

Microbial Forensic Attribution

Where Science Meets International Relations

Final Report

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Executive Summary

The U.S. government is making significant investments in bio forensics as a tool for attribution. In order for that investment to pay-off, it must be combined with investments in international collaborations so that the science behind any future attribution claims that may be made are accepted as fact, both in scientific and political terms. To better understand how evidence derived from microbial forensics will be received in international contexts among people with different cultural, professional, and political backgrounds, the Federation of American Scientists convened a daylong workshop involving domestic and international participants with expertise in forensic science, public health, law, and security policy. Additionally, the research team performed a literature review from the legal, life science, and social science realms to both inform preparations for the workshop and to complement the findings derived from it.

Key findings from the workshop were three-fold: (1) using international partners to build trust in the credibility of the messenger (not just the message) is important to fill potential “credibility gaps” that can exist between the United States and other countries; (2) the media content generation, policy responses, and scientific investigation related to a suspected biological attack all operate on competing timelines that can hamper effective communication and decision making; and (3) forensic data will need considerable support from other information sources in order to marshal international cooperation in taking action against biological attack perpetrators.

The literature review explored some of the specific cultural, ideological, and cognitive factors that could affect how foreign audiences will respond to forensic evidence attributing a biological attack to a given country or group. Key findings were that: (1) cultural differences related to conflict resolution can affect the way microbial forensic evidence is received internationally, as some may question the science as a proxy for questioning the overall U.S. response to a suspected biological attack; (2) strengthening the process through which microbial forensic evidence is created is just as important, if not more, than strengthening the science; (3) credible science needs a credible messenger, and credibility is fragile on politically sensitive issues such as those involving the prospect of terrorism; (4) advanced engagement of international partners can help mitigate natural, and politically expedient, tendencies to disregard or devalue scientific information that presents inconvenient truths to public officials abroad; and (5) the high probative weight that the United States affords to scientific evidence does not necessarily translate into other political or legal contexts abroad.

Introduction

The Federation of American Scientists (FAS) conducted a study designed to provide insights and approaches for policy and decision makers concerning the use of forensic attribution tools. The study examined how forensic science, combined with circumstantial evidence, can be understood, or misunderstood, with regard to identifying biological threats or attributing the proper cause of a biological incident. The study sought to answer the question of what is the threshold level of knowledge to be transmitted between international policy and science professionals in various scenarios and across different countries and cultures wherein the decisions about the significance of forensic data are factored into policy choices.

The question is significant for two reasons. First, the United States government continues to make significant investments in scientific activities (such as microbial forensics) and thus has an interest in understanding how scientific conclusions will be accepted as a source of truth and validity. Secondly, many of the preconditions that countries set for themselves in regard to whether or not they will take action (including the use of force) in responding to biological use, or interrupting potential emerging threats, ultimately centers around the ability to properly attribute the origin of pathogens behind those threats (i.e. to determine the return address). Without such an attribution, there would be no basis for marshaling a response. Unfortunately, forensic evidence can be easily misinterpreted or put in an incorrect circumstantial framework, causing policy leaders to respond to threats that may not actually exist, or miss those that do – either condition leading to an increased likelihood of an undesirable policy outcome. It is simultaneously a technical and political challenge.

Given the stakes involved, it is imperative that the scientific and policy communities have a clear understanding of each other's thinking processes and perceived roles. This is true not just for actors based within the United States, but for foreign ones as well. Reconciliation and integration of how one nation looks at facts, logic and proof with that of another nation's understating of facts, logic and proof is fundamental for preventing misunderstandings and eventually forms the basis for ameliorating threats, both naturally occurring and man-made.

This report aggregates the study's findings, which were derived from a combination of: (1) a review of academic literature; (2) results from a workshop that elicited opinions from an international mix of policy and biological science professionals; and (3) individual interviews.

This collaborative approach is rooted in FAS' belief that a diverse group of leading policy and technical experts are more likely to develop valuable, technically informed, and policy-feasible recommendations to solve vexing security problems than are individual researchers working alone. The goal of this report is for the policy community to consider the recommendations below when addressing the desirability of disclosing microbial forensics data to foreign entities. These recommendations are less prescriptive and more of a checklist of factors to be considered.

About the Workshop

On January 14, 2014, a one-day workshop was held at University of Pittsburg Medical Center's Center for Health Security located in Baltimore, MD. The workshop attracted 33 participants including representatives that were either from, or originated from, France (2), Jordan, Iran, Israel, Pakistan, Turkey and the UK (2). Of the Americans participants there were two participants that recently lived in the Middle East. The participants were a good balance of professionals. Half of the group had significant science based backgrounds, including expertise in microbiology, infectious disease and public health. The other half of the group had stronger policy backgrounds, including expertise in law, law enforcement, intelligence, diplomacy and business.

The workshop was comprised of four table top exercises, each having three phases (injects) built into them. The facilitators introduced each scenario to the entire group and then led a discussion after each phase was presented. All scenarios involved biological incidents and were designed to be ambiguous as to cause (man-made or naturally occurring) in order to cull out conversations amongst participants as to how an investigation might proceed and what were the key factors that would influence a decision to take action. The goal was to look at how technical scientific evidence (particularly microbial forensics) would be used and factored into decision making. (For reference, a list of workshop participants and the scenarios discussed are included as appendices to this report.)

Key Findings

1. Building Trust is Paramount

Amongst our foreign partners there was the feeling that many Non-Governmental Organizations (NGOs) that might be involved in a bio attack or crisis are seen as too Western oriented in their approaches and do not seem interested in the needs of the country they are in. The World Health Organization (WHO) seems to be an exception to this rule as well as independent bodies working under UN auspices, such as the Secretary General's Investigation Mechanism. The unstated derivative point is that the trust must be built during non-crisis times so that it can be a valuable tool during times of crisis. This requires significant investments in world-wide biosecurity engagement activities.

2. Time Clocks are in Competition

The timelines under which forensic science processes works are not well aligned with policy decision making cycles. This is especially true once a situation starts being covered by the press and the timeline for policy decisions heats up. Policy may ask for certainty as to cause, while forensic science may only offer likelihoods or probabilities (especially in the beginning stages of a suspected biological attack or developing threat).

3. Circumstantial Evidence and Context Matter

There was a chasm (friendly/professional) between scientists and the policy-law professionals in the room. In most of the game moves the question was asked; "what would you want to know next and who would you want to get that information from?" The scientists would want more scientific data or lab results while policy people wanted to focus on motivation and geopolitical context question. In the end, it appears that policy choices were likely to be made with limited scientific data as long as that data was not persuasively exculpatory.

More detailed analysis of the observations that support these findings can be found in the section that follows along with recommendations for policymakers and public officials.

Workshop Observations and Recommendations

The findings from the workshop are grouped below according to common themes. At the end of each observation/finding, we have suggested policy recommendations based on workshop discussion and/or from research and literature review.

Observation - 1(A): For each scenario presented to the group, participants initially gravitated toward issues based their expertise and training. Policy experts wanted to know more about the ethnic, local and geopolitical political rivalries in the region affected (motivational factors), while scientists wanted to know more about the historical presence of the suspected pathogen in the region (epidemiological factors). This also went to the question of what additional information sources would be sought – each discipline turning to their respective professional way points (i.e. lab results or regional analysis).

Observation - 1(B): For each scenario, participants in the workshops wanted to know if there were common ethnicities, political affiliations and nationalities of the victims. This was necessary not just for determining motive (potential for foul play) but for looking at epidemiological transmission causes as diseases can sometimes be clustered around members of particular groups as a result of common cultural habits, traditions, ritual activities and/or culinary tastes.

Observation 1(C): In determining cause during an investigation involving a virus or suspicious pathogen, it matters who (what part of the government) is doing the initial investigation. Public health officials may tend to focus on different facts and issues than security personnel and vice versa. This may result in an investigation that initially focuses on one cause and then reverses course and focuses on a different cause as new information becomes available.

Conclusion and Recommendation #1: For government officials, determining cause in suspected bio incidents is an inherently inter-agency activity but more importantly an inter-disciplinary one. Focusing on one cause and then switching gears and focusing on another can result in loss of vital evidence as factors that initially seem inconsequential to a disease outbreak investigation may be very important to those looking at a deliberate bio attack scenario. While this problem has been recognized before, it persists because collaboration is often hampered by

professional bias as well as institutional/bureaucratic structures. The U. S. government would be well served by alerting and bringing in both public health and law enforcement personnel into any investigation of a suspected bio incident early on. Both the security and health communities should stay involved in each other's processes and maintain involvement until either malicious cases or natural causes can definitively be ruled out.

Observation -2(A): Repeatedly, participants either stated or implied that their perception of the veracity of technical evidence was highly dependent on whether or not an international body had confirmed it. In most of the scenarios, participants (particularly foreigners) cited the need for a neutral observer to explain the scientific findings and methodology of the conclusions reached. Many commented on the credibility of the WHO as the most trusted source of knowledge.

Observation – 2(B): Among foreign participants, there was the feeling that many of the NGOs that might be involved in a bio centered crisis seem “too Western oriented” in their approaches and can be disinterested the needs of the country they are working in. The WHO seems to be an exception to this rule as well as independent bodies working under UN auspices, such as the Secretary General's Investigation Mechanism.

Observation – 2(C): Participants expressed concern that in scenarios occurring in foreign countries, the U.S. experts would want to take over the investigations and/or direct responses. This was seen as heavy handed and thus could be seen as suspicious depending on the facts; for example in the Middle East, perceived heavy handedness could also exacerbate the spread of conspiracy theories. Media portrayals of terrorism being primarily an Arab/Muslim phenomenon involving attacks against the West has also increased sensitivity to American accusations of ill-intent in the Middle East and other parts of the developing world. As one participant noted, the memory of Iraq is still very fresh in the minds of people in the Middle East and the objectives and motivations of the U.S. personnel involved in any forensic investigation will be questioned every step of the way.

Conclusion and Recommendation #2: The WHO received frequent mention as a capable and objective interpreter of scientific evidence to help fill the “credibility gap” between the United States and the developing world. Given this state of affairs, it would be wise for any U.S. government personnel conducting a forensic investigation in a foreign country to consider using

as light of a footprint as possible and let internationally recognized NGOs or U.N. based organizations lead the investigation. Any microbial forensic data should be sent to multiple forensic labs in multiple countries whenever possible in order to achieve better public buy-in as to the results and findings. The tradeoff is that the process of identifying causation may be slower but the results will be accepted by a wider audience.

Another way to address this problem would be to internationalize the microbial forensics enterprise to the greatest extent possible. Having people from the Middle East use the equipment and techniques to draw conclusions about what happened in the Middle East will feel different to a Middle Eastern population than when a Westerner speaks on it. In a suspected disease outbreak or bio attack in a foreign country, an NGO representative can be a valuable spokesperson, provided expertise and credentials are verified before reliance is established. However, it must be remembered that sources do not necessarily have permanent credibility.

Notwithstanding the prestige of well-regarded international bodies such as the WHO, research has shown that people will lose confidence in and withdraw support for sources of information that do not agree with their beliefs. Care should be taken to not overstate the strength of the evidence or jump to conclusions in a public context because next time the job of convincing others to act will be even harder. Until an international microbial forensics enterprise becomes well established, the U.S. will need to rely on national means that will be subject to questioning and mistrust.

Observation - 3(A): Participants noted that regardless of the source of the bio problem there would be significant economic impact. This could take the form of lost tourism dollars or ban on crop and animal imports. Thus tension between those responsible leaders focused on economic issues and those focused on national security would be significant, and may lead to a downplay of facts and evidence indicating a bio problem is occurring, such as a Mad Cow disease outbreak, or even more so, a bio terror attack.

Conclusion and Recommendation #3: Protecting a nation's economic foundation is a top priority for any leader. Trying to get a U.S. or international investigation team into a country to gather data may be best sold as a technique for disproving an attack or disease outbreak has occurred, instead of a technique to confirm one. Furthermore, getting an outside team to analyze the situation may help define the limits of the damage from the incident and give the foreign government a proactive tool to reduce anxiety and reverse any economic ostracism.

Observation - 4(A): One observer stated that public health problems often transcended political borders. In some of the scenarios, participants asked why neighboring countries were not reporting symptoms of a suspected outbreak. It seemed as though the gaps in reporting by neighboring countries caused more questioning than the scant information that was coming out the reporting county.

Conclusion and Recommendation #4: The fact that there is an absence of evidence does not always mean that such evidence is absent. In scenarios where the U.S government would have trouble gaining direct access in a particular country that is the subject of a suspected bio incident, it may be possible to gather microbial evidence from just outside the borders.

Observation - 5(A): Science based evidence (such as microbial forensic evidence), may not be conclusive as to causation. Even if it appears conclusive as to the existence of a manufactured pathogen, it doesn't answer the question of how it got to where it was found. The failure to be hyper transparent regarding methods of collection and transference to labs could easily taint any evidence gathered and prejudice any findings, making the use of such data of limited value in a political or diplomatic context.

Observation - 5(B): In some of the scenarios, terms such as “sophisticated equipment” and “suspicious outbreak” were used. Participants picked up on those terms and debated what they actually meant.

Observation - 5(C): In the midst of a media storm that could likely surround a suspected attack or disease outbreak it would be impossible to limit the amount of false, misleading or untrue data in the public domain.

Observation - 5(D): The competing timelines under which the forensic science process works are not well aligned with policy decision making cycles. This is especially true once a situation starts being covered by the press and the timelines for policy decisions heat up. All four scenarios ended up teasing this out as a problem. Policy may ask for certainty as to cause, while forensic science may only offer likelihoods or probabilities (especially in the beginning stages of a suspected bio attack or developing threat). It is likely that policy choices would be made with limited scientific data as long as that data was not persuasively exculpatory.

Observation – 5(E): There is a high risk of being wrong and making mistakes if cause is attributed too early in either the investigative process or the diagnosis.

Conclusion and Recommendation #5: Foreign governments are aware, or can soon become aware, of short falls in evidence or conclusions made by U.S. officials. Exculpatory evidence and facts that may counter U.S. governmental policy decisions need to be dealt with directly and up front. In the public debate that would accompany a suspicious bio event, it is important for government officials not to commit to conclusion too early as this may lead to a need to backtrack from a position. Despite good intentions, early misstatements can be the building blocks for the spreading of conspiracy theories and mistrust in affected areas and around the world. Finally, use of general terms with no real clear definition (such as “suspicious activity” and/or “person of interest”) opens up debate and makes it harder to focus on conclusions related to causation, thus putting a hindrance on resolving the question of whether or not a phenomenon is a threat.

Observation - 6(A): Many observers noted that research on biology is available on the Internet; any researcher and/or members of foreign governments can easily access that information. What comes up on the first few pages of a Google search may affect what is accepted as knowledge and fact.

Conclusion and Recommendation #6: Authors of scientific articles and papers need to account for Google algorithms in their writings and be capable of explaining and publishing science articles in ways that ensure valid scientifically based support claims do not find themselves at the bottom of search results.

Observation -7(A): For Western observers a key to a response, or amount of attention given to an alleged outbreak may be influenced by the number of its nationals that are affected or potentially at risk.

Observation -7(B): In Scenario #4 the question of whether or not to seek and receive extradition of the suspects from Germany was called into play. It appeared that other timely political factors, such as the seemingly ancillary allegation regarding the U.S. government spying on the Prime Minister, and/or whether or not the death penalty could be applied to criminal acts were highly dispositive in considering the willingness to support U.S. government claims. On the other hand, participants concluded that the

United States is less likely to press for extradition if they trust the government involved to take appropriate action.

Observation - 7(C): As expected, the more the conversation surrounding different moves in a scenario turned to potential actions, the greater the scrutiny of the evidence itself and of those involved in collecting it. While the threshold of knowledge that justifies inquiry into a possible man-made outbreak was relatively low, the threshold at which participants supported extradition of suspected perpetrators, or possible military responses, was much higher.

Conclusion and Recommendation #7: Pinning down attribution for purposes of stopping suspected bio attacks is not always the primary driver of another nation's or the United States' decision making calculus. Domestic political sensitivities may also drive the policy choices in a bio attack scenario. In deciding to press a case for extradition, the U.S. policy community must plan for issues extraneous to the alleged bio threat to influence decision outcomes.

Literature Review Findings and Observations

In anticipation of the workshop (and later building on observations from it) the research team reviewed life science, law, and other social science literature related to the role of forensic evidence in different legal contexts to glean insights as to how microbial forensic evidence might be received abroad. Because not all of the issues relevant to the impact of legal, political, and social culture on the interpretation of forensic evidence could be covered in a workshop setting, we are providing a summary of findings from the literature review below to compliment the workshop findings presented above.

In some cases, we discuss issues related to the use of forensic DNA evidence in criminal and civil court proceedings as a way to anticipate how microbial forensic evidence might be judged following a suspected biological attack. Considering also that political decisions are made by human beings who have their own biases and often must account for public perception, we explored some of the social and cultural factors that may impact the international acceptance of microbial forensic evidence. Because the Middle East is both a region of concern for biosecurity as well as distinct culturally and politically from the United States, we explore a few specific issues related to the use of forensic science in that part of the world.

The Need for an International Microbial Forensics Strategy

*Evidence is the basis of justice: to exclude evidence is to exclude justice.*¹

The United States has reportedly spent over 60 billion dollars on biodefense since the attacks of September 11, 2001.² Despite these investments, the 2009 National Strategy for Countering Biological Threats (NSCBT) concedes that “it is quite possible” the United States will not obtain the information needed to respond in time to stop an impending attack.³ Given the limitations of prevention, one important means of reducing overall vulnerability to biological attacks is by improving responses when they occur and ensuring that those who are responsible are held accountable. The NSCBT highlights the importance of enhancing microbial forensics and attribution capabilities to generate “scientifically sound and statistically defensible” information

¹ Jeremy Bentham, *The Works of Jeremy Bentham*, Ed. J. Browning (Edinburgh, UK: 1843): VII 24

² Erika Check Hayden “Biodefense since 9/11: the price of protection,” *Nature*, 477, 150-152 (2011). Available at: <http://www.nature.com/news/2011/110907/full/477150a.html>

³ U.S. National Security Council, National Strategy for Countering Biological Threats, (Washington DC: The White House, 2009), p.2.

that links a biological attack to its perpetrators.⁴ To that end, the National Research and Development Strategy for Microbial Forensics aims to develop a microbial forensics research agenda; promote interagency communication, coordination, and information sharing on research and development efforts; and enhance interagency education and training on microbial forensics and related topics.⁵ These efforts build on nearly \$200 million of investments made by the National Science Foundation in microbial forensic research since 2000.⁶

The laudable goals set forth in the NSCBT comprise a robust and ambitious national strategy. However, an equally robust and ambitious *international* strategy for microbial forensics will help ensure that the “scientifically sound and statistically defensible” determinations yielded therefrom will persuade audiences abroad to take action in support of a U.S. attribution determination – or be a willing participant in an investigation to attribute cause. In Syria, scientific data and other technical evidence establishing chemical weapons use was instrumental in generating international momentum to remove chemical weapons from the country and to compel the Syrian government to sign the Chemical Weapons Convention (CWC).⁷ While the question of whether or not chemical weapons were used has been settled, disputes persist as to who used them – the government or rebel groups.⁸ In the case of biological attacks, similar attribution challenges can significantly hamper efforts to develop fast and effective international responses.

The Federal Bureau of Investigation (FBI) spent seven years, 600,000 investigator hours, established a special task force, and consulted 29 universities for scientific and technical support in the investigation of the 2001 Anthrax mailings. Still, a review of the evidence by the National Research Council concluded that it was “not possible to reach a definitive conclusion about the

⁴ Specifically, the NSCBT calls for establishing a nationwide research, development, and investment plan in microbial forensic science; maintaining a National Biological Forensics Analysis Center to support local law enforcement agencies; and ensuring coordination among professionals in public health, law enforcement, and agriculture.

⁵ National Science and Technology Council, National Research and Development Strategy for Microbial Forensics, (Washington DC: The White House, 2009): p.3.

⁶ National Science Foundation, FY2013 Homeland Security Activities Budget Request. Available at: http://www.nsf.gov/about/budget/fy2013/pdf/09_fy2013.pdf

⁷ Rick Gladstone and C.J. Chivers, "Forensic Details in U.N. Report Point to Assad's Use of Gas," *The New York Times*, November 1, 2011. Available at: <http://www.nytimes.com/2013/11/01/world/middleeast/syria.html>

⁸ Steve Gutterman and Oliver Holmes, "Russia says U.N. report on Syria attack biased," *Reuters*, September 18, 2013. Available at: <http://www.reuters.com/article/2013/09/18/us-syria-crisis-russia-idUSBRE98HORQ20130918?irpc=932>

origins of the B. anthracis in the mailings based on the available scientific evidence alone.”⁹ Of course, the FBI’s case did not rely exclusively on the scientific evidence and there have been many advances in microbial forensics since then. Nevertheless, the field still faces numerous technical challenges due to the need to validate the totality of data collection and analysis methods used for investigating multitudes of potentially dangerous pathogens that may be used in a biological attack. In addition to the technical challenges inherent in gathering and analyzing data, the field also faces practical challenges in communicating results that may be as difficult to overcome. Even assuming the microbial forensics reaches the level of sophistication as other forms of DNA forensic science, turning the data it yields into actionable knowledge for policymakers and public officials requires consideration as to how others will interpret it.

Nuanced and logically sound methodologies have been proposed for synthesizing scientific information, intelligence, and open-source reporting to confirm or disprove accusations of WMD use.¹⁰ The usefulness of microbial forensics to attribute the attack to a suspect will largely be a function of the degree to which international partners understand the science and regard the information it yields as credible. Without a doubt, geopolitics will play a role in shaping the responses of foreign leaders to U.S. concerns about possible WMD use and matters pertaining to culpability. In addition, social and cultural factors play a role in how political leaders, public health professionals, the media, and the public writ-large react to scientific information and what amount of evidence they deem sufficient to attribute a biological attack to a man-made cause and, by extension, an individual or group. Conversely, microbial forensics could serve to discredit false accusations that a naturally occurring disease was the result of an intentional act by humans. Either way, epidemiological and microbial forensics play a pivotal role in guiding policymakers on what to do in the wake of a possible biological attack. But it should not be taken for granted that the world will take this evidence at face value.

⁹ National Research Council. Review of the Scientific Approaches Used During the FBI’s Investigation of the 2001 Anthrax Letters. Washington, DC: The National Academies Press, 2011. p.144

¹⁰ See Rebecca Katz and Burton Singer, “Can an Attribution Assessment Be Made for Yellow Rain? Systematic Reanalysis in a Chemical-and-Biological-Weapons Use Investigation,” *Politics and the Life Sciences*, Vol. 26, No. 1 (March, 2007): 24-42. Katz’s methodology assesses the reliability of each source of information (scientific information, intelligence, and open-source reporting) in combination with the strength of its association with a deliberate WMD attack as opposed to alternative explanations.

Dueling Assertions of Fact and Competing Time Clocks in the Wake of a Biological Attack

We base the following discussion on the proposition that a distinction exists between “knowledge for practice” (for scientists) and “practical knowledge” (for public officials). For policymakers and public officials, more scientific information is an “ambiguous virtue” that can either empower or confuse depending on its nature. What constitutes “knowledge” in the political context is that which empowers policymakers and public officials with the ability to act.¹¹ Thus, while scientific information is a necessary part of knowledge-production, it does not necessarily stand on its own as political knowledge.

Complicating matters further, political disagreements often arise out of “dueling assertions of fact” that stem from differences in how people perceive the world around them. The prevalence of scientific evidence gathered to support public policy decision-making has not settled or even abated the intensity of debate on political issues related to family planning, vaccinations, climate change, and the management of nuclear waste. Oftentimes the point of contention is not whether or not policy should be based on science; rather, it is about what the science *really* says.¹²

Moreover, cultural and ideological differences are continually at work, shaping how people perceive scientific evidence and what, if anything, it actually proves. The ability of the United States to understand these dynamics and develop shared understandings among policymakers, scientists, intelligence and law enforcement personnel, and members of the media will be crucial to building the case against those involved in a biological attack and preventing them from doing any further harm.

Scientists have explained how epidemiologic clues pointing to deliberate, man-made causes of illness among a targeted population can be found “using data gathered on cases over time.”¹³ How much data must be gathered and over what period of time before the government can confidently determine whether or not the outbreak can be categorized as a biological attack or even merits further investigation as such? Medical professionals need time to understand the nature of the problem while public officials have to take action in the event that the evidence

¹¹ Nico Stehr and Reiner Grundmann, “How does knowledge relate to political action?,” *Innovation – The European Journal of Social Science Research*, Vol. 25, No. 1, March 2012: p.32.

¹² See Dan Kahan, Donald Braman, and Hank Jenkins-Smith, “Cultural Cognition of Scientific Consensus,” *Journal of Risk Research*, Vol. 14, pp. 147-74. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1549444

¹³ Julie Pavlin, “Epidemiology of Bioterrorism,” *Emerging Infectious Diseases*, Vol. 5, No. 4 (July – August, 1999): 529. Available at: http://wwwnc.cdc.gov/eid/article/5/4/99-0412_article.htm

does point towards man-made causes. While discerning the mortality rate for disease is crucial from a medical and public health perspective (to save lives), it can take a long time to do establish this scientifically. Intelligence and law enforcement officials do not need to know what percentage of lives a virus strain ultimately claims as much as they need to know that the introduction of the virus was indeed deliberate (to catch perpetrators and prevent future attacks).

Meanwhile, media outlets are likely to report on the story as soon as it comes to their attention and to stay ahead of it with “breaking news.” Professional reporters and citizen journalists alike may be content with describing the outbreak as “potentially” the result of a deliberate act as they file or post a story. In fact, there is a good chance that they will. When information pointing to a deliberately caused disease outbreak is sparse or conflicting, the mere possibility of a biological attack will have resonance with the media and likely gain traction. Åsa Boholm, writing on the politicization of public health issues explains that:

For the media the narrative dramaturgical structure is crucial: there must be a story to be told about intentions and motives, victims, villains and heroes, all staged in a specific setting. Human consequences are spelled out and so are meanings and emotions. Issues of blame, responsibility and trust are topical and are intermingled with questions about causation and speculations on plausible effects. Some episodes even develop a force to structure the interpretation of new events.¹⁴

The “competing time clocks” – among the media, health professionals, and public officials – will complicate efforts to inform the public narrative in the wake of a possible biological attack. As the Benghazi attacks illustrated, the speed and visibility with which the story develops puts enormous pressure on policymakers to speak accurately on a developing security situation and address the emotional needs of the public.

Following a suspicious disease outbreak, determining that a villain exists can be difficult; ascertaining their identity is even harder. Competing accusations of responsibility will come early and often, especially if the attack occurs as an extension of an existing conflict. Conflict areas in particular attract professional journalists as well the attention of bloggers worldwide – neither of whom will be left in want of data sources (accurate and inaccurate) for very long. On-

¹⁴ Åsa Boholm, “The cultural nature of risk: Can there be an anthropology of uncertainty?” *Ethnos*, Vol. 68, No. 2 (2003): p.173.

the-ground citizen reporting via social media has dramatically transformed the information gathering environment from places once shrouded by the “fog of war” into a fog of information surplus.¹⁵ While the mass democratization of reporting power can help “ground truth”, it also fuels the generation of inaccurate or only partially accurate media narratives which box-in policymakers and public officials to issue public statements and make decisions about how to respond.

The growing number of information sources arguably makes journalism more self-correcting than ever before. However, individual media sources now face less risks of losing credibility as a consequence for getting a story wrong. As long as they don’t make egregious errors and fail to correct them on a routine basis, the public will forgive and forget.¹⁶ Public officials enjoy no such luxury and science will not necessarily make their job easier when a suspicious disease outbreak is detected.

Although medical and scientific information help establish a basis for appraisal, subjective “epidemiologic judgment” will also play a significant role in determining what constitutes an “unusual” disease outbreak.¹⁷ Consequently, the United States should prepare for disagreements among scientists, especially during the early stages of investigation into a possible biological attack. Even if an unusual virus strain is found among a group of people afflicted by illness, public health professionals need to question its significance before attributing causation. This could take weeks, if not months. The judgments of experts on the issue may not and likely will not, be unanimous. In fact, scientists will likely be more conservative than others, including political leaders, in their judgments about probable causes of disease outbreak and attributing a cause to a deliberate act by any particular party.

Moreover, the strength of any epidemiologic or forensic evidence of a biological attack will not be weighed by policymakers or the public in a vacuum; it will be weighed against the strength of whatever evidence suggests an alternative explanation. In the ungoverned court of public opinion, trying to “chip away” at an alternative, more benign hypotheses circulating in the public

¹⁵ See Anand Varghese, *Social Media and the Syrian Civil War*, Peace Brief 151: United States Institute of Peace, June 7, 2013. Available at: <http://www.usip.org/sites/default/files/PB-151.pdf>

¹⁶ See Paul Farhi, “The cacophony of breaking news,” *The Washington Post*, April 20, 2013, C1.

¹⁷ See Tracee Treadwell, Denise Koo, Kathleen Kuker, and Ali Khan, “Epidemiologic Clues to Bioterrorism,” *Public Health Reports*, Vol. 118 (March-April, 2-13): p.18. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1497515/>

narrative by raising the specter of bio-terrorism might backfire when the evidence is not yet conclusive or not as strong as that which supports alternative explanations. Conversely, downplaying concerns about terrorism have the same discrediting effect.¹⁸

The following exploration of cultural, ideological, and cognitive issues that can affect the interpretation of epidemiological and microbial forensic evidence by different audiences is written with these challenges in mind. Certainly, political interests will play a large role in determining how a possible biological attack is handled internationally; however, our goal here is to look a layer deeper to explore how other underlying factors can affect the way scientific information is handled in the public sphere. Although the study centers on microbial forensics, we also consider public and policy responses to information gathered from epidemiological investigations as well as issues related to the use of scientific information in a policy-making context generally. Naturally, any forensic investigation that aims to attribute a biological attack to an individual must build on an epidemiological foundation that attributes the cause of a disease outbreak to either a man-made or naturally occurring activity. One assumption we made was that many of the factors that influence the interpretation of information gleaned from other forms of forensic science will logically have similar effects on the interpretation of information gleaned from microbial forensics.

The Cultural Impact on the Role of Science in Addressing Biological Threats

*Did you hear about the famous microbiologist who traveled in thirty different countries and learned to speak six languages? He was a man of many cultures.*¹⁹

Outside of the laboratory, the word “culture” was brought into the anthropological lexicon in 1871.²⁰ Since then, anthropologists have devoted considerable energy to simultaneously

¹⁸ This “weak evidence” effect has been studied among jurors, who tend to interpret evidence that does not meet the “minimum acceptable standard” of convincingness set previously by the other side as further proof that the other side indeed had it right. See Craig R. McKenzie, Susanna M. Lee, and Karen K. Chen, “When negative evidence increases confidence: change in belief after hearing two sides of a dispute,” *Journal of Behavioral Decision Making*, Vol. 15, No. 1 (2002): p.14.

¹⁹ Unattributed biology joke.

²⁰ Edward Tylor, *Primitive Culture*, Bradbury, Evans, and Co. (London: 1871), p.1. Tylor described culture as “that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society.”

redefining culture and refining our understanding of its effects. Writing in the 1950s, Edward T. Hall described culture as a form of communication – a “silent language” comprised of behavior patterns and ways of thinking that people of the same culture take for granted in each other but may seem alien to others.²¹ The meaning embedded in this “silent language” can either facilitate or impede agreement between countries on the nature of problems and the role of technical information in solving them. What constitutes “proof” in one cultural context may not be considered sufficient, or even highly relevant, in another.

Because “culture” is a complicated concept and defined in different ways, it is helpful to delineate a few particular dimensions along which national cultures differ.²² However, we caveat the following discussion by noting the danger in approaching culture in strictly functionalist terms (i.e. as a force that acts on others, but is not acted upon). Assuming culture operates as a variable whose effects are available for observation risks mischaracterizing it as a purely static concept whose effects neither change over time nor vary much person-to-person.²³ Such primordial explanations of culture fail to account for individual characteristics such as professional and educational background, position within an institution or organization, political views, interests and motives, and history of interaction with others from different parts of the world.²⁴ Controlling for all of these factors would go beyond our intentions and capabilities.

Recognizing these limitations, we draw upon a number of different sources to highlight a few cultural dimensions that may (or may not) be salient for diplomats in the aftermath of a biological attack, as the United States engages with international partners to generate a shared understanding of the problem and establish common ground as to what to do about it. Some of

²¹ Edward Hall, *The Silent Language*, (New York, Doubleday: 1959). Available at: http://globalsociology.ucoz.ru/_ld/0/3_SilentLanguage0.pdf

²² Although we use the term “national cultures” here for simplicity’s sake, we do acknowledge that the borders of national cultural traditions are not necessarily coterminous with those of states, i.e. as in a proper “nation-state.”

²³ Anne-Marie Soderberg and Nigel Holden, “Rethinking cross-cultural management in a globalising business world,” *Journal of International Business Studies*, Vol. 29 (2002): 837-862.

http://www.exeter.ac.uk/media/universityofexeter/internationalexeter/documents/iss/Rethinking_Cross_Cultural_Management.pdf

²⁴ Toke Bjerregaard, Jakob Lauring, and Anders Klitmoller, “A critical analysis of intercultural communication research in cross-cultural management,” *Critical Perspectives on International Business*, Vol. 5, No. 3 (2009): 207-228.

the key differentials in cultural types are as follows:

Individualist – Collectivist

In individualist societies, it is expected that beliefs and behaviors will be shaped by individuals acting largely out of self-interest. Cultures with a more collectivist orientation place a higher value on loyalty towards family, friends, and community as a guide for social choices and interactions.²⁵

Hierarchical – Egalitarian

Sometimes expressed in terms of distance from power, this facet of culture speaks to the willingness of people to accept, if not expect, that power will be distributed unequally in a society and concentrated in the hands of elites. Hierarchical cultures are more accepting of large disparities in wealth and power across society; egalitarian cultures less so.²⁶

Traditional – Secular-rational

Traditional cultures tend to view religion, customs, and social conventions as highly important in daily life and regard religious and cultural leaders as sources of authority. Science is one source among many for authoritative knowledge about the world. In secular-rational cultures, people highly value positivistic science and see authority as established through law or by virtue of specialized training.²⁷

Poly-chronic – Mono-chronic

A mono-chronic conception of time leads one to focus on orderly sequencing addressing issues more-or-less in a “one thing at a time” fashion. By contrast, those who adhere to a more poly-chronic concept of time tend to see many things happening at once, interconnected, and in need of simultaneous management.²⁸

²⁵ Gerard Hofstede, “National cultures revised,” *Behavior Science Research*, 18 (1983): 285-305.

²⁶ Gerard Hofstede, “National cultures revised,” *Behavior Science Research*, 18 (1983): 285-305.

²⁷ Ronald Inglehart and Wayne E Baker, “Modernization, cultural change, and the persistence of traditional values,” *American Sociological Review*, Vol. 65 (February 2000): 19-51. Available at: <http://my.fit.edu/~gabrenya/cultural/readings/Inglehart-Baker-2000.pdf>

²⁸ Edward Hall, *Beyond Culture*, Anchor Press (New York: 1976).

High context – Low context

In high-context culture, most of the meaning in communication between people is embedded in the context. (This mode of communication can strike people from low-context cultures as ambiguous or vague.) In low-context cultures, the true meaning of a message must be expressed explicitly because little else is assumed about the meaning from specific context.²⁹

Why does this matter? Cultural factors influence communication styles as well as shape expectations as to how a problem of international concern is framed and should be addressed. For example, the cultural differences between the United States and Iran can complicate efforts to address matters of shared concern. American culture, for instance, is described as individualist, secular rational, mono-chronic, low-context, and (generally) egalitarian. Iranian culture, by contrast, has been described as collectivist, traditionalist, poly-chronic, high-context, and hierarchical.³⁰ Of course, the United States and Iran have differences that extend far beyond culture. Paying attention to cultural differences can only help in building common understanding between the two countries in addressing matters of shared concern. One implication is that Americans involved in negotiations with Iranians may become confused or frustrated with their counterparts' ambiguously-phrased or non-committal ("high context") statements and seemingly mercurial tendency to switch from topic-to-topic during meetings due to the Iranian ("poly-chronic") tendency to see, and want to address, many things happening at once. Additionally, the value Iranians place in saving "face" and retaining close ties to power (a particular concern for individuals from collectivist cultures) may seem disproportionately high to Americans, who are comparatively more task-oriented and less concerned about relationships than getting to the facts of the matter.³¹

Additionally, the U.S. ambition to attribute an attack to a specific source could be seen by third parties as not *the* issue but merely a part of larger issues related to justice and ongoing efforts to improve relations between countries. As a thought experiment, one could also consider the political optics of launching a forensic investigation that will create a zero-sum situation such that either the implicated party must admit guilt or the United States must admit that it erred in

²⁹ Ibid.

³⁰ Hamid Yeganeh, "The 'Great Satan' talks with the 'Evil': A cross-cultural analysis of the American-Iranian communication/negotiation styles," *International Journal of Conflict Management*, Vol. 22, No. 3 (2011): 219-238

³¹ Ibid. See also Seyed Hossein Moussavian and Mohammad L. Shabani, "How to talk to Iran," *The New York Times*, January 3, 2013. Available at: <http://www.nytimes.com/2013/01/04/opinion/how-to-talk-to-iran.html? r=0>

making the accusation. Establishing epidemiological or microbial forensic facts as evidence to implicate foreign governments, while technically sound, may be perceived as singularly-focused on shaming another country and politically unhelpful in the grander scheme of things.³²

Taking the thought experiment a step farther, those who are more concerned about the importance of face-saving in dispute resolution may express their doubts about the wisdom of introducing forensic evidence indirectly by questioning and casting doubt on microbial forensic science. Outwardly, they may question the microbial forensics methods or the messenger (or both), even if they believe the evidence is credible.³³ Americans, by contrast, are accustomed to zero-sum competition in establishing truths and consider empirical facts grounded in positivistic science indispensable to resolving disputes justly. To others, the American comfort level with competitive fact-finding may seem confrontational, unnecessary or possibly even suggestive of a disinformation campaign.

Cultural differences may also account for variations in the probative weight given to technical evidence relative to other available information. In finding answers to questions about what *really* happened, public officials will turn to the same sources of information non-officials often turn to as a means of calculating risks of a given action or inaction: (1) their personal experience; (2) the available scientific information; and (3) the wider, media-driven narrative that frames the issue. In the United States, people are accustomed to turning to official governmental sources of information and assign high importance to numerical information (e.g. statistics) in assessing what has or might occur.³⁴ In other countries, official sources of information are less trustworthy or susceptible to political manipulation in the eyes of the public.³⁵ In some cases, the corroborating sources of information are as important, if not more important, than “official” sources.

³² For example, a similar zero-sum dilemma currently faces the United States, the International Atomic Energy Agency (IAEA), and Iran in the dispute over Iran’s nuclear program. Iran had long denied having any interest in nuclear weapons. Ever since the IAEA went public with specific allegations of weapons-related work, it has become unclear how the IAEA and Iran can both save face: either Iran must admit to lying, or the IAEA must admit to either incompetence or fraudulence.

³³ Face negotiation theory expands on the role of “face” in negotiations and conflict resolution by exploring the effect of people’s desire to be accepted, admired, or respected in their interactions with others. Understanding culturally defined views of shame and face-saving can be helpful for anticipating how international partners view the context in which the microbial forensic evidence is introduced.

³⁴ Hamid Yeganeh, “The ‘Great Satan’ talks with the ‘Evil’: A cross-cultural analysis of the American-Iranian communication/negotiation styles,” *International Journal of Conflict Management*, Vol. 22, No. 3 (2011): 219-238

³⁵ Marvin Zonis and Craig Joseph, “Conspiracy Thinking in the Middle East,” *Political Psychology*, Vol. 15, No. 3 (1994).

Forensic and Scientific Information in a Comparative Legal Context

“...proceed with great caution in deciding more than we have to, because our reach can so easily exceed our grasp.”³⁶ - William Rehnquist

Forensic science has an imperfect record. The problems that plagued the FBI hair and fiber unit serve as a helpful reminder of forensic science’s human aspect. For over twenty years, improperly-trained scientists possibly tainted over 21,000 federal cases by giving inaccurate or misleading trial testimony, possibly contributing to numerous wrongful convictions.³⁷ Improper training aside, American legal culture likely also played a role. The American legal tradition places great emphasis on factual rectitude and gathering physical evidence to establish the facts of a case. Legal documents are often information-heavy and courtroom proceedings do not end until both sides “rest” their case. Increasingly, judges are accepting of “apparently relevant” evidence and expert opinion – perhaps to a fault.³⁸ And jurors increasingly expect that litigants introduce forensic and other scientific information to prove their case and expect this evidence to be conclusive.³⁹

Skeptics have described forensic science as a “science constructed in the image of criminal law.”⁴⁰ This is because forensic science does not follow the traditional scientific method of testing and retesting hypotheses. Thus, the nature of forensic evidence is such that it can only establish probabilities (albeit high ones) that a suspect is linked to a crime; it cannot establish the linkage as a categorical truth. As one forensic scientist described the attribution process, through analysis “. . . we become subjectively convinced of identity; we do not prove it.”⁴¹

DNA evidence generated through microbial forensic methods is far more powerful statistically than the hair fiber analyses described above. However, this may transfer scrutiny from the

³⁶ William Rehnquist, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (June 28, 1993). Available at: <http://caselaw.lp.findlaw.com/scripts/getcase.pl?court=us&vol=509&invol=579>

³⁷ Spencer S. Hsu, “FBI Lab’s woes cast a growing shadow,” *The Washington Post*, December 23, 2012. Available at: <http://www.independent.co.uk/news/world/americas/fbi-labs-woes-cast-a-growing-shadow-8430348.html>

³⁸ Gary Edmond, “Advice for the courts? Sufficiently reliable assistance with forensics science and medicine (Part 2),” *The International Journal of Evidence and Proof*, No. 16 (2012): p.267. As the author notes, the standards for admissibility of expert opinion are relatively weak in the United States.

³⁹ Shelton, Donald E., Young S. Kim, and Gregg Barak. “A Study of Juror Expectations and Demands Concerning Scientific Evidence: Does the “CSI Effect” Exist?” *Vanderbilt Journal of Entertainment & Technology Law*, Vol. 9 (2006): 331-68. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=958224

⁴⁰ Michael J. Saks, “Merlin and Solomon: Lessons from the law’s formative encounters with forensic identification science,” *Hastings Law Journal*, Vol. 49, No. 4 (1998): 1069-1141.

⁴¹ D.A. Stoney, “What made us ever think we could individualize using statistics?” *Journal of the Forensic Science Society*, Vol. 31, No. 2 (1991): 197-199.

possibility that the science is inconclusive to alternative possibilities, such as tampering with the process through which samples are gathered and analyzed, or that the people who present the findings harbor ulterior motives. Indeed, one might ask what *exactly* qualified the National Research Council to weigh-in on the FBI's methods and findings in the Anthrax mailings investigation. Who selected the research team and what do we know about them and their potential motives? In their study of the role of scientific expertise in decision-making, Harry Collins and Robert Evans describe this as a "problem of extension."

Though science studies has resolved the Problem of Legitimacy by showing that the basis of technical decision-making can and should be widened beyond the core of certified experts, it has failed to solve the Problem of Extension: "How far should participation in technical decision-making extend?" In other words, science studies [sic] have shown that there is more to scientific and technical expertise than is encompassed in the work of formally accredited scientists and technologists, but it has not told us how much more."⁴²

This problem of extension can be a particularly thorny one for microbial forensics given the incentive of governments to classify microbial forensics research and associated analytical methods.⁴³ Furthermore, sample collection, transfer, analysis, and method validation following a biological attack will include a range of actors other than microbiologists whose actions and motivations could be brought into question. Who qualifies as an expert and how can it be proven that the process they followed was scientifically rigorous and free from tampering?

By-and-large, the way in which expert opinion and scientific evidence is used in legal proceedings depends considerably on a country's legal and political culture.⁴⁴ In Western Europe, courts are seen as more of an extension of the modern state, they run a civil law system, and power is centralized. In Anglo-American systems, power is less centralized and pushed into the public sphere; thus, the justice system is adversarial and expert witnesses hired by litigants may be less objective. Experts are indeed paid handsomely for their testimony by those lawyers offering it up as evidence. The result is two different orientations towards process. In the more inquisitorial systems of Western Europe, there is a stronger emphasis on "output control" to ensure a fair, just, and fact-based outcome. Standards for expert witnesses are accordingly high

⁴² Harry Collins and Robert Evans, *Rethinking Expertise*, (Chicago University Press: 2007), p.237

⁴³ Salyers, "Microbial Forensics."

⁴⁴ Ron Shaham, *The Expert Witness in Islamic Courts: Medicine and Crafts in the Service of the Law*, University of Chicago Press (Chicago: 2010): p.192

to ensure that the process as a whole is not corrupted by incompetence or politically- or financially-motivated testimony. The Anglo-American systems that embrace a more competitive approach to establishing truth tend to focus more on “input control” wherein the judge serves as the gatekeeper to ensure that expert witnesses called by both sides are at least credible, even if they are not the most technically prestigious authority.⁴⁵

In the Middle East, many systems are based on European models, but Islamic societies in the region have at times resisted the incorporation of scientific evidence into legal proceedings, particularly in matters concerning family law.⁴⁶ Ron Shaham traces this problem back to the motivations of political elites – namely, concerns that the science represented by the “new class” may over time erode the legitimacy of their authority and the traditional values that they represent.⁴⁷ Today, recent discussions in the Muslim world have considered the probative weight of DNA evidence vis-à-vis more traditional methods of establishing paternity.

For societies following *sharī‘ah* law, paternity is directly linked to marriage. It is either confirmed through by that fact alone or it is negated through *li‘ān* – literally “mutual oaths of condemnation” – of an adulterous encounter. Another traditional means of determining family lineage is through *qiyāfah*, which denotes the skill or ability to trace family lineage through examination of physical features.⁴⁸ Thus, the question DNA testing posed to Islamic legal scholars centered on the weight that should be assigned to DNA evidence relative to *li‘ān* and *qiyāfah*. Opinions ranged from adopting DNA testing in lieu of *li‘ān* to delineating situations in which DNA or *li‘ān* should be relied upon to completing disregarding DNA evidence in favor of *li‘ān*.⁴⁹ Our goal here is not to adjudicate this debate; rather, it is to illustrate that DNA evidence will not always be considered determinative in the same way we consider it to be in the United States.

⁴⁵ Ton Broeders, “Forensic evidence and international courts and tribunals: why bother given the present state of play in forensics?” Paper presented to the 17th International Conference of the International Society for the Reform of Criminal Law, The Hague, Netherlands, August 24 - 28, 2003. Available at:

<http://www.isrcl.org/Papers/Broeders.pdf>

⁴⁶ Ron Shaham, *The Expert Witness in Islamic Courts: Medicine and Crafts in the Service of the Law*, University of Chicago Press (Chicago: 2010): p.193.

⁴⁷ Ron Shaham, *The Expert Witness in Islamic Courts: Medicine and Crafts in the Service of the Law*, University of Chicago Press (Chicago: 2010): p.193.

⁴⁸ In the United States, paternity disputes are settled definitively by scientific testing.

⁴⁹ For a detailed discussion of this debate, see Ayman Shabana, “Negation of Paternity in Islamic Law between *Li‘ān* and DNA Fingerprinting,” *Islamic Law and Society*, 20, 15 (2013): 157-201. Available at:

https://repository.library.georgetown.edu/bitstream/handle/10822/559571/Shabana_Negation%20of%20Paternit%20in%20Islamic%20Law%20between%20Li'an%20and%20DNA%20fingerprinting.pdf?sequence=1

Beyond family law, the terms of use for DNA testing in the criminal context are also delimited by culture. In a recent ruling, the Council for Islamic Ideology (CII) of Pakistan – a country whose justice system is influenced by *sharī'ah* law – recently declared that DNA evidence could be used as primary evidence in a rape case, but it could not stand alone as proof of guilt and must be accompanied by other forms of evidence such as the need for a confession or eyewitness testimony from four male witnesses. (The reason being that DNA cannot address matters pertaining to consent; therefore, other parts of Islamic law must apply such as the need for other witnesses.) Interestingly, this development was variously reported as the CII either backing or *backing away* from scientific evidence.⁵⁰ In any case, DNA evidence does not enjoy the elevated position that it has in the Anglophile world where interest in science and technology is deeply (if not uniquely) ingrained culture.⁵¹ Nonetheless, Islamic countries in general do have a tradition of including scientific information and expert testimony that is not unlike Western models wherein scientists provide expert opinion but leave matters concerning guilt to the judge or jury. Still, while expert witnessing and scientific evidence generally does not typically induce a great deal of resistance cross-culturally, it does not settle the issue of *who* qualifies as an expert or how their opinions will be received.

The Effect of Culture and Ideology on Perceptions of Scientists and Expert Opinion

Perceptions of expert qualification do not easily lend themselves to cross-cultural study. But we can study it indirectly by exploring how culture and ideology affect the role of expert opinion and scientific evidence in forming risk perceptions. People's viewpoints about expertise, scientific integrity, professional reliability, and the trustworthiness of messages related to health risks will all be influenced by the surrounding social context in which their judgments are made.⁵² More simply stated, what the science *really* says about a societal risk and who represents a credible source of information about that risk depends in part on what people are predisposed

⁵⁰ See "DNA test can't be primary evidence in rape cases: CII," *The Nation*, September 24, 2013.

<http://www.nation.com.pk/national/24-Sep-2013/dna-test-can-t-be-primary-evidence-in-rape-cases-cii>. See also Mushtaq Hussain and Ammara Mushtaq, "Islamic Law: backing up forensic DNA evidence," *Nature*, Vol. 563, 342 (2013). <http://www.nature.com/nature/journal/v503/n7476/full/503342b.html>

⁵¹ Jon D. Miller, "Public Understanding of, and Attitudes toward, Scientific Research: What We Know and What We Need to Know," *Public Understanding of Science*, Vol. 13, No. 3 (2004): 273-294. Available at:

<http://news.msu.edu/media/documents/2009/02/ea85b0d5-ff05-48d2-91eb-1b7d0641137f.pdf>

⁵² James Tansey and Tim O'Riordan, "Cultural theory and risk: a review," *Health, Risk & Society*, Vol. 1, No. 1 (1999): 71-90.

to believe constitutes the *real* threat.⁵³ In responding to public health threats following possible incidents of biological terrorism, the risk of overreacting and unnecessarily alarming the public will be weighed against the risk of underreacting and leaving the public vulnerable to repeat attacks.

The work to understand the effect of culture on risk perceptions follows several different pathways, all of which seek to answer why people generally fail to assess risk in purely objective, rational terms, and based on the totality of the information available. In short, these schools of thought differ as to whether departures from pure objectivity in taking aboard scientific information are attributable to social forces, individual failures of logic, or some combination of both. Rather than adjudicating the debate between different schools of thought, we take the view that all should be referenced for insight on to how to translate microbial forensic evidence into practical knowledge for public officials. We therefore draw on the literature selectively and summarize a few helpful insights concerning perceptions of scientific experts and expert opinion.

By default, people systematically overestimate the degree of scientific support that exists for positions they are predisposed to accept. In the worst case, an expert is viewed as an expert only insofar as their conclusions accord with what the observer already believed; thus, the probative weight of expert opinion is effectively zero. Other times, when scientific consensus forms on an issue, people are prone to devalue “what most scientists believe” as simply another empirical fact that sits alongside other facts that are assigned equal or greater importance.⁵⁴

For these reasons, research has sought to develop recommendations on overcoming resistance to “counter-attitudinal” persuasion. Unsurprisingly, perceptions of the messenger and their values matter a great deal. Polarization on an issue increases when people receive information affirming their pre-existing beliefs from those whose values they share and disputing information from those whose values they repudiate. Conversely, when the disputing information comes from people whose values are shared and the affirming information from those whose values are not

⁵³ For example, in response to scientific information that points to global warming trends, disagreements about what to do about that problem can be explained by the fact that some are more concerned by the risks inherent in overreacting to the threat with economically costly policies while others are more concerned with the risk of severe environmental consequences of underreacting. See Kahan, “Cultural Consensus.”

⁵⁴ Dan Kahan, Donald Braman, and Hank Jenkins-Smith, “Cultural Cognition of Scientific Consensus,” *Journal of Risk Research*, Vol. 14, pp. 147-74. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1549444

shared, overall polarization on the issue recedes.⁵⁵ These findings may not be surprising to many, least of all those with experience in policymaking. However, they do underscore the importance of having internal validators in a given country to support science-based conclusions as well as, if necessary, communications from external parties that serve to *invalidate* any conclusions based on false presumptions. Building trust and confidence of potential internal validators with credibility abroad could require significant investments in foreign scientific engagements.

On an interpersonal level, other findings lend support to “self-affirmation” methods to bolster the willingness of individuals to accept information that runs counter to their pre-existing beliefs. This concept posits that people are more likely to be persuaded by scientific and empirical data when they feel that doing so will not upset their sense of self or undermine their position within a group – be it social or political. In a controlled setting, research has shown that telling people that they scored unusually high on tests of cognitive ability makes them more receptive to information that runs counter to their previously expressed beliefs and opinions.

Statements that make a recipient of technical information feel as though their opinion is credible and valuable will make them less prone to “defensive information processing” – the tendency to discredit or disregard new information that disputes one’s beliefs – and more receptive to persuasive evidence.⁵⁶ Of course, this is much easier to do in a controlled setting for academic research than it is in the realm of geopolitics. In practice, efforts to bolster the credibility of public officials abroad that are perhaps less likely to agree with the U.S. position also increases the potential for blowback if and when they do not.

Adding to that, other evidence suggests that people are less likely to change positions on an issue in light of new information when they know that their views will become public.⁵⁷ Again, this will not surprise policymakers or public officials. Nonetheless, this finding underscores the importance (and challenge) of crafting a smart media message regarding a disease outbreak and

⁵⁵ Dan Kahan, Donald Braman, Geoffrey Cohen, John Gatil, and Paul Slovic, “Who Fears the HPV Vaccine, Who Doesn’t, and Why?” *Law and Human Behavior*, Vol. 34 (2010): 501-16. See generally, Gwenaële Coat, Jennifer McArdle, Lindsey Marbuger, and Kavita M. Berger, *Scientific Engagement in the Broader Middle-East and North Africa: Report and Proceedings from the 2010-2012 AAAS Middle East and North Africa Meeting Series*, American Association for the Advancement of Science, Washington, DC (2013). Available at: <http://www.aaas.org/sites/default/files/reports/AAAS%20MENA%20Cooperation%20Report%20v.2%202013.pdf>

⁵⁶ Geoffrey Cohen, Joshua Aronson, and Claude Steele, “When Beliefs Yield to Evidence: Reducing Biased Evaluation by Affirming the Self,” *Personality and Social Psychology Bulletin*, 26 (2000): 1151-1164 https://ed.stanford.edu/sites/default/files/when_beliefs_yield.pdf

⁵⁷ M. Gopinath and P. Nyer, “The effect of public commitment on resistance to persuasion: the influence of attitude certainty, issue importance, susceptibility to normative influence, preference for consistency and source proximity,” *International Journal of Research in Marketing*, Vol. 26 (2009): 60 – 68.

staying ahead of the story with international partners to the extent possible. Once a public official has taken a position on whether or not a disease outbreak is natural or unnatural, or whether an implicated party truly is responsible, it will be harder for he/she to change their position, even in the face of powerful countervailing evidence.

In dealing with politically sensitive issues, a credible source of information today can become undependable tomorrow depending on what information the source conveys. That seems obvious, but it raises questions about how to effectively leverage the prestige of international partners – such as the WHO or Biological Weapons Convention (BWC) – in conveying public health information to the public without unduly jeopardizing its reputation when uncertainty surrounds a suspicious disease outbreak. Of course, the WHO and BWC cannot remain silent on matters pertaining to attributing a disease outbreak. While the opinion of authoritative sources can carry a lot of weight in many regions of the world, those sources would benefit from support of other validators, particularly NGOs.

Pluralistic advocacy – gathering a diverse range of actors that support a common position – may leverage the prestige and credibility of the WHO and BWC while reducing their vulnerability to the charge of having been politicized.⁵⁸ Thus, determining if there are NGOs operating in the region where the attack occurred is significant, as they may be able to comment accurately on a developing story.⁵⁹ Smart, region-specific communication strategies should link media outlets to pockets of local expertise that can help public officials in the United States and elsewhere inform the public narrative with scientific expertise.

Some evidence also suggests that the perceived importance of the issue and its urgency can counteract the “prior commitment effect” to a significant degree. Multilateral initiatives that allow high-level political leaders to attach their reputation to biosecurity and protecting public health could thereby improve chances that they willingly follow the evidence to wherever (and at whomever) it points, even if it points in a politically messy direction.⁶⁰ Ultimately, the more an

⁵⁸ Timothy Earle and George Cvetkovich, *Social trust: toward a cosmopolitan society*, Praeger (Westport, CT: 1995).

⁵⁹ This issue was raised on several occasions by workshop participants, who underscored the importance of civil society actors in helping to “ground truth” a situation while also expressing some concern that those available to do so might not possess the necessary expertise to make informed, accurate judgments.

⁶⁰ Geoffrey Cohen, Anthony Bastardi, David Sherman, Lillian Hsu, Michelle McGoey, and Lee Ross, “Bridging the Partisan Divide: Self-Affirmation Reduces Ideological Closed Mindedness and Inflexibility in Negotiation,” *Journal of Personality and Social Psychology*, Vol. 93, No. 3 (2007): 415–430. Available at: https://ed.stanford.edu/sites/default/files/bridging_divides1.pdf

issue matters to a public official's reputation, the more averse they will be to ending up on the wrong side of scientific evidence or history.

Orientations to Science and Scientific Information across Different Professionals Spheres

Nationality and ideology aside, differences exist regarding how people of various professional disciplines view technical information in order to generate a shared understanding regarding the nature of an event. An exhaustive review of the literature on how different segments of society diverge in their perceptions of science would require an entirely separate report because the nature and extent of the differences vary country-to-country. For illustrative purposes, we note a recent study that explored questions related to whether or not science is politically neutral, is objective or subjective, is limited in its ability to provide answers to life's questions, and/or can provide an accurate and complete picture of the world.⁶¹ Building on a common theme in research on public understanding of science, the study differentiated between bureaucratic, academic, economic, and civic cultures (described briefly below).⁶²

Bureaucratic

This sphere encompasses political leaders, public officials, local administrators, and others in the business of policymaking or policy implementation. The main concern of individuals in the political real is promoting and developing *science for policy*.

Academic

Scientists, engineers, technologists, and others involved in the practice of science and applying it fall into this category. Of chief concern to this group is science policy, or, developing *policy for science*.

⁶¹ Katarina Prpic, "Science, the public, and social elites: How the general public, scientists, top politicians and managers perceive science," *Public Understanding of Science*, Vol. 20, No. 6 (2011): 733-750

⁶² Aant Elzinga, "Scientism, Romanticism, and Social Realist Images of Science," in *Essays on Scientism, Romanticism and Social Realist Images of Science*, Report No. 143 (Goteberg, Goteberg University: 1984): 1 – 49. Available at: <http://www.autodidactproject.org/other/aant2.html>

Economic

Individuals in this group include those who work at industrial companies or in business sectors focused on using science to generate products and services for sale. Their primary concern is the *technological use of science*.

Civic

This group includes representatives of social movements and other constituencies that share a mix of optimism and concern about how science will affect the daily lives of people. Their primary concerns relate to the *social consequences of science*.

Findings from this study showed that the general public and elite shared beliefs that science was objective and could improve the lives of people, while also sharing concerns that not all science was good science and that it could be misused. For their part, scientists were even less likely than the general public and political leaders to agree with the idea that all science was good science and least likely among all surveyed groups to agree that science has no limits. Age and professional station also factored into perceptions of science, as younger scientists were more concerned about social impacts and the potential for the misuse of science than their elder peers. Additionally, political elites were notably more skeptical than lower-ranking officers and bureaucrats that science was limitless in its potential and could deliver answers to social problems or political questions.⁶³

Additionally, doubts about the social impacts of science are significantly stronger in the biomedical field than in other natural sciences and social sciences.⁶⁴ This makes intuitive sense because researchers in the life sciences are accustomed to thinking about misuse and to dealing with questions regarding the ethics of their research and their practice. Furthermore, a robust epidemiological investigation would need to account for (and question) circumstantial evidence. The coincidence of events, after all, does not necessarily establish a causal relationship between them.

The study also found that scientists were the only group with less than half its participants (42%) agreeing with the statement that science is policy neutral. By contrast, significant majorities of policymakers, the public, and business managers did agree with that statement, with politicians

⁶³ Ibid. p.741-745

⁶⁴ Ibid. p.743

being the most likely (77%) to agree with it. Of course, scientists are acutely aware that public policy can determine trajectory of scientific discovery by setting priority areas for research, determining funding levels, and influencing the basis on which research is judged to have scientific merit. Scientists and medical professionals are also aware of how scientific information can be construed, or misconstrued, to advance a political agenda. Thus, some of the most useful foreign partners in conveying microbial scientific information to political leaders may also ask some of the most difficult questions about whether or not findings are backed by sound analytic methodology and has not been tampered with in any way.

The literature review and analysis underscores the importance of multilateralizing the sampling and analysis of microbial forensic information to the extent possible, and to draw on the regional prestige of other organizations as a way of lending credibility not just to the message but, importantly, to the messenger.

Concluding Observations

1. Context in which evidence is presented in as important as the validity of the evidence

Because the United States does not hold jurisdiction over foreign territories where biological attacks may originate or occur, it will need to introduce forensic evidence (microbial or epidemiologic) into an international dispute resolution process wherein conflicting culturally-defined orientations as to conflict resolution play a role. Putting all questions about the quality of the science aside, political leaders abroad may be less enthusiastic than leaders in the United States in assigning scientific investigation and fact-finding the highest priority in the wake of a possible biological attack. It is conceivable that others could question the science as an indirect means of questioning or disagreeing with the overall U.S. Government's approach to the matter.

2. Strengthening the process is as important as strengthening the science

Forensic science, even forensic DNA science, does not follow the typical scientific method and can be manipulated, misunderstood, or even misused by scientists. Microbial DNA evidence may yield extremely powerful statistical probabilities that a pathogen came from a particular source, but it cannot necessarily prove it on its own. At the early stages of investigation, informed yet subjective judgments made by scientists as to what constitutes an "unusual" outbreak of disease or from where it came may not be unanimous and could be wrong. And while public health experts are likely to follow the evidence to where it leads, scientists are also aware that neither they nor their work are inherently politically neutral. The stronger the conclusions derived by microbial forensic science, the greater the scrutiny that skeptics will place on the processes and people involved in gathering and analyzing samples, and in validating the methods by which experts arrived at a conclusion.

3. Credible science cannot be conveyed without a credible messenger

The proliferation of unofficial media outlets and the continued growth of citizen journalism has created new sources of information on potential biological attacks and made journalism writ-large more self-correcting than ever before. On the downside, the ability to aggregate information from numerous outlets has arguably made people more tolerant of any one story (or outlet) getting the facts wrong. This dynamic, along with uncertainties inherent to investigating suspected biological attack, contrasts sharply with the high expectations for accuracy to which official sources are held. Moreover, public officials should take note that speculative statements

meant to poke holes in dominant media constructs about the nature of the problem, and who bears responsibility, though alluring when evidence challenging those constructs mounts, could undermine credibility if the balance of the publically available evidence still favors alternative hypotheses.

4. Advance engagement can help overcome inconvenient truths

Microbial forensic science may be questioned or devalued not because it is disputed, but because other countries may question the wisdom of introducing it. Moreover, culture, ideology, and other social forces, as well as individual-level cognitive dynamics, often skew perception about what scientific information *really* says. People may resist accepting scientific information that does not support their previous positions or is in accord with their pre-existing beliefs. Research in a controlled setting suggests that these biasing effects can be mitigated by positioning science-based messages, to the extent possible, in a non-threatening, apolitical framework. With foreign political leaders, their willingness to accept and respond to politically inconvenient truths revealed by science might be increased through pluralistic advocacy (e.g. by engaging multiple partners) and through preparatory efforts that associate their own prestige with competent, technically-informed judgment on matters related to biosecurity and health security writ-large.

5. The probative weight of microbial forensic should not be assumed

The U.S. legal culture is based on competitive fact gathering as a means to ascertaining proof of truth. In that context, forensic science is more highly regarded in the U.S. than in other legal systems while concerns about the qualifications of experts proffering opinions is less so. Whereas, DNA evidence by itself is more-or-less determinative in certain court proceedings in the United States (e.g. regarding paternity), in other systems, greater emphasis is placed on corroborating evidence, often based on eyewitness testimony. Comprehensive regional studies of the legal means through which foreign perpetrators of a biological attack would be prosecuted, and issues affecting the introduction of microbial forensics therein, could serve as a useful guide for policymakers and public officials in the future.

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Appendix II: Workshop scenarios

Scenario 1: A Suspicious Outbreak Affects a Marginalized Population

Move 1

Representatives of the U.S. Cooperative Threat Reduction Program are visiting Kyrgyzstan to review and promote the Biological Engagement Program. Kyrgyzstan is an important logistics partner in the Afghan Coalition effort and an important exporter of rare earth and heavy metals to the U.S.

The Kyrgyz Health Ministry reports an unusual disease outbreak in the Fergana Valley (an important agricultural region), which it shares with Uzbekistan. This area has been the site of past land disputes and ethnic tensions between the two countries. The predominant ethnic groups in this region are Kyrgyz, Uzbek and Tajiks, although about 80 ethnic groups are represented in the region.

An epidemiological investigation is launched by the Health Ministry, with U.S. advisors. Based on the disease symptoms, Congo Crimean Hemorrhagic Fever (CCHF) is the preliminary diagnosis. No public reporting for CCHF in Kyrgyzstan is available, but is for Uzbekistan and Tajikistan.

Move 2

Later with WHO assistance, CCHF is confirmed. CCHF is a severe viral hemorrhagic disease that is usually transmitted by tick bite, contact with infected animals or their byproducts (parts, fluids, unpasteurized milk) or human-to-human contact.

The outbreak is only noted in non-Uzbek, non-Tajik and non-Kyrgyz villages (those with the other ethnic groups in the majority).

Official Russian media picks up on the outbreak and accuses the U.S. CTR program of responsibility for the outbreak, and offers assistance. Nationalists on each side of the border call for action against the other. Some of these nationalists are blaming the Russian Government. An unknown terrorist group “representing a coalition of minority ethnic groups” claims responsibility for the attacks, although this claim cannot be verified.

The Kyrgyz national police have no expertise or experience with bioterrorism, have a minimal relationship with their public health agency, no capability to collect hazardous evidence, transport it safely or have it analyzed in a manner that will meet expectations of their country’s legal or policy making agencies. Neither does Uzbekistan.

Neither country has mutual assistance agreements in place for this type of assistance with countries that may possess necessary capabilities.

Move 3

Both the Kyrgyz and Uzbek governments are suspicious of Russian involvement, but cannot rule out some previously unknown group, possibly being sponsored by another foreign government.

Meanwhile, assessing that they have the advantage, the same terrorist group claims that they are preparing for more attacks.

Some countries with experience in or capabilities for dealing with bioterrorism including forensic investigation (including the U.S., UK, SWE, CAN and AUS) have offered assistance, but are not confident they have validated microbial forensic methods and resources in place to properly analyze and draw conclusions about the agent and confirm attribution to the group in question, let alone Russia or another foreign government.

The investigation is at a standstill; it cannot be fully ascertained whether this outbreak was as a result of a natural outbreak or deliberate attack. The U.S. Government is seeking options with trusted partner countries.

Scenario 2: Alleged Biological Attack on the United States and Allies

Move 1

Tensions are higher than normal in Northeast Asia as a result of a series of threats and actions by the DPRK against the ROK, JPN and the U.S. as an ally of both. Threat levels are raised in ROK, JPN and at U.S. military installations in each.

After two weeks of increased DPRK bellicosity, tensions briefly subside.

Public health officials in the ROK and JPN, report an unusual, contemporaneous zoonotic infectious disease outbreaks occurs in the ROK, JPN and then the U.S. itself, spreads rapidly, with high mortality in infected persons and domesticated animals. In the U.S., the outbreaks coincided with horse shows in two states. Public health and agriculture systems are overwhelmed with the investigations and crisis management, including with “worried well” issues.

Media outlets in the affected countries are actively covering the outbreak; influential politicians in all three countries voice “grave concern” and are “monitoring the situation.”

Due to unusual properties of the viral causative agent isolated, a bioattack is suspected. This suspicion leaks to the televised media which labels it “Bug Bio-Attacks” and makes it the top story 3 days running. The blogosphere is in hyper-speed with new allegations and conspiracy theories. Public sentiment shows signs of panic.

Move 2

Samples from patients and affected animals are collected and sent to the appropriate laboratories in each country. For the U.S., DoD, CDC, USDA, FBI and IC experts are collaborating on the analyses and consulting with the ROK and JPN.

The causative agent in the outbreaks is determined to be a close relative of Japanese Encephalitis Virus (JEV) which is well known in East Asia, including ROK and Japan. JEV is very rarely detected in the U.S.

Later, genomic analysis of samples from all three countries determine very nearly the exact same sequences from samples collected from victims in all three countries.

Forensic evidence collected at two of the outbreak sites in the U.S. includes containers with dead mosquitos. Testing and examination are ongoing.

Move 3

U.S. and ROK intelligence services identify a communications intercept between DPRK military leadership and the director of a specific suspect military BW laboratory congratulating each other on “the recent special operations.” “Future operations with food virus” are also mentioned. ROK agents inside the DPRK are reporting increased activities at the suspect laboratory and recent travel of the laboratory director to Pyongyang. Appropriate samples from that laboratory have not been acquired, though ROK intelligence is considering options to do so.

These events, after years of failed negotiations and adventurism which continues to exacerbate tensions in NE Asia, cause U.S. leadership to decide to publicly accuse the DPRK in preparation for “all options on the table” retaliatory action; U.S., ROK and JPN forces in the region are placed on highest alert and additional U.S. assets are being forward-deployed.

China accuses the U.S. of moving too quickly to hostilities, and engages the UN.

The DPRK, realizing that U.S.-led military action is probably imminent, demands that U.S. present “evidence” of accusations to UN, engages in an extensive public relations campaign and retains a team of legal and scientific experts from several countries to rebut accusations on the world stage. Other countries are weighing in on both side.

Scenario 3: Food-borne Outbreak at a Military Base, Foreign Citizens Suspected

Move 1

Based on forensic and other evidence, U.S. and German (GE) authorities have determined with high confidence that the recent, severe foodborne illness outbreak at Patch Barracks, Stuttgart, was as a result of contract food workers at the base food court contaminating meal items. USEUCOM Headquarters is located in Stuttgart. USAFRICOM Headquarters are nearby in Stuttgart at Kelley Barracks, as are other U.S. military facilities. The Patch Barracks food court is frequented by military and civilian personnel from Patch and the other nearby bases

Approximately 120 victims, many of them under the age of 18, have been identified and are under care at local medical facilities. While no deaths have been reported, the symptoms presented are considered severe.

GE, which has strong scientific capabilities but not specifically with microbial forensics, quickly identifies the causative agent as Salmonella spp., a well-known foodborne disease organism.

Since patients are not responding to treatment with antibiotics commonly used to treat Salmonella infections, antibiotic resistance is suspected. Further analysis is being conducted in the U.S. at laboratories with expertise in microbial forensics and foodborne diseases, under oversight and with guidance from the FBI, FDA and other experts.

Move 2

Three contract workers have been singled out by GE law enforcement and intelligence for further scrutiny. All three are GE citizens in their early 20s, and prospective graduate students in food microbiology at the nearby University of Hohenheim. Two are of Syrian descent and one is of Turkish descent. Their parents emigrated to GE approximately 30 years ago. The two of Syrian descent are related.

Under intense interrogation by GE authorities, all three persons of interest (POIs) deny any involvement but reveal strong support for the opposition in the ongoing Syrian civil war. They decry the lack of response by the West to oust the Assad regime, and weakness by the current U.S. Administration.

The POIs admit visiting pro-Syrian opposition websites, meeting with Syrian opposition supporters from GE who have traveled to Syria, and as “being aware of the research” of ethnic Syrian academics employed at a GE university microbiology research institute. These individuals are placed under surveillance and investigation.

The POIs residences are searched, and while relevant evidence is gathered, microbial cultures or residues and equipment related to the attack are not found. GE authorities are preparing to search the university offices and laboratories of the academics identified by the suspects. It has been learned that those academics are active researchers who study bacterial food- and waterborne diseases and have affiliations with institutions throughout the Middle East and North Africa.

Move 3

The GE Justice Ministry (JM) is briefed on the situation because the suspects are GE citizens, and takes the lead because of the potential prosecutions and coordinating the investigation through GE police and security services.

News of the investigation and suspects leaks out and right-wing groups in GE mobilize a media campaign, large anti-immigration protests are staged.

The German JM and Courts have limited experience with the use of microbial forensics evidence. The U.S. Departments of State and Justice have substantial interest in the case as it occurred on a U.S. installation. While the latter is applying U.S. standards as it engages GE, the JM is debating what requirements and strategies it will apply to the microbial forensic evidence during the course of the investigation and possible prosecution.

Genetic sequencing at both GE and U.S. “gold standard” laboratories indicates that the agent found at the attack site and isolated from victims is most closely related to Salmonella enterica S Kentucky ST198-X1. This has been isolated from several African and Middle Eastern countries, is widespread and has expressed antibiotic resistance to several most commonly used antibiotics.

Meanwhile, GE and U.S. authorities are pursuing leads related to the affiliations the academic researchers have with Middle East laboratories to locate possible sources of the bacterial agent used in the attack, as well as associated intelligence and evidence.

Scenario 4: Anti-trafficking Operation Uncovers Possible Biological Weapons Program

Move 1

In the Tri-Border (Triple Frontier) Region shared by Brazil, Argentina and Paraguay, the law enforcement/border security agencies contend with rampant organized crime and illicit cross-border trafficking and corruption.

There are various ethnic minorities known in this region, of particular interest is the large Arab minority (primarily Lebanese and Palestinian). U.S. authorities have identified that al-Gama’a al Islamiya, Islamic Jihad, Hezbollah and Al Qaeda are active in various ways. These groups are involved in illicit criminal activities, fund raising and recruiting for terrorist activities elsewhere; Hezbollah is reported to have its own armed militia. Paraguay has no anti-terrorism laws, which limits law enforcement involvement on that side of the border.

The U.S. provides Brazil and Argentina with intelligence that indicates that Hezbollah may be stepping up illicit drug production/trafficking in the Region and identifies a specific location in a remote area from various intelligence sources (medium confidence).

A joint Brazilian – Argentinian law enforcement operation (Paraguay sends one observer) reveals the presence of a sophisticated laboratory at that location, in Argentinian territory.

Move 2

Thinking the lab is for illicit drug production and wanting to take the lab down, law enforcement rushes in, and removes laboratory hoods, equipment, unusual glassware, reagents, documents, computers and photographs without fully protecting the custody and integrity of the evidence. Reportedly, large quantities of chicken eggs are also found, as well as large metal baker’s racks and several makeshift temperature-controlled chambers. The responders have no idea what to make of the racks, chambers and chicken eggs, but decide to post a guard force to secure the scene until a decision on the latter is made by their superiors.

A Lebanese male, who claims to be the caretaker, is arrested and held for questioning.

Brazilian and Argentinian law enforcement report back to their respective headquarters; the Argentinians share the results with U.S. authorities as a courtesy.

The U.S. quickly suspects that the lab was being set up or used for the production of biological agents (viral). The U.S. urges Argentina to work with their Brazilian and Paraguayan counterparts to exploit and share the documentary, computer, and photographic evidence that was seized. The FBI offers assistance, which is accepted. Several experts from the FBI laboratory are immediately deployed.

Later, after following up with FBI forensic experts, the in-country authorities realize that the lab was one being set up for working with viral pathogens, not illicit drugs. Neither Argentina nor Brazil have any legal experience with bioterrorism. Paraguay indicates that they will defer to Brazil and Argentina in this matter.

Newspapers in the region have reported an ongoing investigation; U.S. media is beginning to ask questions.

Move 3

Documents and computer evidence indicate that Hezbollah operatives owned the property and had recruited technical experts. These and other physical evidence indicate that new influenza strains and pox viruses were being considered initially as weapons. The FBI recommends that a second crime scene operation is conducted to seize the eggs as well as process the chambers and racks for evidence. Brazil and Argentina agree to permit CDC experts to deploy as consultants to discuss the handling and disposition of eggs that were seized.

Further analysis of computer and document evidence of seized items determines that U.S. interests in South and Central America were intended targets of bioterrorism operations originating from this facility and associated personnel.

The Argentinian and Brazilian justice ministries, under pressure from their political leadership, have decided that the evidence from the lab is too tainted by improper crime scene activities and cannot be used in legal prosecutions.

The U.S. Departments of Justice and State engage and send legal experts to consult with the Brazilian and Argentinian Governments, hoping to convince them to prosecute or turn over suspects to the United States.