a breakaway faction of al-Qa`ida in the Islamic Maghreb (AQIM) for those who believed that AQIM and in fact the entire al-Qa`ida-affiliated network were insufficiently vigorous in waging jihad. When they broke away, the Sayala brothers claimed in particular that the core al-Qa`ida had become a lackey of the ungodly Pakistani security forces and thus could no longer function as the vanguard of the global Salafi jihad. They followed their claims by carrying out a string of daring but brutal attacks on Western facilities in several African countries, including the American Embassy in Tunisia, the offices of a French mining company in Morocco and a particularly egregious attack where they conducted a suicide bombing of a nursery school in Algeria, which catered to expatriate's children. They have vowed that these attacks were only the beginning of their jihad and have begun to attract growing numbers of hard-core jihadists from not only North Africa, but all over the globe.

**Beliefs:** The Sayala brothers have come to embrace a more virulent strain of Islamism than any yet seen, one based on a particularly idiosyncratic interpretation of the Qur'an and hadith. Believing that *jahiliyya* (ignorance) is threatening Allah's rule on earth, they have vowed to reconquer the lost lands in the name of the Prophet and to eventually bring the entire world under the banner of Islam – or die trying. They preach that present-day Christians and Jews (the Zionist conspiracy) are quite literally the children of *Dajjal* (the antichrist) and as such are non-human maggots that deserve no quarter and must be obliterated. They view the United States in particular as the chief serpent among the snakes of evil, a paper tiger hollowed out and rendered powerless by its own infighting and excesses. America's only purpose is to serve as a warning to the enemies of Islam as it burns in the fires of hell. Unlike many other Salafist groups, the SOJ exhibits a strong *takfiri* strain – rather than attempting to appeal to the broader Muslim communities in North Africa and around the world, they denounce any Muslim that does not embrace their interpretation of jihad as an apostate and thus deserving of summary execution.

**Group Structure:** The group is structured hierarchically around the hub of charismatic leadership of the Salayas. It is divided operationally, however, into several decentralized “fighting wings,” each consisting of several dozen seasoned AQ fighters, together with younger jihadists. While painting itself as a truly global organization, it is believed that the main concentration of SOJ forces, including the leadership, are situated in remote camps in Algeria, Mali, and Mauritania. There have also been some reports that the organization is keen on setting up operational cells in several Western countries.

**Leadership and Membership:** Since splitting from AQIM with a core of hardened fighters, SOJ has attracted many impatient and dissatisfied jihadists from around the world, who have flocked to the

Salayas. Current membership size is unknown, but several intelligence estimates put the number of core operational fighters at no more than two hundred individuals, excluding any undiscovered cells already in the West. The membership is fairly evenly divided between seasoned jihadists who have spent a decade or more fighting various opponents around the world (including the U.S. military in Afghanistan and Iraq), and young, eager, but largely untrained recruits, several dozen of whom grew up in Western countries and possess Western citizenship. Almost all of the senior operational commanders belong to the first category. The Salayas demand intense loyalty, often making senior members of the group swear a *bayat* (oath) to “serve them in blood”. While the elder brother Mahmoud is a competent ideologue and preacher, most of the operational decisions seem to be made by Ali. Nonetheless, the brothers are reportedly close and disagreements are exceedingly rare. . The group is open to any Muslims who have embraced a rigidly puritanically view of the faith, but demands strict obedience to the leaders, with any deviations subject to extremely harsh punishment. Once they have joined and sworn an oath to the Salayas, it is impossible for a member to leave the organization, under penalty of death.

**Resources:** The group is thought to have inherited some portion of the resources of AQIM when it broke away from the main body, including well-trained cadre, explosives, and access to existing radical and criminal networks, especially in North Africa and the Middle East. The Salaya brothers did not, however, manage to take with them sizeable amounts of funding, at least not initially. It is rumored, however, that the group has since acquired a handful of wealthy patrons in the Middle East and South Asia who have been bankrolling the group’s continued operations. Even so, SOJ does not have the same access to funds as some of the more established jihadist organizations, and its rejection of the al-Qa`ida network has limited the sources of funding. Its existing resources are thought to be primarily held at its hidden bases in North Africa, with perhaps a few arms caches forwardly deployed in those countries that it has targeted, prior to carrying out large attacks. Although the group has been shunned, both overtly and covertly, by the vast majority of the existing Sunni jihadist networks, the Salayas’ uncompromising vision and brash attacks have led to pockets of sympathy.

## Cherokee Dawn

**Brief History:** Cherokee Dawn was founded in January 1971 by Henry Arapoe, a charismatic young man whose mother had recently died of cancer allegedly linked to the use of DDT. Cherokee Dawn carried out a wave of ineffective bombings against Oklahoma and U.S. federal government targets between January and March 1971. This wave of violence ended when Arapoe died from exposure and several others were made ill while attempting to contaminate the groundwater near Oklahoma City with cyanide. Before his death, however, Arapoe recruited Michael Chino, the son of the tribal president, who subsequently took control of Cherokee Dawn. Chino used his father’s 43 year term in office to infiltrate the tribal governments of the Cherokee Nation and the Eastern Band of Cherokee Indians in North Carolina, made up of remnants of the original Cherokee people who had avoided the Trail of Tears. While many Cherokee Dawn members were active in the broader movement for greater indigenous rights, Chino orchestrated a long-term plan to secretly build a militaristic capability. During the subsequent five decades, Cherokee

Dawn members succeeded in infiltrating the US military and civilian scientific establishments, gaining technical expertise and gradually acquiring and stockpiling equipment.

**Beliefs:** Cherokee Dawn believes that the traditional Cherokee and other Native American lands are illegally occupied and remain the sovereign territory of the indigenous peoples. Members believe that the use of insecticides and other pollutants on their ancestral lands are the latest and most horrific acts in a long campaign of genocide against the Cherokee people. Consequently, Cherokee Dawn has a deep hatred for the federal government and has secretly declared a total war with the United States. This secret war is being executed through a two-prong approach. First, by consolidating its power within the tribal governments, especially within the police and paramilitary forces, Cherokee Dawn seeks to build the infrastructure for a return to sovereignty to the whole Cherokee people. Second, recognizing their numerical and technological inferiority, Cherokee Dawn seeks a military capability to force the return of their traditional lands. However, most of the peripheral followers are unaware of the existence or centrality of this second prong.

Although Cherokee Dawn is generally highly pragmatic and strategic in its thinking, it has elements of mysticism within its ideological grounding. The organization derives its name from a 19<sup>th</sup> century shaman's prophecy that the "Cherokee lands would be restored when the earth takes its revenge on its despoilers" which Arapoe interpreted as referencing a natural disease pandemic. After Chino took control, this prophecy was re-interpreted to signify a Cherokee biological weapons capability. Other prophecies cited by Cherokee Dawn include references to large-scale death of their enemies preceding the restoration.

**Group Structure:** Cherokee Dawn is a highly centralized organization. Michael Chino and a council of ten elders, most of whom live on reservations in Oklahoma and North Carolina, jointly run the organization. Each elder has a small cadre of assistants (between one and five) who maintain contact with the implanted agents, peripheral members, auxiliary organizations, and allies. The council also monitors and guides the weapons development and deployment teams, both of which operate primarily on the reservations.

Cherokee Dawn members are recruited at a very young age (mostly through familial ties) and pass through a series of training camps that identify individuals with useful abilities, indoctrinate them, and teach them the skills to effectively mask their hatred of the United States. Although cohorts grow up together, implanted agents generally only maintain contact with their handlers and outwardly shun their Cherokee roots.

**Leadership and Membership:** Cherokee Dawn and its above-ground auxiliary organizations have over 6,000 members, including influential leaders within the tribal governments and police forces. The core membership that is aware of the military program is limited to 400, most of whom are active infiltration agents. As a result, most Cherokee Dawn members are highly trained and educated scientists, technicians, explosives experts or special operations soldiers. Because the plan to acquire a biological



weapons capability requires absolute secrecy and could be derailed if the US government were to discover the plot, there is only minimal contact between the agents-in-place and the central leadership. Thus, individuals are mostly self-directed.

After a brief leadership contest in 1978, Chino has been the undisputed leader of the organization and continues to provide long-term strategic vision. However, he runs the organization through consensus with the council of ten elders. The council of elders primarily consists of original members recruited by Arapoe, but is beginning to be replaced by second-generation leaders who passed through the US government and industry establishments. These younger leaders advocate a more rapid deployment of weapons, but defer to Chino's authority and he remains committed to building a large enough supply of weapons to provide a secure deterrent.

**Resources:** Cherokee Dawn has access to roughly \$50 million in various assets and investments. While most of the leadership council lives on one reservation in Oklahoma, the organization is spread out throughout the country, with some members working or studying abroad. Chino has a large personal stake in the casino that was built on tribal lands in 1982 and contributes a significant share of the annual profits to the organization. Several Cherokee Dawn members established companies that have since become major suppliers within the biotech industry or minority-owned pass-through entities for large government contracts. Others rose through the ranks within government regulatory agencies. Cherokee Dawn's near total control over some of the remote areas of the reservations also provides a place to produce and test components and build the final weapons with little chance of detection.

## GUARDIANS OF THE FREE REPUBLIC

**Brief History:** Founded in 1997 in Fort Collins, Colorado, the Guardians of the Free Republic (GFR) is led by its founder, "Plenipotentiary Nathaniel Gregory Storm," (hereafter Storm, b. 1943). An early member of the sovereign citizen movement, Storm took his original inspiration from the 1970s group "Posse Comitatus." Subsequently, he and a growing number of followers were involved in a variety of incidents designed to weaken the "illegitimate" U.S. government (believed to have been corrupted in the late nineteenth century largely from the enactment of the 14<sup>th</sup> Amendment—an act perceived to have created a special class of citizenry, one with no inherent rights, only privileges the government conceded to grant them). By virtue of its unwillingness to accept the contracts of illegitimate "citizenship" (via driver's licenses, social security cards, etc.), GFR members and other sovereign citizens considered themselves immune from the laws of the de facto fraudulent government. In 2000, at the behest of his son, **John Lloyd (b.1963), Storm embarked on an enduring relationship with leaders of the Hammerskin Nation and Donald Beauregard's Montana Free Militia.** Such contact precipitated a new incarnation of GFR, one that more readily embraced violence to combat the illegitimate federal government and was far more adept at paramilitary operations. Storm, John Lloyd, and eleven other group members were arrested in 2001 after their plot to bomb nine U.S. district courts was uncovered. Storm's youngest son, Phineas (b. 1975), assumed control of GFR until both Storm and John Lloyd were released from prison in

2013. During their incarceration, both men became fully engrossed in the teachings of Christian Identity; GFR now decrees Identity as its official spiritual doctrine.

**Beliefs:** As adherents of the Christian Identity religious ideology, GFR members believe that they are descendants of the ancient Israelites—the direct offspring of Abel. In their interpretation of the Old Testament, following the invasions of the Hittites, Assyrians, and Babylonians—the scattering of the Israelites—these “Lost Tribes” established themselves in Europe. Their biological descendants subsequently found their way to America—God’s true “Promised Land” (specifically understood by Storm and other followers of Identity to be the Pacific Northwest). Identity’s view toward “non-Abel” descended peoples is grim: Jews are considered the offspring of Cain—himself the result of the union between Eve and the Serpent. Thus, Jews are literally the children of the devil; non-whites are believed to be the “mud-people” whose origin predates Adam and Eve (only the offspring of Adam and Eve were made in God’s likeness; their forerunners—the “muds”—literally have no soul). Giving urgency to these racial beliefs—one that is fully manifest in GFR’s *Weltanschauung*—is Identity’s inherent millenarianism. In contrast to popular evangelical contentions that deserving followers of Jesus will be raptured (saved) *before* the period of Tribulation, Identity adherents believe that Christ will only return *after* the Tribulation (i.e., GFR’s embrace of Identity is postmillennial; even proper followers of God must endure the apocalypse). GFR believes that it is *about to enter* into the time of Tribulation and, as the side of good, GFR must fight—and help conquer—evil in an apocalyptic racial war.

Bolstering GFR’s embrace of the Identity movement’s distrust of secular institutions is the group’s sovereign citizen and militia movement characteristics. In concert, these ideological creeds collectively precipitate a visceral distrust and animus toward the U.S. federal government and all its manifestations, down to the local level. Given their inferior numbers, GFR knows that regional ascendancy over the “demonic Jews” and “soulless muds” during the apocalypse is only possible if the protection of these enemies under the illegitimate secular federal system is destroyed or severely weakened. At its deepest level, GFR is only beholden to “God’s laws,” not “Man’s laws”—perceived as rules established by the illegitimate secular government. Thus, although linked to several small communities of Identity, sovereign citizen, and militia movement followers, GFR places little emphasis on potential worldly constituents. Beyond what is necessary to prepare for victory during the imminent Tribulation—an event that will demonstrate their allegiance as God’s true followers—GFR maintains no immediate loyalty to outsiders.

**Group Structure:** True to its sovereign citizen roots (a movement that typically replicates an “illegitimate” governmental entity with its own “legitimate one”), GFR has nominally based its “Republic’s” hierarchy on democratic principles. The result is a four-tiered, hierarchical power structure. At the top is the President. Below him, but still in the top tier, is the Vice President. The Senate Leader officially represents the second tier—a body of 6 Senators. In theory, the President is elected by the Senators who, in turn, are the “elected representatives” of the GFR’s third level—its fully initiated adherents. Akin to the initiation methods utilized by members of the Hammerskin Nation, GFR’s initiation rites are savage and psychologically intense. While third level members are allowed to leave GFR, they

are traditionally compromised by exposure to GFR's various criminal enterprises; consequently, full withdrawal is virtually impossible. Finally, the group's fourth tier consists of rank and file part-time supporters—primarily the initiates' families and sympathetic local residents and benefactors. Presently operating unfettered out of its Montana compound located within the Flathead Indian Reservation (a "99 year lease" obtained jointly by Storm and Beauregard in 1999 through a *sub rosa* agreement with the reservation's leaders), the vast majority of GFR's members live either on the sprawling compound grounds or within 200 miles of the Flathead Reservation.

**Leadership and Membership:** Despite its putatively democratic principles, in practice, Storm and his sons have handpicked the Republic's Senators. The Storms, however, have relied on the Senate to provide the majority of its fully initiated members (about 67 individuals). Currently Storm remains the nominal leader, though debilitated by Parkinson's disease and depression. Storm's power is thus increasingly in the hands of GFR's Vice President—Storm's eldest son John Lloyd. With Storm's other son Phineas acting as Senate Leader, all final decisions can be confined to just the family. However, the Senate is aware of all relevant happenings within the group and, whenever possible, decisions are made in a consensual manner. While initiated members are knowledgeable about several key aspects of GFR (e.g., they are involved in the group's criminal enterprises), highly confidential matters are beyond their scope of inclusion. Members possess a variety of blue-collar and white-collar skills; overall, the group has about a dozen members with graduate-level education in the natural sciences and several competent technicians. Control of the group is primarily maintained by Phineas and the 5 Senators he oversees. Though at times violent, control is usually maintained through strong bonds of loyalty and group pressure.

**Resources:** Over the decades, GFR has accumulated almost \$200,000 dollars in bullion (like most sovereign citizens, GFR technically considers paper money as unconstitutional, with gold and silver the only lawful forms of currency). The group's early –and highly successful - moneymaking enterprises largely consisted of fraud and extortion. In the late 1990s, Storm used his financial resources to acquire various properties and even funded several pseudo yet lucrative law schools, for example, the Minnesota-based "Erwin Rommel School of Common Law" and the Texas-based "Freedom School." Despite its "illegitimacy," paper money is often used by GFR to purchase a wide variety of tools and equipment for the Flathead compound. Until the arrests of 2001, Storm and his sons—working primarily with Hammerskins in southern California, Arizona, and New Mexico—also engaged in lucrative gunrunning operations to Mexico. Since 2007, the group has solely been on the buying end of illegal firearms and explosives as they prepare for Tribulation.

## The Chivalric Order of the Golden Dawn

**Brief History:** The Chivalric Order of the Golden Dawn (COGD) was established thirty years ago in southern France by two highly educated individuals with esoteric and occult beliefs. The eldest of these individuals, Jacques Chairoff, had once been a high-ranking operational member of a covert right-wing paramilitary network established by the supporters of Charles de Gaulle and his successors, the Service d'Action Civique (SAC), which was created to wage a covert war against enemies of the Gaullists, both

domestic and foreign. Alain Berque, COGD's co-founder, had earlier been affiliated with an elitist chivalric order that claimed to be descended from the medieval Knights Templars, the Noble Order of the Templar Mages (NOTM). Since its establishment, the COGD has managed to recruit over 1,500 members, developed an increasingly complex organizational structure, established branches in several countries (including the United States), honed its covert operational techniques, and constructed elaborate facilities on large parcels of land it has purchased in rural regions.

**Beliefs:** The COGD is a syncretistic occultist group combining an elaborate (but fictive) neo-Templar lineage and mythology, with ritual and doctrinal elements drawn from several gnostic and esoteric traditions including Theosophy and Rosicrucianism. In addition, its innermost circles espouse an elitist, conspiratorial, right-wing, exterminationist, and apocalyptic millenarian ideology with overt political overtones: they believe that the materialistic, spiritually bankrupt, corrupt, and ignorant masses throughout the world are in the process of precipitating an ecological catastrophe that will soon destroy the Earth as we know it. Thus, it is the task of the enlightened spiritual masters from the COGD to cull these unenlightened masses and dominate those who survive in order to save the planet and allow those more enlightened human specimens with esoteric knowledge to usher in a new era of global peace and harmony whilst striving to elevate mankind spiritually. The COGD views the United States as the epicenter of the current debased, materialistic human civilization, one dominated by selfish, greedy "plebeians" rather than those who are guided by spiritual "ascended masters," which is pushing the world to the brink of catastrophe.

**Group Structure:** The COGD is an ostensibly chivalric order organized in the fashion of a traditional European secret society, i.e., into a hierarchical, compartmentalized, onion-like structure with a series of inner and outer circles. Prospective members must perform various rituals and fulfill sundry assigned tasks in order to pass upwards through a series of higher "grades" before being admitted into the highest and innermost circles, the most secret sanctuaries, and the most esoteric doctrines of the group. There are 33 total grades, as is typical of certain Masonic obediences, and only those members who have reached grades 30-33 have full knowledge of the group's true agendas, which are hidden both from outsiders in the "profane" world and from its lower-level initiates. Prospective recruits are first assessed and vetted by being admitted into a series of COGD front groups with an occultist or spiritual orientation. Those who pass muster are eventually invited to join the outer layers of the COGD, after which they must repeatedly demonstrate their loyalty and capabilities by performing various functions if they wish to advance to higher levels of the organization.

**Leadership and Membership:** The COGD numbers approximately 1,500 members internationally, of whom about 90 have been initiated into the innermost and highest organizational circles (i.e., levels 30-33) and are thus privy to the group's apocalyptic political agendas. Most of the members come from relatively high SES strata and are either well-educated or well-trained in certain desired technical, intelligence, or military skill sets; those who form the inner circle view themselves not only as "patricians" or "knights," but also as spiritually elevated beings who have been entrusted to lead a new utopian social order. Within that group there are several scientists, including chemists, and several

engineers, as well as more than 40 former professional intelligence, military, and special operations personnel, many with extensive operational experience.

**Resources:** The COGD has several millions of dollars stashed in an elaborate series of laundered accounts, some in Switzerland but most in other countries with high levels of corruption and/or lax banking regulations (e.g., Liechtenstein). This money comes from a variety of sources, including gifts solicited from wealthy members and benefactors, a long series of successful financial and property investments, dues paid by members scaled in accordance with their incomes, money raised by COGD front organizations from those attending their seminars and conferences, and funds acquired through a wide array of illicit activities such as smuggling, drug trafficking, extortion, blackmail, and weapons trafficking (since group members from the French and other secret services had developed extensive contacts with international criminal organizations over the course of their careers).

**APPENDIX VI-C: SAMPLE INSTRUCTIONS FOR ROLE-PLAYING EXERCISE**

1. Read carefully through your profile, taking note of the various characteristics of the group.
2. Jointly craft a [biological] weapons attack plan for SOJ as if you were the personnel in your organization responsible for developing such a plan. Pay close attention to your group profile as it will provide context for your planning (it's more fun if you actually do the planning in role – you can decide who plays what role in the decision-making process).
3. Your plan can be structured however you see fit (something akin to a military order of battle might be useful), but you should try to include as many of the listed attack behaviors as possible. At minimum, your plan must cover the following elements:
  - a. What type of weapon (including delivery mechanism) will your group use? Why?
  - b. How will you acquire this weapon and/or its components?
  - c. What will your intended target(s) be? Why?
  - d. What will your group seek to achieve through its attack? This should include intended casualty counts, economic and social effects, government reaction, etc.
  - e. How will the weapon be stored and transported to the target area?
  - f. How will your group ensure that the attack is not discovered and interdicted before it is launched?
  - g. If this is important to them, how will the key leader(s) of the group ensure that their decisions regarding the use of the weapon are carried out as per their wishes?
  - h. Describe the attack team – how large will it be? What will be the selection criteria for members?
  - i. Will any warnings or claims of responsibility be given? Will your group wish its involvement in the attack to be widely known?
  - j. What are your post-attack plans, both for egress from the attack area (if any) and for dealing with the consequences?
4. Once you have completed the scenario, prepare to present your plans (in role!!!) to the rest of the participants as if you were explaining the plans to fellow members of your group. Which member of the team plays which role in presenting is up to you.

**APPENDIX VI-D: SAMPLE ELICITATION TEMPLATE**

**Chemical Elicitation (State 1): Domestic based: Right Wing (Unaffiliated Cells)**

Name \*

**Domestic based: Right Wing (Unaffiliated Cells): Motivation**

**Relative Strategic / Tactical / Intragroup / Emotional Benefit (Excluding Ideology) \***

- Very Low: Upon weighing the relative costs and benefits of using chemical weapons, the actor is unlikely to perceive any substantial benefit to their use.
- Low: The actor is likely to perceive some strategic, tactical, intragroup or expressive benefits that might accrue from using chemical weapons, but expects the costs involved to outweigh the benefits, or perceives alternative weapons to be equally beneficial for lower costs.
- Moderate: The actor is likely to perceive some strategic, tactical, intragroup or expressive benefits that might accrue from using chemical weapons, but expects the costs to equal or nearly equal the benefits, or perceives alternative weapons to be equally beneficial for similar costs.
- High: The actor is likely to perceive chemical weapons in particular as advantageous to achieving its strategic, tactical, intragroup or expressive goals, and that these expected benefits somewhat outweigh potential costs.
- Very High: The actor is likely to perceive that the use of chemical weapons in particular will assist tremendously in achieving its strategic, tactical, intragroup or expressive goals, and that these benefits greatly outweigh any potential costs.

**90% confidence interval: Low probability bound**

**90% confidence interval: High probability bound**

**Relative Strategic / Tactical / Intragroup / Emotional Benefit (Including Ideology) \***

- Very Low: Upon weighing the relative costs and benefits of using chemical weapons, the actor is unlikely to perceive any substantial benefit to their use.
- Low: The actor is likely to perceive some strategic, tactical, intragroup or expressive benefits that might accrue from using chemical weapons, but expects the costs involved to outweigh the benefits, or perceives alternative weapons to be equally beneficial for lower costs.
- Moderate: The actor is likely to perceive some strategic, tactical, intragroup or expressive benefits that might accrue from using chemical weapons, but expects the costs to equal or nearly equal the benefits, or perceives alternative weapons to be equally beneficial for similar costs.
- High: The actor is likely to perceive chemical weapons in particular as advantageous to achieving its strategic, tactical, intragroup or expressive goals, and that these expected benefits somewhat outweigh potential costs.
- Very High: The actor is likely to perceive that the use of chemical weapons in particular will assist tremendously in achieving its strategic, tactical, intragroup or expressive goals, and that these benefits greatly outweigh any potential costs.

**90% confidence interval: Low probability bound**

**90% confidence interval: High probability bound**



## Domestic based: Right Wing (Unaffiliated Cells): Capability

### Personnel \*

- Very Low: Actor likely to have only primitive technical skills; likely to have no capability in chemistry and related relevant disciplines.
- Low: Actor likely to have basic technical skills. Likely to be competent with standard explosives design and manufacture and to have basic theoretical knowledge of chemistry.
- Moderate: Actor likely to possess skills associated with producing sophisticated conventional explosives and to have some access to graduate level expertise in chemistry and related relevant technical disciplines.
- High: Actor likely to possess skills associated with producing sophisticated conventional explosives, a competent chemist, although no specific weapons expertise. Broad-ranging engineering expertise.
- Very High: Actor has specialized expertise in chemical weapons production, including associated delivery engineering skills.

**90% confidence interval: Low probability bound**

**90% confidence interval: High probability bound**

### Raw Materials \*

- Very Low: Unlikely to gain access to chemical agents (weapons, weapons precursors or toxic industrial chemicals).
- Low: No evidence of past attempts to acquire chemical agents, but will likely operate within geographic areas with known sources of chemical weapons, chemical weapons precursors or toxic industrial chemicals.
- Moderate: No evidence of past successful acquisition of chemical agents, but likely to exhibit sophisticated tradecraft as well as to have operations within geographic areas with known sources of chemical weapons, weapons precursors or toxic industrial chemicals.
- High: Demonstrated ability to acquire chemical agents or highly likely to be able to acquire these agents.
- Very High: Demonstrated possession of chemical agents or almost certain to be able to acquire them.

**90% confidence interval: Low probability bound**

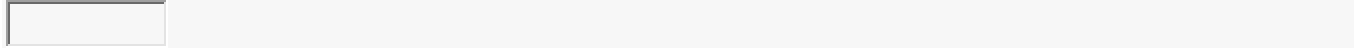
**90% confidence interval: High probability bound**

### Logistical Backbone (including required laboratories; testing areas and equipment) \*

- Very Low: Isolated from outside world; no safe area in which to operate undetected; no access to specialized equipment or transnational support network.
- Low: Robust, relatively secure operational network for transfer of materials, weapons, personnel, etc.
- Moderate: Space in which to develop weapons undisturbed / undetected.
- High: Space in which to develop weapons undisturbed / undetected PLUS robust, relatively secure operational network for transfer of materials, weapons, personnel, etc.
- Very High: Access to expensive, sophisticated equipment PLUS space in which to develop weapons undisturbed / undetected PLUS robust, relatively secure operational network for transfer of materials, weapons, personnel, etc.

**90% confidence interval: Low probability bound**

**90% confidence interval: High probability bound**



## Domestic based: Right Wing (Unaffiliated Cells): Additional Motivation (If Necessary)

Answer this question only if you have selected “Moderate” or lower for the second motivation question above: Relative Strategic / Tactical / Intragroup / Emotional Benefit (Including Ideology and Capability) \*

- Very Low: Upon weighing the relative costs and benefits of using chemical weapons, the actor is unlikely to perceive any substantial benefit to their use.
- Low: The actor is likely to perceive some strategic, tactical, intragroup or expressive benefits that might accrue from using chemical weapons, but expects the costs involved to outweigh the benefits, or perceives alternative weapons to be equally beneficial for lower costs.
- Moderate: The actor is likely to perceive some strategic, tactical, intragroup or expressive benefits that might accrue from using chemical weapons, but expects the costs to equal or nearly equal the benefits, or perceives alternative weapons to be equally beneficial for similar costs.
- High: The actor is likely to perceive chemical weapons in particular as advantageous to achieving its strategic, tactical, intragroup or expressive goals, and that these expected benefits somewhat outweigh potential costs.
- Very High: The actor is likely to perceive chemical weapons in particular as advantageous to achieving its strategic, tactical, intragroup or expressive goals, and that these expected benefits somewhat outweigh potential costs.

**90% confidence interval: Low probability bound**

**90% confidence interval: High probability bound**