Confronting the Biological and Chemical Weapons Challenge: The Need for an "Intellectual Infrastructure"

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International efforts to address the challenges posed by the proliferation of chemical and biological weapons (CBW) and the threat of terrorist use of such weapons are at a loss regarding where to go next. The effort to negotiate a legally binding compliance protocol to the Biological Weapons Convention (BWC) ended in 2001 without producing an acceptable outcome. The Action Plan agreed upon at the Fifth Review Conference of the BWC in December 2002 is a minimalist agreement that might produce useful results, but results that can hardly be called dramatic in light of the severity of the challenge. Similarly, the First Review Conference of the Chemical Weapons Convention (CWC) in April 2003 provided a distinctly undramatic outcome that suggested little interest in new initiatives to address a profound challenge.

It is incumbent on the international community to explore novel ideas—both substantively and operationally—that might yield concrete actions nations and others can take to strengthen efforts to address the challenge that chemical and biological weapons pose in the hands of states or terrorists. The need for new thinking is especially strong in the community of nongovernmental organizations (NGOs). Governments are likely to spend most of the next several years focused on the issues that were addressed at their review meetings. While potentially useful, these measures are likely to be limited in terms of the policy outcomes they produce. This makes it incumbent on the NGO community to be the source of

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new thinking with respect to both substance and operations for addressing the complex CBW challenges. Many NGOs, however, invested considerable effort in traditional arms control and nonproliferation approaches to these problems in recent years, and they have few, if any, alternatives in the wake of these unsuccessful efforts. It is now time to move beyond those failed exercises and to push new conceptual and operational paths that can lead to concrete government action.

THE RECENT PAST

On July 25, 2001, the United States announced that it would not support the draft protocol negotiated by the Ad Hoc Group (AHG) of states that are parties to the BWC as presented in the "composite text" offered by the AHG Chairman.[1] The U.S. statement made clear that further negotiation of specific language in the draft would not address the major concerns it had with the proposed protocol, which it felt was based on a fundamentally flawed conceptual approach and unwarranted assumptions. Five months later, the Fifth BWC Review Conference suspended its efforts in light of a U.S. demand that the Ad Hoc Group be brought to an end. This last-minute standoff was the culmination of three weeks of sometimes bitter disputes over how best to strengthen the BWC and to carry forward the fight against biological weapons proliferation.

Between these two events, the United States was the victim of unprecedented anthrax attacks in the wake of the terrorist acts of September 11, 2001. The anthrax attacks transformed what had been a theoretical concern for some people into a very real security threat for the entire country. In doing so, they created a fundamentally new context within which the challenge of chemical and biological weapons had to be addressed.

Fifteen years ago, these challenges were primarily the province of a small group of technical experts. The policy community, including government policymakers and the broader strategic community, had little familiarity with—and less understanding of—the security problems created by the use of chemicals and living organisms as instruments of violence.

However, a number of developments emerged in the early 1990s that began to change the situation including:

- Iraqi use of chemical weapons in its war with Iran in the mid-1980s and, more important to policymakers, the fact that coalition forces confronted a chemically- and biologically-armed Iraq during the first Gulf War. This confrontation transformed what had been a rather uninteresting potentiality for many members of the coalition into a concrete security problem.
- Emerging intelligence about a massive illicit biological weapons program in the Soviet Union. Information provided by defectors described a program

involving dozens of facilities, tens of thousands of people, and billions of rubles that was previously unknown to Western intelligence sources.

- Ongoing concerns about North Korea, which was believed to have had a chemical and biological weapons program for decades.

These events combined to create an impetus for bringing the negotiations of the CWC to a successful conclusion in 1992. The treaty was opened for signature in early 1993 and entered into force in April 1997. At the same time, efforts were also made to strengthen the BWC, both through new confidence-building measures and through agreement on a process for supporting these measures that would bolster confidence in compliance with the convention.

Throughout the 1990s, a litany of events continued to push CBW issues further up the post-Cold War security agenda. These included continuing discoveries about the Iraqi CBW program by the United Nations Special Commission on Iraq (UNSCOM), the difficulties of getting the new Russian government to address problems left behind by the Soviet CBW program, and the March 1995 Aum Shinrikyo sarin nerve gas attack in the Tokyo subway.

This last event in particular transformed the security landscape. Occurring soon before the bombing of the Murrah Federal Building in Oklahoma City, it created a new mentality among policymakers and the public alike that the United States was not invulnerable to terrorism, that such terrorism could entail the use of chemical or biological weapons, and that the United States was not prepared. This mentality triggered the initial efforts that became the foundation for what is now the government's focus on homeland security—an orientation reinforced by the anthrax experience in the autumn of 2001. Because of these anthrax attacks, the threat of bioterrorism—nearly overnight—crashed its way into the national consciousness through the most mundane of daily events, delivery of the mail. As a result, in contrast to the last half of the twentieth century when nuclear weapons were the paramount concern, public opinion polls today report that what scares Americans most is the threat of biological or chemical attacks.

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CBW issues—and biological challenges in particular—are now near the top of the nation's security agenda. Despite this ascendance, understanding of the issues among policymakers and the public remains limited. This limited understanding translates into an absence of innovative approaches to deal with these demanding challenges, whether they relate to the state proliferation or to non-state terrorism dimensions of the problem.

Despite increased recognition of the CBW problem, the security community is not prepared to address it, especially in conceptual terms. The situation regarding chemical and biological weapons stands in strong contrast to efforts directed at the challenge of nuclear weapons when it first emerged. From the onset of the nuclear age, the strategic studies community recognized that the world was confronted by a potential future of unspeakable horror. In response, it created an intellectual infrastructure to live in that world and deal with its problems. It developed new concepts and new analytical tools, fostered new ways of conceptualizing issues and defining the world so that governments and their publics could cope with the realities that nuclear weapons had created. Indeed, it was largely through its work on nuclear weapons issues that modern strategic studies and the security community were defined.

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Nothing similar emerged with respect to chemical and biological weapons. To the extent that they were considered at all during the Cold War, CBW were often assessed in the same category as—yet of lesser importance than—nuclear weapons, with the argument that anything that is useful for dealing with the challenge of nuclear weapons would have the additional benefit of managing chemical and biological challenges. That may have been true in a Cold War context, but once the nuclear standoff ended, it became an unwarranted assumption. Limited experience yielded a limited range of tools to address them. At a time when the world had changed and priorities had shifted, governments—and the broader community—were not prepared. Today, confronting a situation in which the old conceptual, analytical, and policy tools have been found wanting in their ability to manage the CBW challenge, the policy community is largely empty-handed.

THE NEED FOR NEW THINKING

The case for needing new thinking and new approaches to CBW rests on four rather simple arguments:

- First, the old ways and old tools have not worked—at least not very well—in recent times. What might be called the "Geneva process"—formal multilateral negotiations by governments of legally binding agreements with inputs from NGOs and others—has not yielded major results since the conclusion of the CWC negotiations. Equally, the system of using the UN as the last resort to deal with problems of noncompliance, which is a key feature of these agreements, is not satisfactory. Members of the Security Council, and the five permanent members in particular, have done almost nothing to give content to the declaration at the 1992 Security Council Summit that the proliferation of weapons of mass destruction is a threat to international peace and security.

- Second, there is no reason to believe that the ongoing contentious political disputes that were obstacles to progress in the past will not continue to seriously hinder any new attempts based on the usual practices and procedures. One of the most destructive elements in this regard has been the dispute carried by radical members of the Nonaligned Movement (NAM) over security requirements in treaties on one hand and demands for cooperation and assistance in the peaceful uses of technologies covered by these agreements on the other.
- Third, old methods fail to accommodate inputs from important players who should now be making contributions to solving the problems. Industry, in particular, was not well integrated into past efforts, yet it stands at the cutting edge of the application of remarkable advances being witnessed in chemistry and the life sciences that are shaping the environment within which these issues must be addressed.
- Finally, old methods sometimes confuse intermediate goals with the ultimate objectives of global efforts. In particular, strengthening the BWC or CWC through the Geneva process seemed to become more important than effectively dealing with CBW proliferation or terrorism using such weapons. By emphasizing what is in essence an intermediate goal, the international community tended to lose sight of the full range of tools needed to address the challenge. This is not to argue that the BWC and CWC are not important or that they should not be strengthened. They are and they should be, but focusing exclusively on that objective arbitrarily limits the potentially useful efforts.

Beyond these specific challenges, a range of other issues reinforces the need for new thinking and novel approaches.

The Terrorists' Arrival

The events of September 11 and the subsequent anthrax attacks suggest that the connections between the state proliferation and terrorism dimensions of the unconventional weapons challenge are more important than ever before. This linkage is especially acute with respect to biological weapons. In the past, analysts have tended to conceptualize and address the two dimensions along separate tracks. This split approach has produced different strategies and different policy tools for dealing with what were considered distinct aspects of the problem, if not separate problems altogether. In the world after September 11, such a stovepipe approach will no longer suffice.

The distinction between war and terrorism and terrorists and the state has become increasingly blurred and the concepts are now inextricably linked. Confronting this complex challenge, the United States and the international community must implement a response that is strategic in nature and multifaceted in action. A range of tools must be exploited. Arms control is important in this context, but classic multilateral arms control is unlikely to yield significant results on its own. Nor does it provide a sufficiently wide perspective to facilitate all of the varied actions that will be required by the necessary actors—from both the public and private sectors—to deal effectively with the new realities that the convergence of state and non-state challenges present. The combination of politics, science and technology, and the treaty language of the CWC and BWC ensures that these conventions will be insufficient on their own. What is needed is an approach that goes beyond the traditional modalities of arms control to new ways of thinking about how to strengthen the conventions and the norms against CBW that these conventions embody.

Advancing Science and Technology

Both chemistry and the life sciences have produced incredibly rapid scientific and technological advances in recent years, and, if anything, the pace of change is likely to accelerate. Today's Nobel Prize-winning experiment is tomorrow's high school science fair project. Classic arms control will have difficulty in capturing this dynamism in the underlying science and technology, which has the potential for contributing to remarkable advances in the human condition but which could also be used for malign purposes.

Rapid changes in science and technology will shape new scientific and business methods and practices far removed from those of today. Moreover, many of the breakthroughs in science and technology are likely to be achieved by combining them with other technologies such as nanotechnology, cutting-edge information technologies, and new materials science. Creative scientists and technologists could find new ways of putting such things together to advance their CBW capabilities. In essence, advancing science and technology will allow future proliferators to enter the CBW game with a more solid scientific and technological base on which to build their efforts.

The potential injury to mankind resulting from the exploitation of advancing science and technology is almost inconceivable, but conceive it we have, from stealth viruses to ethnic weapons to behavioral modification techniques.[2] They are all now deemed to be in the realm of the possible.

Government bureaucracies are notoriously slow to adapt. International organizations are no less so. Because of the vastly different rates of scientific advancement and government adaptation a broader approach is required that facilitates an ongoing appreciation of the evolving scientific and technological landscape in as close to real-time as possible.

Another key issue related to science and technology is the pace at which this knowledge is spreading around the world. Scientific activity in chemistry and biology is a genuinely international endeavor, as is the development of chemical and biotechnology industries. Developing countries such as Singapore and India are looking to such advanced technology industries to facilitate their economic development. Singapore, for example, has committed itself to becoming a biotechnology hub in East Asia, and it has already succeeded in attracting foreign companies. The drive of developing countries to exploit advanced technology is another dimension of the chemical and biological challenge that complicates efforts to apply old approaches and, likewise, demands new thinking.

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Casting the issue as one of managing technology diffusion changes the perspective of both policymakers and analysts whose traditional approach would emphasize controlling exports. Nonproliferation export control regimes have their origin in the Cold War's emphasis on nuclear weapons, for which access to fissile material is the critical factor. Looking at the problem as one of technology diffusion, economic development promotion, and risk management, however, leads to the conclusion that controlling material and equipment is becoming less important than managing the risks of transferring knowledge. The commercial, medical, or agricultural ubiquity of the material and equipment needed to develop at least a limited chemical or biological weapons capability makes technical know-how the essential element. In such a world, it is obviously not realistic to suggest that flows of knowledge can be strictly controlled, especially with so many means of direct communications with global reach.

It is not the knowledge per se that is important, however, but the people with that knowledge. Therefore, in managing the potential risks greater attention should be given to what people do with the knowledge they acquire, especially in academic and industry settings. CBW scientists in places like Iraq received at least some of their training in the West. It is impractical, however, to try to track every foreign student or scientist studying or conducting research in the life sciences or chemistry at European and North American universities. Restricting research is no less difficult. Despite the difficulties, some sensitivity to the issue of managing the risks associated with people involved in such research should be promoted.

Engaging Industry More Productively

Those involved in industries based on science and technology that can also yield chemical and biological weapons emphasize the vast contributions their rapidly advancing capabilities make to improving the quality of life for many people, and they are right to do so. Not everyone shares the view, however, that this science and technology, especially biotechnology, is an unalloyed positive. Unscrupulous drug companies or other biotechnology enterprises, for example, have recently become the villains in popular novels and movies. Although such depictions exist in the domain of fiction, the fact that advanced science is portrayed negatively in the popular culture captures a sentiment among the public that reflects uncertainty and uneasiness with issues generated by the advancing life sciences and related technology.

The issues involved, including cloning, gene patents, eugenics, genetically modified food, genetic testing, and privacy are many and difficult. The public perception of industry "fiddling around with nature" suggests a view that advanced science and technology could contribute to a more serious threat to public safety and security.

As the drivers of much of the critical science and technology developments, industry must be made to understand its stakes in the challenge and be fully integrated into the necessary strategic response. The direct contribution that industry can make to dealing with the problem is obvious. It should be the source of some of the more technical tools that could be deployed to help manage the risks associated with CBW, including sensors for detection and identification, new medical treatments, or improvements in passive and active protective gear.

The indirect contributions of industry, however, should not be overlooked. Even companies that have no direct relationship to the security sector engage in activities with risks attached, and managing the risks associated with advances in chemistry, biology, and the associated specialties is an increasingly vital element of future action. A device for the needle-less application of medical treatments, for example (involving absorption of the drug through the skin), could be of great medical value, but in some contexts it might also be useful for terrorists.

The rapid movement of personnel in a highly volatile industry could create opportunities for those who want to do wrong to operate without close observation (just as participants in national proliferation programs such as those in Iraq received their training in European and North American universities). Given the growing public and governmental concerns over developments in biotechnology, it would also be very much in the interest of the biotechnology industry to cooperate in promoting proper, safe, and ethical practices around the world. Increasing awareness within industry of the risks associated with critical developments in the relevant sciences and their commercial application is an area in which industry and government could work closely together.

A similar effort to raise awareness of security-related concerns should be pursued with the scientific community. From the beginning of the nuclear age, with the active participation of Einstein himself, physicists have understood that they must think about the negative implications of atomic power to avoid the catastrophic consequences of the knowledge they uncover. That recognition has been lacking in the life sciences community. Their single-minded focus on the good they are trying to do for humanity or scientific discovery for its own sake too often blinded life scientists to the risks that stood alongside the benefits they were seeking. Security issues were kept at arm's length.

While attitudes within the life sciences community appear to be changing in this regard, they still have a long way to go before they can provide the requisite strong leadership and sustained engagement. Life scientists should now help strengthen the norms against chemical and biological weapons research, acquisition, and use. Codes of conduct, peer reviews and panels, and self-regulation that defines appropriate restrictions in scientific research are all ways in which the scientific community can contribute to an environment that does everything possible to foster the apposite use of the biological and chemical sciences in the service of public safety and security.

BUILDING INTELLECTUAL INFRASTRUCTURE: CREATING BETTER ANALYTICAL TOOLS

As has been argued, there is no intellectual infrastructure that provides a common framework for understanding the chemical and biological challenge similar to the one that evolved with respect to nuclear weapons in the second half of the twentieth century. In and of itself, such a framework will not generate answers, but the development of reasonable policy must begin with shared understandings, a common language, and useful conceptual tools. This conceptual infrastructure is important because concepts shape our constructs of reality, and they can prompt a sense of new opportunities with respect to what can be done to address major challenges. In other words, it both opens up new policy options and promotes either the identification of new policy tools or the application of existing tools in novel ways.

Threat Assessments

The process of constructing an intellectual infrastructure must begin with a shared appreciation of the problem. Today, a common view of the threat does not exist. Are chemical and biological weapons strategic or tactical? What is their military utility on the battlefield, against operational in-theater targets, or against an adversary's home base? Do states or terrorists pose the greater threat? Is such a dichotomy even useful, or does the relationship between the state and non-state dimensions of the problem require recasting how we think about both? What are the best ways to classify the critical components of an effective response? How are those components related and how do they interact? These are only some of the questions on which it would be hard to reach a consensus let alone a shared set of concepts or common language for addressing them.

The first requirement of an intellectual infrastructure, then, must be better threat assessments. Such assessments today often explain the chemical or biological threat in terms of a single factor such as the agent (whose potential lethality is emphasized in most vulnerability assessments), or the actor seeking to use such weapons (which historical assessments usually stress). Single factor analyses, however, are inadequate. The CBW threat is the product of a complex interaction among several categories of factors—actors, agents, targets, and operational considerations—each of which includes many variables. Taken together, these variables can produce a large set of combinations and permutations, some of which will yield significant results and some of which will not. Examining so many variables together and integrating their interaction into a meaningful analysis is not easy. Better threat assessment methodologies, therefore, should be one of the building blocks of this intellectual infrastructure and a valuable tool to promote new thinking.

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Risk Assessment

Threat is not the same as risk; however, better risk assessments, particularly in the biological arena, are as badly needed as better threat assessments. The biological weapons challenge—that is, the deliberate misuse of the life sciences—should be seen as one end of a spectrum of risks associated with the life sciences. This spectrum begins with natural developments such as the outbreak of disease, continues through accidents and "misadventure," as in the unforeseen negative consequences of what are otherwise beneficial activities such as medical research, to deliberate use at the other extreme. Public safety and security risks emanating from developments in the life sciences are converging. The growing realization of the links between infectious disease and biological weapons or the potential implications of scientific research (advanced genomics, for example) for shaping the biological weapons problem are examples of why it is more difficult to draw a clear dividing line between safety and security risks. Casting risks associated with the life sciences across the full spectrum—from those that occur naturally to those that are the result of deliberate human choice—not only better reflects reality, but it also creates a means for identifying the critical cost-benefit tradeoffs associated with particular courses of action.

Cost-benefit analysis is a crucial part of the risk assessment process. Considering the full risk spectrum facilitates an appreciation of costs and benefits in a way that merely doing threat assessments does not. A cost-benefit analysis of applying strict regulations to the publication of contentious research, for example, might deem such limitations sensible if one were only concerned about the security implications of such research. But when the broader spectrum of affected activities is considered, including the need for sharing knowledge generated by new research for medical, commercial, or other legitimate reasons, the cost-benefit calculation is likely to yield a different policy outcome.

Impact Assessments

In addition to better threat and risk assessments, a useful contribution to the intellectual infrastructure would come from elaboration of alternative measures of the impact of breaches of biological or chemical security. Developing such measures could contribute to a better and more widely shared view among policymakers of just how serious biological and chemical risks and threats are. They could also foster a better appreciation of the full range of how such capabilities could be used.

The most obvious measure of impact is casualties, which is useful because it is quantifiable, but the level of casualties is a useful indicator of impact only if the goal of using chemical or biological weapons is to kill people. If killing people is a means to some other objective, such as disrupting military operations or inciting widespread public panic, then casualty levels are at best an indirect indicator of the utility of such weapons. In some cases, killing people may be neither the objective nor the outcome. The economic cost of biological weapons use is probably the next easiest impact to measure, again because it is quantifiable. Models can be developed, for example, which assess the costs of various attack scenarios against agricultural targets or business operations.

A particularly helpful impact metric would address the psychological effect of biological or chemical weapons threats and use under a variety of conditions. Biological weapons, in particular, seem to be especially distressing to people, perhaps because of the prospect of an unpleasant death from an infectious disease or because biological weapons are viewed as a result of manipulating nature. Whatever the reason, a better understanding of the potential psychological impact of chemical or biological weapons use could have important benefits.

In urging the development of better metrics for assessing the impact of breaches of biological or chemical security, one should not expect a high degree of precision or a predictive capability. Casualties or economic costs are attractive metrics because they can be quantified, but other results do not lend themselves to numerical representation. Working on better impact assessment methodologies, however, would yield yet another set of tools for understanding the nature of the problem and pointing toward potentially useful responses.

Infrastructure is defined as "the underlying foundation or basic framework" of a system or the "resources required for an activity."[3] Physical infrastructure makes a particular way of life possible in a given natural environment. In the same way, a new conceptual and policy environment within which to address chemical and biological security requires an intellectual infrastructure. The components of such an infrastructure discussed here—better threat assessment methodologies, risk assessments based on cost-benefit analyses, development of impact metrics—are obviously not exhaustive. Other components are also needed. These three are each important because they address some of the most basic needs on which other capabilities can be based. Some hope should be taken from the nuclear experience. It was not until after the elaboration of that intellectual infrastructure that breakthroughs in nuclear arms control became possible. Likewise, in the chemical and biological arena, we must be sure we are thinking about the problem and the potential solutions in the right way before the best routes for dealing with it can be determined.

Developing an intellectual infrastructure to support a conceptual and policy environment that stresses the proper role of science and technology in the service of safety and security requires contributions from many more actors than diplomats in Geneva or government policymakers and bureaucrats in national capitals. Through this more universal effort, the task of building bridges to the industrial and scientific communities can be advanced by acknowledging the value of their contributions and through involving them early in the process.

The challenge in confronting the potential catastrophes inherent in the use of chemical and biological weapons—whether by states or non-states—is not to prevent those international actors from acquiring the capabilities to exploit chemistry and the life sciences for malign purposes. That is not possible. Rather, that challenge is, as UK Ministry of Defense analyst Paul Schulte put it, "to keep it out of their behavioral repertoires."[4] The job is to shape the behavior of those who might be interested in such capabilities. We will only be successful in doing so if we have the right tools, not only in policy terms but in conceptual and analytical terms as well. Developing the right tools will not be easy. It is difficult to break out of familiar and comfortable ways of thinking about problems and to replace them with ideas that may not be refined and whose value remains unproven. It is also hard to combine the requisite insights from politics, economics, science, and technology, as well as security, which will be required for dealing with this problem.

Yet if there is to be success, both of these difficulties must be overcome. Changing the way we think can be the most difficult problem of all. ■

NOTES

1 Donald Mahey, "Statement by the United States to the Ad Hoc Group of Biological Weapons Convention States Parties," delivered July 25, 2001 in Geneva, Switzerland, available at <http://www.state.gov/t/ac/rls/rm/2001/5497.htm> (accessed November 20, 2003).

2 Ethnic weapons are weapons using biological materials or the life sciences (such as growing knowledge of the human genome) to attempt to target genetic differences between ethnic groups with the goal of developing a capability that would have an impact on one ethnic group but not others. A debate exists within that scientific community about how close the ability for developing such a weapon is.

3 This definition is according to *Merriam Webster's Collegiate Dictionary, Tenth Edition* (Springfield, MA: Merriam Webster International, 1995.)]

4 Comment made during a presentation at a conference at Wilton Park on "Chemical and Biological Weapons: The Threats of Proliferation and Use." Schulte's presentation was on "Revising the CBW Non-Proliferation and Arms Control Agenda: Essential in the New International Security Environment."