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Necessary Interventions

Expertise and Experiments in Bioweapons Intelligence Assessments

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Abstract

This paper describes how the U.S. government has attempted to assess and govern emerging biological threats in the early 21st century, and how a science and technology studies scholar is aiming to bring new perspectives to these assessments. To do so, I trace the historical evolution of the U.S. intelligence community's scientific advisory body, the Biological Sciences Experts Group (BSEG). In light of failed U.S. intelligence assessments from the Iraq war and concerns about advances in biotechnology, the BSEG was created in 2006 to improve the detection and evaluation of bioweapons threats. In the U.S. policy community, the BSEG is seen as a natural, logical, and necessary policy response. Yet a study of the context and historical antecedents of the BSEG reveals a variety of actors and institutions that have worked to frame the bioweapons intelligence challenge as largely a "technical problem" in need of technical expertise. With this focus on the technical, however, other critical factors necessary to improve intelligence on bioweapons threats have been left out. I conclude with a description of my attempt to launch an intervention into U.S. intelligence to address these shortcomings by creating a new, unclassified dialogue on bioweapons threat assessments between scholars from the field of science and technology studies and U.S. intelligence analysts. Through its descriptive analysis of BSEG, this paper provides a look into the social machinery that has shaped technology assessment within the secret world of intelligence. This analysis also illuminates the ways in which alternative forms of knowledge making in intelligence can reflect more open, inclusive, and reflexive modes of technology assessment.

1 Introduction

On February 6, 2004, President George W. Bush announced the creation of the bi-partisan Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction (hereafter referred to as the WMD Commission), to examine American intelligence capabilities related to assessments of weapons of mass destruction (WMD) threats (Bush 2004). Bush's response came on the heels of growing criticisms that U.S. pre-war intelligence assessments on Iraq's WMD programs were wrong (Kay 2003). Within a year, the WMD Commission would issue a report on its findings and offer specific policy recommendations for intelligence reform that would be widely cited (Commission 2005). In its report, the Commission devoted special attention to the future threats posed by biological weapons, referred to as "The Greatest Intelligence Challenge" (cf. Commission 2005: 503). The Commission recommended that the U.S. Director of National Intelligence take the lead in catalyzing reform within the intelligence community on bioweapons threat assessments.

Approximately two years later, in May 2006, U.S. Ambassador Kenneth Brill, Director of the National Counterproliferation Center (NCPC), a then–newly formed center within the Office of the Director of National Intelligence, testified before the Subcommittee on Prevention of Nuclear and Biological Attacks of the U.S. House of Representatives' Committee on Homeland Security (Brill 2006). In his testimony, Brill described the steps the NCPC was taking to respond to the WMD Commission's charge to reform bioweapons intelligence assessments. A centerpiece of NCPC reforms was the establishment of a new science advisory group within the Office of the Director of National Intelligence called the Biological Sciences Experts Group (BSEG). As Brill described, the BSEG would be the first technical advisory group on the biological sciences to be of service to all sixteen members of the U.S. intelligence community, and would consist of a network of non-government biological science experts across a range of life science and related technical disciplines. These individuals, possessing security clearances at the highest levels, would provide technical advice to the intelligence community on a broad range of national security threats emanating from biology.

The BSEG is an exemplar of the kinds of technically oriented policy responses against bioweapons threats receiving current U.S. government attention and resources. These responses come in light of growing concerns about new developments in the life sciences and biotechnology that could lead to new and more dangerous types of biological weapons. In policy discussions, these concerns tend to invoke a consistent, dominant technovisionary narrative on the bioweapons threat — one that emphasizes the increasing pace and proliferation of new biotechnologies and their growing accessibility to terrorist groups or lone wolf "biohackers" to cause future harm.[1] As a recent National Intelligence Council report asserts, "For those terrorist groups that are active in 2025, the diffusion of technologies and scientific knowledge will place some of the world's most dangerous capabilities within their reach. One of our greatest concerns continues to be that terrorist or other malevolent groups might acquire and employ biological agents … to create mass casualties" (cf. U.S. National Intelligence Council 2008: ix). This narrative and the people, places, and things that structure it work to create a certain kind of understanding about the future of biotechnology and its security implications, as well as to shape particular kinds of public attention, policy

[1] I describe this narrative in more detail in Vogel (2008a,2013).

prescriptions, and government responses for intelligence assessments.[2]

In the United States, because bioweapons threats are increasingly framed as a problem of rapidly advancing and diffusing biotechnologies, policy attention and responses have focused on its material and technical dimensions, such as published scientific information, specific pieces of equipment or materials (Carlson 2003; Petro/Carus 2005; Chyba 2006). Some have argued that a lack of biological knowledge and expertise within the U.S. intelligence community has greatly hindered an accurate assessment of how new types of biological materials and resources could pose imminent and future bioweapons threats (Institute of Medicine and National Research Council 2006; Petro 2004; U.S. Central Intelligence Agency 2003). In response to these critiques and concerns, the establishment of the BSEG is part of a concerted U.S. government effort over the past ten years to increase the amount of life science expertise within U.S. government intelligence and policymaking communities to better anticipate future bioweapons threats.

Although technical expertise and knowledge are valuable, many of the critical questions in evaluating bioweapons threats are not purely technical. For example, assessing a bioweapons capability by individuals, teams, or states involves important social dimensions underpinning technical work such as the development of know-how, interdisciplinary forms of weapons knowledge, and the necessary organizational, management, and political structures to support weapons development. In addition, the motivations and intent of actors wishing to pursue bioweapons capabilities are also critical to integrate as part and parcel of any technical assessment. Yet, with the current technical focus, these alternative and more complex means of assessing bioweapons threats are not given policy attention. Rather, the implicit, default position among those in the policy community is that an interjection of technical expertise is the most important intervention needed to improve assessments on emerging bioweapons threats.[3] This perspective, however, is based on taken-for-granted assumptions, rooted in a series of historically contingent actors and activities regarding the nature of bioweapons threats, and the forms of expertise, knowledge and modes of assessment needed to counter those threats.

In this paper, I use the formation of the BSEG as a lens through which to trace the discourse and associated social and material elements that have shifted focus to technical dimensions of the bioweapons threat in order to show the limitations of existing policy prescriptions, as well as to illuminate more constructive interventions. I begin by examining President Bush's 2005 WMD Commission report, which first recommended the formation of a BSEG-like group and drew high-level public and policy attention to the lack of bioscience expertise within the intelligence community. I also discuss how a related collection of non-governmental reports, articles, hearings and actors have reinforced these recommendations, and how these perspectives continue to shape policy responses for U.S. bioweapons threat assessments. Next, I situate these claims

[2] Also, for a discussion of the role of narratives in shaping technology assessments, see Brown 2003), Wullweber 2008), and Expert Group (2007).

[3] With this said, however, scientific and other forms of technical expertise remain essential for bioweapons assessment. My critique here is that the dominant focus on the technical has marginalized and/or lost sight of other equally important forms of information and knowledge that should be brought to bear on intelligence assessments. Moreover, this critique relates specifically to contemporary bioweapons policy discourse and not necessarily to all security-related discourses.

within a broader historical context of how U.S. government assessments of weapons threats have been conducted. I then show how an alternative understanding of the bioweapons intelligence problem, informed by science and technology studies perspectives, suggests a different set of prescriptions to improve intelligence assessments of such threats. And I am attempting to launch an intervention into intelligence: the creation of a new, unclassified dialogue on bioweapons threats between scholars from the field of science and technology studies and U.S. intelligence analysts. My analysis of the BSEG provides a look into the social machinery that has shaped particular types of expertise and knowledge in technology assessments within the intelligence world. This analysis also illuminates how alternative forms of knowledge-making in intelligence are possible that reflect more open, inclusive, and reflexive modes of technology assessment.

2 The WMD commission report

In February 2004, President George W. Bush established the WMD Commission by Executive Order 13328 (White House 2004). The Commission, cochaired by former U.S. Senator Charles Robb and Federal Judge Laurence Silberman, was tasked with submitting to the President, within one year, a report of its findings and policy recommendations regarding U.S. intelligence capabilities on weapons of mass destruction and related 21st century threats. In terms of bioweapons threats, the Commission report examined three specific issues to inform its analysis and recommendations: pre-war intelligence on Iraq’s bioweapons program; pre- and post-war intelligence on al Qaeda’s bioweapons program; and advances in biotechnology. Below, I summarize the Commission’s key findings on each of these issues, as well as their resulting policy recommendations.

Prior to the 2003 Iraq war, the U.S. intelligence community had assessed that Iraq had biological weapons, as well as mobile facilities for producing bioweapons agents. Yet, extensive post-war investigations found no evidence of bioweapons stockpiles or of mobile bioweapons production facilities in Iraq after the 1991 Gulf War. These investigations determined that due to its concerns over the intrusive United Nations (UN) inspection operations, Iraq had destroyed its bioweapons agents by 1992 (Duelfer 2004: 11), and had, by 1996, given up its ambitions for continuing a bioweapons program, after the UN destruction of its sole bioweapons production facility, Al Hakam (Duelfer 2004: 11). At the time, however, these pieces of evidence and their implications for a viable Iraqi bioweapons program failed to be captured by U.S. intelligence analysts. In its commentary on the problem of U.S. intelligence collection in Iraq, the WMD Commission stated that “the technical complexity of the WMD target … suggests that it may require a cadre of case officers with technical backgrounds or training” (cf. The Commission 2005: 159).

My own independent assessments of the intelligence failures on Iraq's bioweapons capabilities, however, suggest a different interpretation of where the key intelligence problems (and reforms) reside (Vogel 2013; Vogel 2008b). Using information gleaned from detailed interviews with former intelligence and related U.S. government officials, I have found that although there were problems with assessing the status of Iraq’s bioweapons program, the larger issue was a conceptual and contextual one: How did intelligence analysts initially conceptualize Iraqi bioweapons capabilities? And then, how did they connect this conceptualization to facts on the ground? What I have found is that intelligence analysts assumed an advanced Iraqi bioweapons capability based primarily on material and tech-

nical considerations, with a limited exploration of how an Iraqi bioweapons program would develop in the more complex social, political, and economic context in Iraq since the 1991 Gulf War.[4]

It is necessary to understand that technical analysts within the U.S. Central Intelligence Agency (CIA) had little working interactions with political or economic analysts to inform their assessments of Iraqi bioweapons capabilities, and as a result, there existed disconnects between the technical assessments and other intelligence knowledge about Iraq (Kerr et al. 2005). Moreover, CIA analysts systematically ignored UN and other nongovernmental data on and observations of the deleterious effect of inspections and sanctions on Iraq's WMD programs (Laipson 2005; Lopez/Cortright 2004; Findlay 2004). In their assessments, CIA analysts privileged material and technical details that reinforced and perpetuated a particular way of assessing Iraq's bioweapons capabilities — one that assumed advanced Iraqi bioweapons capabilities but did not take into account how social, economic, and political factors could shape Iraq's bioweapons intentions, abilities and actions. Thus, in contrast to the WMD Commission's final conclusions, I determined that the salient problem in the Iraq intelligence failures was not a lack of technical data or bioscience expertise, but rather, not knowing how to contextualize the technical data at hand.

The WMD Commission report also studied U.S. intelligence failures in assessing al Qaeda's bioweapons program. Before the 2001 war in Afghanistan, the U.S. intelligence community had assessed that al Qaeda likely had a small-scale bioweapons capability, primarily focused on developing crude methods for producing and disseminating biological agents. At that time, the intelligence community also judged that al Qaeda operatives had probably acquired a small quantity of anthrax and planned to assemble devices to disseminate it. Thus, prior to the war, the U.S. intelligence community assessed that al Qaeda had only limited and crude means to launch a bioweapons attack.

After the 2001 war, however, the WMD Commission report stated that the U.S. intelligence community found documents suggesting that al Qaeda's biological program was further along than previously assessed. For example, the WMD Commission report stated that seized documents indicated al Qaeda had scientific articles and handwritten notes about a dangerous biological agent referred to as "Agent X," and had considered acquiring a variety of other such agents. Moreover, the documents suggested that al Qaeda's bioweapons program was extensive (located at several sites in Afghanistan), well-organized (with commercial equipment and specialized technicians), had operated for two years prior to September 11th, and had developed a limited production capacity (The Commission 2005: 269-270).

Prior to the release of the WMD Commission report, some information on the captured post-war al Qaeda materials had been shared with the public. In December 2003, Defense Intelligence Agency analyst James Petro and Stanford Microbiology professor David Relman co-authored a paper titled "Understanding Threats to Scientific Openness," published in the journal Science (Petro/Relman 2003a). The article provided pictures and lists of the captured al Qaeda journals, books, and handwritten notes (Petro/Relman 2003b). These materials included books that explain the history of bio-

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[4] Former Director of the CIA Richard Kerr also notes this disconnect in his group's independent assessment of the WMD intelligence failures in the Iraq war (Kerr et al. 2005). Also, after the war, the Iraq Survey Group also showed that a more contextualized approach to bioweapons assessment was possible before the Iraq war (Duelfer 2004).

logical weapons, as well as specific scientific journal articles on anthrax and plague bacteria, botulinum toxin, and hepatitis viruses that dated back to the 1950s and 1960s. Petro and Relman described how the author of the handwritten notes appeared to have been technically trained, had attended European biotechnology conferences, and had visited a variety of biological companies to purchase pathogen cultures and equipment. With these findings, the authors recommended new partnerships between scientists and members of the national security community in order to help security professionals keep up with developments and applications in the life sciences that could be misused by terrorists.

Through a Freedom of Information Act (FOIA) request, non-governmental bioweapons expert Milton Leitenberg obtained additional declassified information on these captured al Qaeda materials, consisting of two three-page letters and accompanying handwritten notes (Leitenberg 2005: 30). Although the materials indicate the proposed layout of a biological laboratory, description of future work, personnel and equipment needs, there is no indication that al Qaeda had obtained biological material or commenced any work. From interviews with U.S. government officials, Leitenberg also learned that the Khandahar laboratory site where the materials were seized contained little biological equipment aside from an autoclave, and appeared not to have been functioning at the time of U.S. invasion. Subsequently, computer discs captured from a high-ranking al Qaeda official in 2001 appeared to indicate that al Qaeda (at the time) devoted only a few thousand dollars to support a bioweapons program, and after several months, considered it to have been "wasted effort and money" (cf. Leitenberg 2005: 35). Although Leitenberg used the al Qaeda findings to mark the real, failed development of a bioweapons capability by terrorists, Petro and Relman instead pointed to these findings as illustrating the potential that a more dangerous bioterrorist capability could develop over time with the increasing ubiquity of biological information, materials, and equipment.

But, if one looks closely at the WMD Commission report (beyond its highlighted conclusions), the report itself is inconsistent in how it discusses the post-war capture of the bioweapons-related al Qaeda documents. For example, the WMD Commission report states that within the intelligence community, regional, terrorism and state-level WMD technical analysts all came to different conclusions about al Qaeda's bioweapons capabilities from these captured materials. Thus, as in the case of Iraq, disconnects are also seen here between intelligence analysts across technical and non-technical disciplines. The Commission report also found that analysts writing on al Qaeda's WMD efforts in Afghanistan did not adequately clarify the basis for, or the assumptions underlying, their most critical judgments (i.e., al Qaeda's advanced capabilities) (The Commission 2005: 275).

Given these unresolved issues, the WMD Commission report briefly warned that outstanding questions remained about the reliability of the pre-and post-war intelligence assessments in Afghanistan. Yet little attention was given to further unpacking or highlighting this statement in the report, or connecting it to the intelligence assessment problems in the Iraq case. Instead, the Commission's final conclusions highlighted that U.S. intelligence found that "al-Qa'ida's biological weapons program was both more advanced and more sophisticated than analysts had previously assessed" (cf. The Commission 2005: 267). The Commission's internal deliberations on its al Qaeda findings have been kept classified, therefore it is difficult to ascertain how these final conclusions were reached given the analytic

discrepancies described above.[5] In a private interview after the report was published, one member of the WMD Commission stated that, given the problems with the Iraqi WMD assessments, one should not be any less skeptical regarding the U.S. intelligence assessments made about al Qaeda's bioweapons capabilities (Leitenberg 2005: 39). This statement, however, has gone largely ignored by press and policy accounts that have drawn attention to the WMD Commission's final recommendations.

In addition to the Iraq and al Qaeda case studies, in a separate chapter, the WMD Commission report devotes significant focus to the growing bioterrorism threat, referred to as "The Greatest Intelligence Challenge" (cf. The Commission 2005: 503). To make its arguments, the report refers to an emerging "biotechnology revolution," in which advances in biotechnology are making even potent and sophisticated biological weapons available at low cost to small or relatively unsophisticated terrorists: "Scientists can already engineer biological weapons agents to enhance their lethality either through genetic engineering or other manipulations. Such weapons of science fiction may soon become a fact. Given the exponential growth in this field and access to insights through the Internet, our vulnerability to the threat might be closer at hand than we suspect" (cf. The Commission 2005: 506).

Yet, other than a few references to recent scientific publications, little evidence is provided to substantiate these claims (although a footnote indicates that a classified version of the report contains a more detailed description of this bioweapons threat). Instead, attention moves directly to the problems of intelligence collection due to the ubiquitous and diffuse nature of dual-use biotechnologies and biological information. Referring back to the Iraq and al Qaeda intelligence failures, the report here emphasizes the collection problem (i.e., lack of data) as the major reason for past failures, as well as the primary challenge facing future biological threat assessments. As I have argued elsewhere, many government and non-governmental assessments of bioweapons threats are flawed because of their predominant focus on the material aspects of biotechnology (e.g., codified knowledge, pathogens, genome sequences, biological supplies), at the expense of considering its tacit and social dimensions (Vogel 2008a; Vogel 2013).

In response to these bioweapons concerns, the WMD Commission report devotes a significant portion of a concluding chapter on policy recommendations for responding to these technically based threats. Two main recommendations are (1) increasing collaboration between the intelligence and biological science communities to increase scientific and technical expertise into the intelligence process; and (2) developing a comprehensive biological weapons targeting strategy aimed at increasing intelligence collection efforts. To meet these goals, the WMD Commission report recommends the creation of an intelligence community–wide National Biodefense Initiative, to increase the intelligence community's biological weapons–related expertise. This initiative would include creation of the following components: an elite, external biological science advisory group; a post-doctoral fellowship program that would fund scientists for up to two years of unclassified research related to biodefense and bioweapons intelligence; and a scholarship program for graduate students in biological weapons–relevant fields (The Commission 2005: 510-516). As is evident, this new initiative is focused solely on bringing in technical expertise to the intelligence community, ra-

[5] Subsequent policy briefings also do not discuss this disconnect in the al Qaeda bioweapons findings; for example, see Gronvall (2005).

ther than broader and complementary sets of expertise and knowledge.

3 Important antecedents to the WMD commission

Although the WMD Commission's recommendations garnered significant policy attention at their release, public calls for the interjection of bioscience expertise into intelligence had existed prior to 2005. For example, in 2003, Petro and Relman's article in Science on the post-war capture of al Qaeda documents in Afghanistan explicitly called attention to the need for closer interactions between the scientific and security communities to inform threat assessments: "Scientists can help ensure security professionals maintain a working knowledge of cutting-edge tools and data with national security implications. Such a partnership should include scientists who are given security clearance and national security participants that represent the spectrum of relevant agencies with a strong background and training in the life sciences" (cf. Petro/Relman 2003: 1898).

In follow-on papers published in policy-oriented journals, Petro continued to draw attention to the need to engage the life science community to anticipate threats from the biotech revolution. In his co-authored article, "Biotechnology: Impact on Biological Warfare and Biodefense," published in a high-profile biosecurity journal, Petro and his intelligence colleagues argued that "the national security community will need to become more engaged in educating academic and industrial researchers regarding foreign exploitation offers and establishing approved mechanisms for communicating suspicious activity" (cf. Petro et al. 2003: 165). Petro described how the knowledge gained through this engagement would help the intelligence community better target its collection capabilities and resources, as well as increase the number of life scientists attracted to work in the U.S. national security agencies. In a subsequent paper, "Intelligence Support to the Life Science Community: Mitigating Threats from Bioterrorism," Petro emphasized the tandem benefits to academic researchers from collaborations with the national security community. For example, he explained how life scientists could obtain access to classified information on the physical properties and characteristics of a range of unusual biothreat agents; such data could help academic scientists and engineers better design technological countermeasures against bioweapons threats. Later, Petro also argued that these partnerships "could play a critical role in establishing legitimacy, building confidence, and ensuring quality of [intelligence community] threat characterization research activities" (cf. Petro/Carus 2005: 300).

In the early 1990s, David Relman and a small cadre of other scientists also became interested in bioweapons threat issues when they were awarded biodefense research grants under the "Unconventional Pathogens Countermeasures Program," run by the Defense Advanced Research Projects Agency (DARPA). This grant was part of a larger DARPA program aimed at raising the level of awareness and knowledge of biological threats to the U.S. academic life science community. During bi-annual DARPA meetings held over eight years of grant support, the new crop of principal investigators such as Relman met various officials in the U.S. government who had worked on bioweapons threat assessments and policy responses. The meetings provided these scientists with rare opportunities to interact with the U.S. security and intelligence communities. It is through these DARPA-related connections that these scientists were later asked to become members of various government advisory groups

focused on anticipating future biological threats.

For instance, in 2004, Relman was asked to co-chair a new Institute of Medicine and National Research Council study, Globalization, Biosecurity, and the Future of the Life Sciences, designed to examine current and near-term global scientific trends in biotechnology that could be developed into next generation bioweapons threats. In its 2006 final recommendations, the report outlined strategies for strengthening and enhancing the scientific and technical expertise and capacity in biotechnology within and across the intelligence and national security communities. To do this, the report recommended four actions: (1) create by statute an independent science and technology advisory group for the intelligence community to produce open and classified reports; (2) expand the intelligence community's relationships with non-governmental science and technical communities, to increase bioscience expertise; (3) create a new cadre of life science intelligence analysts with state-of-the art and hands-on experience; and (4) encourage cross-national sharing and coordination of future biological threat analysis between the U.S. intelligence community and its international counterparts (Institute of Medicine/ National Research Council 2006: 1-14). Once again, the focus on technical expertise and recommendations involving increased outreach to the life science community are evident in the report's key recommendations.

With these collective actors and activities, there existed various social and material antecedents to the WMD Commission report that were interwoven and built on one another to focus and reinforce policy attention on the technical solutions to the bioweapons problem. These solutions were a logical response to the framing of bioweapons threats as a primarily material and technical concern, although there is much that this framing left out. By tracing the presence and evolution of these antecedents, one can begin to see how calls for more technical expertise have become a taken-for-granted meta narrative in U.S. policy attention directed at improving intelligence on bioweapons threats. In doing so, this narrative begins to "tacitly define horizons of possibility and acceptable actions" (Expert Group 2007: 19). This outcome becomes increasingly evident in policy actions subsequent to the WMD Commission report.

4 Bioscience expertise and intelligence reform

After the WMD Commission report was released in March 2005, attention in Congress turned towards the report's bioscience recommendations. House Representative John Linder, then-Chairman of the Subcommittee on Prevention of Nuclear and Biological Attack of the Committee on Homeland Security, spearheaded Congressional attention on these recommendations because his committee held oversight responsibilities for U.S. Department of Homeland Security (DHS) biodefense and biothreat assessment programs.[6] While chairing this subcommittee, Linder held a personal interest in devoting more government attention and resources to the prevention of catastrophic nuclear and biological attack. In Linder's view, good intelligence was a key to prevention.[7] In addition to being influenced by the WMD Commission report, his attention to bioscience and intelligence reform at that time also stemmed from his receipt of a copy of the Institute of Medicine/National Research Council draft report, Globali-

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[6] Rep. Linder began an initial series of hearings on how to assess the role and responsibility of DHS in preventing a bioterrorist attack in the United States in July 2005 (U.S. House of Representatives 2005).

[7] Telephone interview with former Linder staff member, 24 August 2007.

zation, Biosecurity, and the Future of the Life Sciences, that David Relman had co-authored.[8]

In light of these report findings, Rep. Linder organized a set of Congressional hearings to learn more about the bioweapons threats coming from the life science community and what the U.S. government was doing to respond to these threats. For the first hearing, "Bioscience and the Intelligence Community," held in November 2005, the Subcommittee asked recognized experts in the life science and biosecurity communities to speak. Given their technical expertise, David Relman and David Franz, former commander of the U.S. Army Medical Research Institute for Infectious Diseases (the primary U.S. biodefense facility), were asked to testify.[9]

In his prepared testimony, Relman critiqued the current physical science focus in intelligence, emphasizing that relatively few biologists have been recruited to work within the intelligence community (Relman 2005). He also argued that those biologists tend to be thinly and unevenly distributed across various agencies, assigned large portfolios, often reassigned to new positions, and quickly become cut off from advancing developments in life science research. In Relman's opinion, this has led to an inability of intelligence analysts to appreciate cutting-edge technologies in predicting future threats. Relman advocated that large numbers of researchers with doctoral degrees in the life sciences be recruited to work for the intelligence community, in ways that maintain their close connection with the cutting edge in their respective disciplines. In specific reference to the WMD Commission report, Relman also called for the establishment of an external bioscience advisory group. These recommendations were consistent with his prior writings advocating the increased need for technical expertise in intelligence.

In his testimony, David Franz emphasized the problems of evaluating the bioweapons activities of a state or terrorist group (Franz 2005). What is interesting in Franz's statement was his focus on technical solutions even when he acknowledged the problem was not solely technical. In Franz's judgment, understanding the intent of bad actors is key, due to the dual-use nature of biotechnology.[10] Yet Franz recommended that if intelligence analysts become more versed in understanding biological science and connecting that with specific pieces of intelligence, they would be able to better understand intent. Thus, what was being advocated was a prioritization of the technical, even while acknowledging that the problem of intent has critical social dimensions. An alternative recommendation that Franz could have given was to train intelligence analysts to become versed in the context of the intelligence information they receive and then connect that with biological science developments. Brian Rappert has argued that major deficiencies in the ability of intelli-

[8] This report is often referred to as the Relman/Lemon report, after its co-chairs David Relman and Stanley Lemon. Although the official report was not issued until January 2006, Linder's staff obtained a draft version of the report in the fall of 2005. Telephone interview with former Linder staff member, 24 August 2007.

[9] Franz is also a board member of the National Science Advisory Board for Biosecurity, director of the National Agricultural Biosecurity Center at Kansas State University, and served as Chief Inspector on three United Nations Special Commission biological warfare inspection missions to Iraq. He also served as a member of the first two U.S.-U.K. teams that visited Russia in support of the Trilateral Joint Statement on Biological Weapons. Franz has also served on senior S&T advisory biodefense panels for the Defense Threat Reduction Agency, Department of Homeland Security, and the Defense Intelligence Agency.

[10] "Dual-use" refers here to biotechnologies with peaceful scientific applications but could also be used for bioterrorism purposes.

gence and law enforcement officials to collect, share, and process information on terrorists have led to technologies being given a more prominent place in academic and policy biosecurity discussions, instead of focusing on how knowledge about these threats is gathered and analyzed (Rappert 2006). In this light, and given Franz' own technical background, his recommendations to Congress make pragmatic and logical sense, although they do not address the absence of context that persists in bioweapons intelligence assessments.

After this hearing, Rep. Linder's staff summarized what they saw as the primary take-home messages from the testimonies. In an internal memo written up by Linder's staff, two critical needs were emphasized: building a "robust, sustained and effective capability in the life sciences within the intelligence community"; and a "cadre of trained, motivated and educated personnel who can raise awareness and knowledge throughout the bioscience community of intelligence and the role it can play."[11] In the memo, a staffer outlined the need for technical expertise which largely reiterated Relman and the WMD Commission's earlier statements: "The intelligence community is only able to discern or anticipate a potential bioterrorist threat from seemingly innocuous research when intelligence analysts have a firm grasp of cutting edge bio-sciences and know what to look for. This knowledge base, unfortunately, does not lie in the intelligence community, but is based in the academic and research life science and engineering communities worldwide" (cf. Brill 2006: 4).

To prevent a biological attack through better intelligence, the memo emphasized the importance of integrating the scientific expertise held within the life science community into the wide reaching network of the U.S. intelligence community. Given the reports and testimonies available to Linder and his staff, these conclusions are not surprising. Yet, the absence of alternative voices and perspectives on the problems in bioweapons intelligence assessments limited the ability of Linder and his staff to see and consider a broader array of interventions to improve intelligence collection and analysis of bioweapons threats.

In the months after Linder's hearing, a set of other activities kept the policy focus on the technical problem of biothreat assessment. In January 2006, the Institute of Medicine/National Research Council officially released its report, Globalization, Biosecurity, and the Future of the Life Sciences. In concert with the report's release, some related news and opinion pieces were published. In a January 2006 article in the New England Journal of Medicine, David Relman argued that one must reject studying historical weapons programs as a guide to inform current biodefense policymaking because: "Today, anyone with a high-school education can use widely available protocols and prepackaged kits to modify the sequence of a gene or replace genes within a microorganism; one can also purchase small, disposable, self-contained bioreactors for propagating viruses and microorganisms. Such advances continue to lower the barriers to biologic-weapons development" (cf. Relman 2006: 114).

This statement again reveals a focus on the material and technical dimensions of biotechnology, rather than the broader array of social factors and that can shape bioweapons development.

In a Science editorial published the same month, Relman argued, "The risk that knowledge emerging from life sciences research could be misused, either intentionally or otherwise, needs responsible attention. … Those working in the life sciences must gain a

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[11] Hearing Summary of *Bioscience and the Intelligence Community*, private communication.

greater awareness of the potential threats and learn to recognize, discourage, and report misuse or irresponsible behavior" (cf. Choffnes et al. 2006: 26).

Relman, who also served on the National Science Advisory Board for Biosecurity (NSABB), briefed the 2006 Institute of Medicine/National Research Council findings at the March 2006 NSABB meeting (Relman 2006b). Finally, in a fall 2006 article, "A Brave New World in the Life Sciences," published in the widely circulated policy journal Bulletin of the Atomic Scientists, Relman and colleagues emphasized the report's troubling, overarching conclusion: "the breadth of biological threats is much broader than commonly appreciated and will continue to expand for the foreseeable future" (cf. Choffnes et al. 2006: 28). Although Relman was not the only scientist working in front of and behind the scenes regarding these security concerns, he was one of the more visible and persistent actors emphasizing the technical dimensions of the threat and the need for more technical expertise to counter it.

Rep. Linder's staff organized a second, follow-on hearing in May 2006, which brought in high-level U.S. government officials with intelligence and counterterrorism responsibilities to discuss what the U.S. government was doing to address the gaps between the life science and intelligence communities. The witnesses included Ambassador Kenneth Brill, Director of the National Counterproliferation Center (NCPC), Office of the Director of National Intelligence; Mr. Charles Allen, Chief Intelligence Officer, Department of Homeland Security; Mr. Bruce Pease, Director, Weapons Intelligence, Nonproliferation, and Arms Control (WINPAC), Central Intelligence Agency; and Dr. Alan MacDougall, Chief, Counterproliferation Support Office, Defense Intelligence Agency. In opening the second hearing, Rep. Linder reiterated the intelligence problems identified in the first hearing, namely, the difficulties in keeping up with the pace of biotechnology and its applicability to terrorism.

To start, Ambassador Brill led the testimonies by describing what steps the NCPC had taken to address the WMD Commission recommendations (see Brill 2006). He explained that the NCPC's role in the intelligence community was to integrate the analysis and collection of intelligence by the CIA, Defense Intelligence Agency, and other elements of the intelligence community, as well as promote partnerships between the intelligence community and experts both inside and outside the U.S. government. Brill described the NCPC's approach as a priority setting and integrating role, which includes "determining what types of traditional intelligence and scientifically grounded information the intelligence community needs to better answer questions posed by senior policymakers, and how to ensure this information is distributed to all relevant parties within the intelligence community" (cf. Brill 2006: 5). Before describing his Center's efforts, Brill framed what he saw as the most important issues facing the intelligence community on biological threats: "The key questions for the intelligence community are primarily not highly technical in nature [emphasis in original]. We must determine if a state adversary has the intent to establish, maintain, or acquire a BW [bioweapons] program, because a country of concern typically will also have dual-use capabilities in those areas. Some non-state actors, such as al Qaeda, have publicly stated that they have the intent to have an offensive biologic capability, and the intelligence community must constantly monitor the plans and capabilities of these groups in order both to block the acquisition of such a capability, as well as to determine their plans for using such a capability if they acquire it. So focusing on technology alone will not answer these key questions … it can

lead to speculation, based on nightmare scenarios that are not necessarily grounded in reality" (cf. Brill 2006: 2).

Curiously, however, in moving on to describe the Center's efforts, Brill primarily described technologically based solutions established by his office to better assess bioweapons threats, rather than non-technical approaches. This response was similar to David Franz's earlier testimony to the Committee and illustrates how a dominant narrative and framing of a problem (in this case, the need for technical expertise) co-opts alternative formulations, and gains popular policy momentum over time, marginalizing other possible articulations and focal points for the problem.

In his testimony, Brill described his creation of a new NCPC position, Senior Advisor for Biological Issues; Lawrence Kerr was appointed in April 2006 to serve in this position. Kerr holds a Ph.D. in Cell Biology and was previously on faculty at Vanderbilt University School of Medicine.[12] In his new position, Kerr was tasked to enhance the partnership of the intelligence community with non-government science and technical experts to improve overall intelligence collection on biological threats. One core component of this new partnership would be to establish what Brill described as "the intelligence community's first broadly focused biological science advisory group" (cf. Brill 2006: 4). This advisory group's members, who would be granted top-level security clearances, would work with the intelligence community (writ large) on a regular basis and report to the director of national intelligence.

Brill stated that he envisioned the new bio advisory group as having a two-tiered structure: a permanent "core" advisory group of leading scientific experts, and a larger network of biological scientists with security clearances that the core group could tap as needed. This new advisory group would identify for the intelligence community important cutting-edge biotechnologies and bioweapons threats to U.S. national security.

Following Brill, Charles Allen, speaking for the Department of Homeland Security, started his testimony by describing al Qaeda's interest in developing a bioweapons program (Allen 2006a). In contrast to the WMD Commission report findings, Allen described how al Qaeda managed to construct a "low-tech" facility in Khandahar, Afghanistan, but that subsequent U.S. intelligence and military operations in the region had further damaged al Qaeda's leadership and operational capabilities. Yet Allen maintained that concern remained about al Qaeda's intent to develop biological weapons. He said that, in addition to small, loosely affiliated terrorist cells, the Department of Homeland Security was concerned with threats posed by a technically competent "lone wolf." Yet, in responding to a question from Rep. Linder about threats from advances in biotechnology, Allen stated: "In this area we must exercise caution and not confuse capabilities of bioterrorists with state-level BW [bioweapons] programs. There is no doubt that the knowledge and technologies today exist to create and manipulate bio-threat agents; however, the capability of terrorists to embark on this path in the near-to–midterm is judged to be low. Just because the technology is available does not mean terrorists can or will use it. … In general, terrorist capabilities in the area of bioterrorism are crude and relatively unsophisticated, and we do not see any indication of a rapid evolution of capability. It is, therefore, unclear how advancements in high-end biotechnology will impact the future threat of bioterrorism, if at all." (cf. Allen 2006a: 3).

[12] Kerr also served as adjunct professor in microbiology and immunology at Georgetown University School of Medicine.

Allen went on to state that before advanced biological agents become a threat, he would expect to see the more frequent attacks or large-scale use of traditional biological weapons agents (e.g., anthrax or plague bacteria).

Addressing the gaps in knowledge about the nexus of biology and terrorism, Allen stated that any effort to enhance "bio-intelligence" must focus on targeting and collection over analysis. In advocating this position, he stated, "Our difficulties do not come from analyzing scientific information, but in obtaining credible, relevant information to analyze" (cf. Allen 2006a: 4). Thus, in his view, the problems are not inherent and do not stem from a limitation in existing technology assessments (i.e., their technical focus) but from the lack of inputs that would enter into these assessments. In spite of Allen's cautions about the low-tech character of bioweapons threats, his solution to improve intelligence is also a technical one: to partner the intelligence community with outside scientific experts to improve the targeting and collection of open source and classified scientific information, because "We simply must have more collection" (Allen 2006b).

Allen suggested focusing primarily on tracking technically trained people with the motivation, intent, and capability to become or aid bioterrorists, to aid intelligence collection. He cited Homeland Security's collaboration with technical subject-matter experts at several U.S. national laboratories, to obtain the necessary technical information for their assessments. Yet, Allen's focus on technical collection obscures a more refined discussion of how to better integrate social and technical forms of data and expertise in bioweapons assessments to judge threat capability.

Next to testify, Bruce Pease, the director of the CIA's main technical analytic unit, WINPAC, described bioweapons analysis as a thousand-piece puzzle: "Each bit of information is a piece of the puzzle, but alone, these pieces probably do not reveal much. Understanding the science of BW is a critical part of what we do, but still, it is only a piece of the puzzle" (cf. Pease 2006a: 6; emphasis in original). Pease also mentioned that the information the CIA receives from their collectors is typically not highly technical. He described how the CIA's analysis goes beyond the technical aspects of biology to other factors that might shed light on suspected bioweapons activities (e.g., motivation, intent, regional security, military and industrial infrastructures). In his spoken testimony, Pease described the difficulties in assessing the bioweapons threat: "The hard part is getting the information on where the threat is actually being developed, what they're developing, how they're doing it, and what they intend to do with it … the work that needs to be done there … needs to be both relentless and creative" (cf. Pease 2006b).

Yet again, in describing the CIA's strategy to increase its knowledge on bioweapons threats, Pease focused his remarks on an increase in recruitment of technical experts to the CIA and outreach to non-governmental academic and industrial scientists, rather than exploring broader sets of expertise to better evaluate how these threats might be developing. Although Pease stated that science is only a piece of the larger puzzle, his suggested solutions focus exclusively on the technical at the expense of the other, more complex pieces.[13] He left out a variety of non-technical issues that could have

[13] Moreover, WINPAC bioweapons analysts typically are technical analysts who are organizationally structured to work largely independently on their own technical assessments, disconnected from other intelligence analysts that could provide a more contextualized approach to understanding a state or non-state actor.

been suggested as alternative reforms for intelligence.

Alan MacDougall, from the Defense Intelligence Agency (DIA), chose to focus his testimony on two main efforts established within the DIA to connect bioscience expertise to intelligence: (1) an advisory group known as BioChem 20/20, and (2) the Jefferson Project (see MacDougall 2006). BioChem 20/20 is a scientific advisory group formed by the DIA in 1998 to help them anticipate the impact of new technologies and processes on biological and chemical warfare threats. In contrast to Brill's proposed new advisory group at the NCPC, BioChem 20/20 is a much smaller group of experts (about 20), and consists of both governmental and non-governmental scientists, working specifically for the DIA, with a focus on threats facing the U.S. military. Analogous to Pease and Brill's testimonies, MacDougall also stated that the DIA was looking to build its internal technical capacity by recruiting more biological scientists to aid in its assessments of bioweapons threats.

What is clear about these collective testimonies is the consistent focus on technical solutions, when there is awareness among several of these experts that technical issues are only part of the bioweapons assessment problem. This contradiction could have been further interrogated by Linder and his staff within and after the hearing — but was not. Instead, Linder's staff focused on the technical expertise recommendations emphasized in the testimonies. After the hearing, Rep. Linder's staff met with Kerr to obtain more detailed information about the plans within the Office of the Director of National Intelligence (ODNI) to establish a biological sciences advisory group. Kerr's presentations reassured Linder's staff that the ODNI was taking the appropriate steps to address the gap between the bioscience and intelligence community, so Rep. Linder did not press for additional Congressional mandates on this issue. Linder had planned to hold a third set of hearings looking into how intelligence "customers" (e.g., executive branch agencies) benefited from receiving bioscience information. But, with the 2007 Congressional shift in power, Linder lost his seat on the Homeland Security Committee, which prevented him from organizing another set of hearings.[14]

Behind the scenes, Kerr continued to work towards establishing the ODNI's bioscience reform efforts. Initially, Kerr had considered two approaches: (1) focus on increasing the biological science competence within the intelligence community's analysts, and (2) create an outside bioscience advisory group. He chose to focus his efforts on the second approach.

Throughout 2006, Kerr met with various members of the U.S. intelligence community to obtain suggestions for how to structure this new advisory group. In talking with Dr. Peter Jutro, Deputy Director for Science and Policy at the National Homeland Security Research Center, U.S. Environmental Protection Agency, Kerr learned Measurements of Earth Data for Environmental Analysis (MEDEA), a novel external science advisory group set up by the intelligence community.[15] MEDEA was established in 1993 to bring both academic and intelligence knowledge to bear on understanding the science behind global environmental concerns (Gore/Belt 1997; Carter 1996). Approximately 70 scientists were recruited from academia, the private sector, and relevant government agencies to serve on MEDEA.[16]

MEDEA scientists worked to compile a list of critical environmental issues and

[14] Telephone interview with former Linder staff, 24 August 2007.

[15] Interview with U.S. intelligence official, Arlington, VA, 24 July 2007.

[16] The name MEDEA, chosen by CIA official Linda Zall, came from a Greek mythological character who helped Jason and the Argonauts steal the Golden Fleece (Beardsley 1995).

the intelligence information needed to address them. With their security clearances, these scientists were then given highly classified briefings on U.S. intelligence technology to help them determine what kinds of archived classified data might be useful for environmental research. The briefings also helped inform the scientists as to how existing classified satellites and other technological systems could be targeted to collect new environmental data.[17] With this MEDEA model in mind, Kerr began structuring the ODNI's new biological sciences advisory group.

5 Evolution of the BSEG

In November 2006, the NCPC established the Biological Sciences Experts Group by official charter within the ODNI (see Office of the Director of National Intelligence 2006). An Executive Secretariat — with its own dedicated, classified budget — was created in the ODNI to provide support and management of the BSEG's operations. In addition, a steering group consisting of various representatives of the intelligence community was established to advise Kerr on BSEG taskings.

The BSEG consists of a cadre of external life science and bioweapons experts from universities, companies, and non-government organizations. These experts provide technical advice and counsel to the intelligence community on specific scientific and technical issues relevant to assessing the bioweapons threat.[18] These experts serve as independent consultants to the NCPC, appointed through the National Intelligence Council Associates program and paid for their time (plus per diem and travel expenses) to attend meetings.[19] Although contracts are renewed on an annual basis, BSEG consultants are expected to serve at least three to four years.

The BSEG consists of a group of 50 scientists (Prentice 2011). Because there are a variety of subspecialties within the life sciences (and related technologies), it is expected that the larger BSEG network will grow in the future to allow the intelligence community access to a greater pool of technical expertise as the need arises. Thus, it is expected that the BSEG will change and grow, depending on intelligence community needs.[20] New BSEG members can be proposed by members of the BSEG and the intelligence community. As with other advisors to the intelligence community, BSEG mem-

[17] Through negotiations with MEDEA, the intelligence community agreed to periodically image selected sites of environmental significance. Interestingly, MEDEA has served as an advocacy group in favor of further declassification of intelligence data for scientific research. For example, MEDEA scientists successfully lobbied to declassify over 800,000 images produced by Corona, Argon, and Lanyard photoreconnaissance satellites (Richelson 1998).

[18] The BSEG Charter explicitly states the following technical areas are of current interest: microbiology, molecular biology, synthetic biology, forensic sciences (e.g., microbial forensics), biochemistry, medicine, pharmacology, pathology (e.g., plant/human/animal), immunology, public health, epidemiology, veterinary medicine, food safety/security/production, agricultural sciences, pharmaceutical, biosecurity/biosafety, counterproliferation/ counterterrorism issues, former or current state bioweapons programs, former or current biological terrorist programs (Office of the Director of National Intelligence 2006).

[19] The National Intelligence Council (NIC) Associates Program was designed to enhance cooperation between academia and the Intelligence Community. Its associates are chosen from the ranks of academia, the corporate world, or think tanks. Prior to the formation of the BSEG, the NIC associates typically have followed a particular region or transnational topic for at least ten years, are U.S. citizens, and have traveled extensively. In the past, associates were asked to bring their historical understanding to bear on a wide spectrum of intelligence issues. See U.S. National Intelligence Council, "NIC Associates," available at < http://www.dni.gov/nic/NIC_associates.html >.

[20] Interview with U.S. intelligence official, Arlington, VA, 22 March 2007.

bership is confidential; individual member names are publicly released only with that member's permission.[21] To help recruit new members and raise awareness of the importance of bioscience expertise to the intelligence community, Kerr, Brill, and related NCPC staff have given public talks to large scientific and policy audiences and visited several universities across the United States (Brill et al. 2006; Kerr 2006; Prentice 2011).

The BSEG is separate from any particular U.S. intelligence agency, although it was established to be able to advise all U.S. intelligence agencies on biological issues. Thus, any one of these sixteen agencies may suggest to the NCPC specific topics or issues for research and analysis by BSEG experts. From these submissions, Kerr, as Senior Biological Advisor for the NCPC, could prioritize specific topics or issues for tasking to specific BSEG members (either to individuals or larger groups). As the charter stipulates, the types of issues that the BSEG may be assigned include: (1) supporting intelligence customers in the design of scientific/technical experimental protocols, intelligence analyses, or collection methodologies against biological threat agents (BTA), biological warfare agents, and/or state and non-state actors which do or may pose a threat to the United States; (2) advising on strategies to improve the execution or interpretation of results of experimental protocols, analysis, and collection against the aforementioned agents and/or actors; (3) undertaking technical assessments/performance review of the intelligence community's scientific/technical programs, analytical products, and collection methodologies against the aforementioned agents and/or actors; and (4) addressing any other issues as requested by the NCPC or intelligence community departments or agencies (Office of the Director of National Intelligence 2006).

To illustrate the types of activities that BSEG members may be involved in, if the intelligence community has captured a toxin recipe from al Qaeda and would like to determine whether it poses a threat, BSEG members could be involved in: providing technical advice on how to design an experiment to replicate the toxin recipe; helping the intelligence community interpret the results from the experiment; or serving as an independent reviewer of the finished experiment.[22] In addition, one policy official with an understanding of BSEG work has stated that the "BSEG has value in pointing analysts to open sources related to science and technology and what is going on in an open, vibrant and globalized S&T base."[23]

Unlike some intelligence activities, the name and existence of the BSEG is not classified. Yet most of BSEG's work is highly classified (e.g., specific code word classification, use of facilities that can work with special compartmentalized information). Currently, BSEG members are not required to undergo a polygraph examination, but this could change, depending on the types of projects proposed by the intelligence community. It is anticipated, however, that any necessary polygraphs would be done on a volunteer basis.[24] Although intelligence community members may be called on to work with specific BSEG members, the charter specifically states that BSEG members will serve only in an advisory capacity — they will not produce final

[21] Some BSEG members have expressed concern about identifying their association with U.S. intelligence to their national and other international scientific colleagues and collaborators; others, however, proudly list their membership on their academic CVs and in other public/policy forums.

[22] Interview with U.S. intelligence official, Arlington, VA, 22 March 2007.

[23] Personal communication with anonymous U.S. policy official.

[24] Interview with U.S. intelligence official, Arlington, VA, 22 March 2007.

intelligence products nor engage in collection activities (Office of the Director of National Intelligence 2006). To date, the BSEG has held regular meetings every few months, including briefings to BSEG members by intelligence community representatives, as well as talks by additional government and non-government speakers.

In addition to providing specific project advice, the BSEG can also provide commentary on emerging technologies of concern. One U.S. intelligence official has stated that the BSEG could maintain an annual "Top 10 Tech Watch" list, which would advise the intelligence community on what cutting-edge biotechnologies are emerging or changes in existing biotechnologies that may pose security threats.[25] This Top 10 list would then be given to intelligence analysts and collectors to help inform them in their open source and clandestine collection efforts in identifying whether states, terrorists, or lone-wolf "bio-hackers" were pursuing these technologies, as well as to help the intelligence community design new countermeasures or collection devices against such threats.

The BSEG is still evolving. As one BSEG member has commented to me, the group as it exists now is merely a collection of independent consultants who come together for regular meetings.[26] Thus, no cohesive identity, governance structure, or means of carrying out its assessments has been set. Therefore, opportunities exist for trying to re-shape how this group is informing bioweapons threat assessments. For example, at one BSEG meeting, a guest speaker was invited to discuss his archival research on former U.S. and U.K. bioweapons programs and how this historical knowledge can inform contemporary biodefense preparedness efforts. One BSEG member stated, however, that this type of presentation is atypical, as meetings typically focus on technical presentations with technical experts.

6 The logics and practices of BSEG

"Well, the use of preconceptions to guide inquiry is actually — is perfectly rational. In fact, it's a condition of rationality. You can't approach things with a tabula rasa. You have to start somewhere. The Commission gives a very good example of the use of preconceptions, sensible use of preconceptions, when it emphasizes the danger of bioterrorism. That's a preconception in the sense that we don't have any concrete information about the intentions or capabilities of our enemies with respect to bioterrorism. But we do know the logic of the situation, given what we think they want to do to us and given the means that are available in scientific knowledge and technical facilities, this is something to worry about" (Silberman 2005).

– Laurence Silberman, Co-chair of the WMD Commission Report

Silberman's words powerfully illustrate how preconceptions and narratives about biotechnology and terrorism are embodied in and work through particular kinds of people and institutions to shape public attention, policy prescriptions, and governmental responses to bioweapons threats. The establishment of the BSEG is the logical culmination of a security narrative that frames current and future bioweapons threats as a predominantly material and technical concern and privileges technical expertise to address those concerns. In looking at the history of the BSEG's formation, one can see how particular kinds of actors (e.g., WMD Commission, scientists, intelligence and policy officials) have worked to define the bio-intelligence problem as a lack of bioscience expertise and technical data, and have thus structured a variety

[25] Interview with U.S. intelligence official, Arlington, VA, 22 March 2007; see Brill (2006).

[26] Telephone interview with BSEG member, 21 September 2007.

of methods and activities to attract policy attention to this particular definition of the problem. As described earlier, activities designed to articulate and reinforce these claims have included: enrollment of high-profile scientists, government hearings, government and non-governmental reports, articles and editorials in high profile science and policy journals, and high-level policy briefings. Although the actors advocating this framing of the problem are sincerely concerned about bioweapons threats and U.S. preparedness against those threats, their narrowly focused policy prescriptions leave out important sets of non-technical knowledge and expertise critical to producing more accurate bioweapons assessments.[27]

Secrecy has also played an important role in shaping the public and policy discourse on the bioweapons assessment problem. For example, although the WMD Commission report included declassified information on al Qaeda's bioweapons efforts (as well as statements about threats from advances in biotechnology), other important contextual information about these issues remained (and continue to remain) classified. For example, there is little public information as to how the WMD Commission structured and formulated its assessments; most of its meetings were closed to the public. Although the report highlights the growing threat of bioterrorism, cryptic clauses in the report about the continued ambiguity of existing intelligence data go unexplained. And the classified nature of the BSEG's ongoing work also work to minimize public scrutiny over its activities. As a result, most of what we know about the BSEG and its work is dependent upon rare public and private statements. 2010 FOIA requests to release the BSEG's annual report were denied by the Office of the Director of National Intelligence, even though the denial was not based on classification concerns, but on what seem to be privacy issues (Aftergood 2010).

These half-secret/half-open activities constituting bioweapons threat assessments can be described as working under what John Cloud has called the "Shuttered Box" model of knowledge production,[28] which allows one to see how specific actors in recent bioweapons assessment policy discussions possess dual access to the classified and unclassified domains where discussions on the bioweapons threat and the bioweapons assessment problem are conducted. The way in which reports and related activities are constructed by these actors serve as shutters that "allow successful passage of people, money, ideas, technologies, and data back and forth between the disparate domains, but without ever providing direct sight or communication between the realms" (cf. Cloud 2001: 240). In the BSEG case, certain kinds of people and knowledge are allowed to pass through these shutters — those that support a particular kind of technical narrative and policy solutions about biotechnology and the bioweapons threat.

Cloud also writes that the shuttered box also "transforms or disguises the identities of the elements passing through it" (Cloud 2001: 240). The secrecy that structures the BSEG obscures the identities of its members, which are, however, important for understanding the kind of knowledge

[27] Having spent time in and out of the policy community, I have developed long-term professional connections and relationships with these individuals. From my judgments, these individuals do believe the problems are primarily technical, and that is the basis for their policy prescriptions.

[28] As Cloud explains, the Shuttered Box is an adapted metaphor of the "black box," where a technology or machinery was sealed or otherwise inaccessible, such that its contents and workings could not be seen. In a Shuttered Box model, however, areas of exchange can exist (Cloud 2001: 240).

that the group produces. An intelligence analyst who attends BSEG meetings has noted that many of its members have overlapping membership with other technical advisory committees, such as the Defense Intelligence Agency's Bio-Chem 20/20.[29] As a result, this analyst observes that instead of having alternative sets of outside expertise coming to bear on intelligence, there is a redundancy of perspectives about bioweapons threats represented behind the scenes — mostly those focused on a technovisionary of an increasing bioweapons threat with advances in biotechnology.[30]

Historian of science Michael Dennis noted that "one gets a certain type of knowledge from a particular social organization, in this case a secret organization or research that is secret. … This knowledge is different than what might be produced in a more open space … secret knowledge produced a different map of intellectual geography, a different sense of the horizons of possibility" (cf. Dennis 1999: 13-14). Dennis concludes that secrecy works to constrain and condition the imagination in different ways. In the case of the BSEG, because the group consists of technical experts who are tasked to look at purely technical aspects of bioweapons threats, the intelligence community (and its policy customers) will continue to consider bioweapons threats from a primarily abstracted technical perspective, without a richer understanding of the potentially larger contextual factors that shape real bioweapons capabilities.

Yet, in moving beyond the specific case of the BSEG, one can see the larger effects that this purely technical narrative in structuring intelligence can have on U.S. biodefense policy. In the past, U.S. biodefense planning has been tightly coupled to intelligence assessments based on specific clandestine information on particular adversaries. Recently, however, some have questioned this logic by, for example, advancing the need for a forward-looking, "capabilities-" or "science"-based approach to biodefense.[31] Under this model, justification for U.S. biodefense activities would move away from a tight coupling to intelligence assessments on specific adversaries and instead be based on exploring the abstract technical feasibility of current and future bioweapons threats. Such an approach is seen as providing a more robust and rapid mechanism for developing countermeasures against a broad range of potential bioweapons attacks in light of poor intelligence information and the unpredictability of advances in biotechnology. [32] One should see, however, that this technical solution is only one of several possible ones for improving intelligence on bioweapons threats. For example, testimonies and policy prescriptions could have focused efforts and resources on how to better collect and analyze intelligence information on adversaries that would include a broader range of social and technical data sets, as well as wrestle with the more complex problem of how to integrate and understand technical data

[29] Although its composition has changed from time to time, Bio-Chem 20/20 has typically consisted of about 15-20 prominent technical experts in the life sciences and related bio-chemical technologies from government, academia, and private industry.

[30] Personal communication with U.S. intelligence analyst, Washington, DC, 18 August 2010.

[31] For an example, see Petro and Carus (2005). This capabilities-based approach to biodefense has been based on former Secretary of Defense Donald Rumsfeld's interest in a similar approach to military transformation, where technology has been envisioned as a critical centerpiece and force multiplier.

[32] In choosing to focus on a science-based approach to biodefense, Petro and Carus describe the problem of assessing adversary intentions because this information is seen as scarce, dated, incomplete, contradictory, or insufficient for prioritizing biodefense resources and activities.

situated within different individual, terrorist, and state-level contexts.

With the existing technical focus, much gets left out. Sociologist of science Stephen Hilgartner notes that "Quantitative metrics and indicators may express particular forms of objectivity, but they cannot escape the deep and often invisible politics of what is counted, how it is counted, why it is counted, and how the counts are used" (cf. Hilgartner 2007: 4). It is important to note that a focus on the technical dimensions of the threat comes at a cost: the marginalization of analyses examining the social context underpinning bioweapons development and use, which is reflected in the considerable resources and programs within U.S. biodefense that have been shifted to focus on "science"-based threat assessments, R&D for countermeasures, and surveillance and detection systems. These programs remain largely focused on finding technological solutions to counter potential bioweapons threats, rather than funding the harder work of trying to better understand the multi-faceted and messy ways in which adversaries choose, design, develop, and use technologies for harm.

The fractures in social and technical knowledge in U.S. intelligence assessments are not new — they have been pointed out by a range of academic, policy, and intelligence scholars and practitioners over the past twenty years. During the Cold War, scholars and analysts failed to understand the role of technological development and change in the U.S.-USSR arms race. In the late 1980s, sociologist Donald MacKenzie, in the then-emerging academic field of science and technology studies, published an important commentary in the prominent journal International Security, attributing such analytic errors to judgments that failed to take into account that "There is more to weaponry than high technology, more to the competition of the Soviet Union and the United States than weaponry" (cf. MacKenzie 1989: 161). MacKenzie also noted how analysts and policy officials at the time tended to assume unproblematically the primacy of strategic state goals in establishing and advancing a weapons program, with the relevant weapons technology assumed to follow in a predictable trajectory devoid of shaping by a range of contextual factors. In contrast, he argued that there needed to be more attention to how technological change is intimately shaped through a variety of internal and external social factors, and to the need for more detailed case studies and historical analyses of the development of weapons technologies in different national contexts. Yet, more than twenty years later, as the BSEG example illustrates, a narrow technical focus in weapons assessments remains (albeit with a unique framing and narrative constituting the problem), leaving out crucial factors that can modulate the development of biological weapons by state and non-state actors.

7 Coda: New interventions and experiments

The current technical approach to bioweapons intelligence assessments needs to be broadened to include more attention to contextual factors in bioweapons threats and responses. I have argued elsewhere that these assessments should consider biotechnology more as a sociotechnical assemblage, which takes into equal account both the social and the technical character of biotechnology (Vogel 2013). In this way, one would examine how the social component of biotechnology is co-constructed with the technical — how this assemblage infuses and shapes how materials and infrastructure are used. Thus, this approach would examine qualitative aspects of biotechnology as a way to ground and refine purely technical analyses that dominate to date, and would recognize that biotechnology knowledge is embedded within a larger sociotechnical assem-

blage that can modulate the manner in which biotechnology can be adopted by terrorists or proliferators. This approach would suggest that greater effort should be given to examining the social dimensions of the bioweapons threat and how it interacts with the technical.[33] Instead of working so hard to infuse the CIA or other intelligence agencies with scientists, more attention in bioweapons assessments should be given to including other non-technical sets of expertise, as well as pairing non-technical and technical analysts to work closely together. In this way, CIA analysts could better understand the more complex synthesis of the technical with the political, economic, social, and cultural dimensions of terrorist and state-level bioweapons programs.

Tracing the historical evolution of the BSEG illustrates that existing ways of assessing bioweapons threats are not a given, but were historically contingent. Thus, new interventions can be created to include more open, inclusive, and reflexive modes of technology assessment. For example, some effort could be given to restructuring the types of BSEG-resident expertise by including other advisors from the National Intelligence Council Associates Program (the BSEG's hiring mechanism) to participate in its meetings and reviews. Typically, these associates are subject-matter experts from academia or think tanks who have followed a particular region or transnational topic for at least ten years and are asked to apply their historical and contextual knowledge to better understand the various factors affecting an intelligence issue. Although the BSEG currently views the Associates Program as merely a contracting mechanism to bring in technical experts, this perspective loses sight of broader sets of valuable expertise for helping BSEG members, the intelligence community, and its customers better understand the broader social and technical dimensions of bioweapons threats.

In addition, a recent set of overlapping activities and circumstances indicate additional openings to include alternative modes of producing knowledge in intelligence assessments. In July 2008, the Office of the Director of National Intelligence issued Intelligence Community Directive Number 205 (ICD 205), "Analytic Outreach" (Office of the Director of National Intelligence 2008). This Directive charges intelligence analysts to "leverage outside expertise as part of their work." To do so, the analyst is expected to seek opportunities to engage openly with these outside experts, to "explore ideas and alternative perspectives, gain new insights, generate new knowledge, or obtain new information." The Directive recognizes the importance for analysts to move out of their classified domains to tap into valuable outside knowledge and expertise relevant to intelligence problems, and thereby challenge erroneous group-think that can occur in the closed worlds of intelligence. This directive could provide a new impetus to include multi-disciplinary and cross-functional groups of experts to advise the BSEG or related intelligence analytic entities.

Also, in 2011, the U.S. National Academy of Sciences published a report — Intelligence Analysis for Tomorrow: Advances from the Behavioral and Social Sciences — sponsored by the Office of the Director of National Intelligence, to synthesize and assess evidence from the behavioral and social sciences relevant to analytic methods and their potential application by the U.S. intelligence community. The report recommended that the intelligence community "embed IC analysts in academic research environments to

[33] My research on the pre- and post-war assessments of Iraq's bioweapons program suggests how a more contextualized approach, as partly designed and implemented by UN weapons inspectors and the Iraq Survey Group, could be carried out to reform intelligence assessments (Vogel 2013).

participate in research and to network with [social and behavioral] scientists who can be consulted later," and that "the intelligence community should expand opportunities for continuous learning that will enhance collaboration, innovation, and growth in the application of [social and behavioral science] analytical skills" (U.S. National Research Council 2011: 85, 88-89).

Although this report is not specifically geared to the issue of biological weapons intelligence assessments, its general conclusions about consulting outside social and behavioral science experts to better inform intelligence is relevant to strengthening the BSEG to include multi-disciplinary sets of expertise. The report also suggests mechanisms and opportunities for intelligence analysts to exit their classified domains to spend time in academic and non-government settings, to enhance their learning on intelligence matters. In addition, other intelligence practitioners and academic scholars have pointed to the need for increased interaction among intelligence analysts and other government and non-government analysts and officials to produce more accurate and holistic weapons assessments (Koblentz 2009; Kerr et al. 2006).

Moreover, in November 2011, I attended a one-day meeting entitled "The Role of Tacit Knowledge in Nuclear, Biological, and Chemical Weapons Proliferation," sponsored by a high-level official within the intelligence community. This meeting involved a collection of intelligence analysts and non-government experts. At this meeting, a broad-based discussion of tacit knowledge in the development of nuclear, chemical, and biological weapons was presented by a set of non-government experts. As a participant-observer, I found it interesting to hear and reflect on the comments that intelligence analysts and officials made during the presentations and discussions. Although some in the audience were aware of the tacit knowledge literature in the field of science and technology studies and its application to weapons issues (mostly academic speakers), it was clear that most of the intelligence attendees were not aware of this body of literature, how it could be applied to weapons proliferation, or more broadly, how to think about the social dimensions of science and technology. In their comments about science and technology, they seemed to be working with older and more simplistic information-driven or cognitive-based models instead of taking into account how scientific and technical work are socially shaped.

Observing firsthand the disconnects between academia and intelligence has further underscored what I see as a critical need for more substantive and extended discussions between academic scholars and intelligence practitioners on specific case studies that illustrate the mechanisms by which know-how and other social dimensions of technical work relate to bioweapons development. Furthermore, in November 2011 I participated in the annual Emerging Biodefense Threats and Information Sharing Strategies Symposium organized by the IC-Private Sector Program, sponsored by the Office of the Director of National Intelligence. In the symposium, there was much interest generated around discussions of further outlining academic scholarship on the social and organizational factors shaping biotechnology development. Both these meetings therefore indicate interest by some within the intelligence community to explore a more contextualized approach to assessing bioweapons-related technologies, given the time and opportunity to consider alternative perspectives.

In response to these activities and my research, I am in the process of launching a new scholarly intervention into U.S. intelligence. In informal collaboration with intelligence analysts, I am creating a new unclassified "study group" consisting of a small group of

academic experts and intelligence analysts, which will explore the development and use of different framings and social science analytic methodologies for intelligence assessments on biological weapons threats. I use the concept of "study group" instead of "seminar" to highlight that close engagement between academic scholars and intelligence analysts and officials on these issues will be in a manner that facilitates a co-exploration of the social and technical dimensions of bioweapons technologies.

An initial focus for this group will be the facets of tacit knowledge (i.e., know-how) involved in the development of biological weapons. Through an examination of a range of case studies and examples, some questions the group will explore include:

- How does tacit knowledge (and other forms of weapons knowledge) get transferred between people (or teams of people)? How is it possible to discretely identify and measure this process?
- How are different forms of tacit knowledge combined, across different stages, for the development of a particular weapons technology? How might this process differ between nuclear and biological weapons technologies?
- What are the mechanisms and factors by which tacit knowledge becomes converted to codified knowledge in nuclear and biological examples? What might be useful indicators by which to assess such change?
- In what ways does secrecy affect the development of technical work in a weapons program? How can one probe these effects and better infer their implications for weapons development?
- What kinds of social engineering are required (e.g., pedagogy, exchanges, organization and management structures, etc.) for weapons to be developed and transmitted? What are their variations in the context of nuclear and biological technologies? How does such social engineering vary across cultures?
- What analytic tools are available to better assess how intent (state/non-state actor) shapes technical decision making in the development of weapons programs? How can one assess changes in intent over time, and the resulting impact on weapons programs?
- What other important factors, conditions, and time scales shape the development and transfer of nuclear and biological weapons technologies? How do these vary by cultural context?
- How is weapons development blocked? What particular local conditions and practices contribute to the failure to develop these technologies? What do studies of technological failure reveal about the social and technical factors that shape weapons development, and how to measure these factors?

The goals of these study groups are to introduce intelligence analysts to new, unclassified, multidisciplinary social science approaches to study bioweapons problems relevant to their work, and to provide opportunities for intelligence analysts to raise challenging questions and pressing issues to academic scholars, in order to further refine academic social science scholarship on these bioweapons-related issues. In addition, this project aims to create new knowledge within the social sciences about how intelligence analysts acquire, process, and respond to new information and analytic methodologies.

By bringing new social science analytic tools to bear on intelligence and policy problems and better integrating it with technical forms of information and expertise, the U.S. government stands to gain more robust approaches for probing and sorting through the messy, contingent character of science and technology in weapons development. This project will also challenge the

conventional wisdom in policy and intelligence communities, that substantive discussions of analytic methods for biological threats can only occur in highly classified settings and solely relate to technical expertise and knowledge. Also, this work aims to add to academic scholarship by shedding light on the knowledge-making practices in U.S. intelligence and how social science concepts can be translated to work in specific policy-oriented contexts. Therefore, there is much benefit from bringing the academic and intelligence communities together in close conversation. In this way, this project is akin to experiments that other social science scholars have launched to bring new perspectives to the governance discourse on science and technology (Expert Group 2007; Nordmann 2009).

Starting such an engagement, however, is fraught with challenges. For example, at a recent focus group with a small collection of intelligence analysts and officials to discuss this new engagement initiative, one intelligence official emphasized to me the problem of classification. He stated that for academic ideas to be really useful and challenge intelligence analysts' assumptions, academics would need to talk to analysts about the details of a specific case.[34] In his mind, this poses obstacles related to academics not having the appropriate security clearances to have such a conversation; for example, intelligence analysts would be reluctant to have detailed, explicit discussions about how to better assess the bioweapons capabilities of al Qaeda or North Korea without some level of classification. Thus, concerns over secrecy remain a difficult issue to work through as this engagement goes forward.

More recently, however, I co-organized a workshop between U.S. and U.K. academics and intelligence analysts aimed to start a conversation on merging social science and technical understandings of emerging biotechnology threats.[35] Although the analysts in the room were reticent to make public remarks during the workshop, during coffee breaks, lunches, and dinners there were a number of interesting side-bar conversations and follow-on discussions between the academics and intelligence analysts on specific workshop presentations. Both the academics and the analysts indicated that informal means of information and expertise sharing did occur on specific biotechnology/ bioweapons issues. Therefore, I think this as an important starting point for establishing trust, dialogue, and value to holding more unclassified dialogues in the future.

Trying to assess the intentions and capabilities of a state or non-state actor bent on hiding its bioweapons activities will always be a notoriously difficult problem to solve. Thus, analytic shortcomings and failures (even on the path to intelligence reform) should not be unexpected. As former Deputy Director of National Intelligence for Analysis Thomas Fingar has argued, "intelligence is not omniscience" (Fingar 2009). However, both the difficulty and the stakes of assessing bioweapons threats highlight the need to examine and open up how bioweapons assessments are conducted, to identify gaps and new ways to approach data collection and analysis for these assessments and, in turn, mitigate error.

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[34] Anonymous U.S. intelligence official, Washington, DC, 8 March 2012.

[35] U.S.-UK Joint Workshop on Improving Intelligence Analysis for Emerging Biotechnology Threats, 12-14 September, London, sponsored by the UK Economic and Social Research Council's Genomics Forum.

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