A Report of the Center for the Study of Weapons of Mass Destruction

Combating WMD

Challenges for the Next 10 Years

February 2005

National Defense University

CENTER FOR THE STUDY OF WEAPONS OF MASS DESTRUCTION
NATIONAL DEFENSE UNIVERSITY

Since its inception in 1994, the Center for the Study of Weapons of Mass Destruction (previously the Center for Counterproliferation Research) has been at the forefront of research on the consequences of weapons of mass destruction (WMD) for American security. Originally focusing on threats to the Armed Forces, the WMD Center now also applies its expertise and body of research to the challenges of homeland defense and security. In February 2004, President George W. Bush commended the Center for providing "vital insight into the dangers of a new era."

The broad mandate of the Center includes research, education, and outreach. Its research focuses on understanding the security implications of weapons of mass destruction, as well as the challenge of fashioning effective responses to them. Education and outreach programs seek to enhance awareness in the next generation of military and civilian leaders of the WMD threat as it relates to defense and homeland security policy, programs, technology, and operations. As a part of its outreach efforts, the WMD Center hosts annual symposia on key issues, bringing together experts and participants from the government and private sectors.

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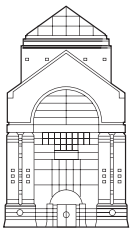

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Acknowledgments

The Center for the Study of Weapons of Mass Destruction (WMD Center) of the National Defense University convened a 2-day conference in May 2004 to examine key challenges that the combating-WMD community will need to address in the coming decade. The conference, entitled *Combating WMD: Ten Challenges for the Next Ten Years*, drew an audience of more than 150 leading experts from government, military, academia, and the private sector.

This report is grounded in, but further elaborates on, the presentations and discussions conducted in that conference. While all sessions were off the record and all comments delivered on a nonattribution basis, the authors appreciate the many speakers and panelists for their direct and indirect contributions to, and/or review of, this product. In particular, the WMD Center thanks Dr. Condoleezza Rice, National Security Advisor, for delivering the conference keynote address; Charles B. Curtis of the Nuclear Threat Initiative for his perspectives on international cooperation in combating WMD; Vice Admiral Arthur K. Cebrowski for his presentation on transforming technology and acquisition; and Michael Eisenstadt for his presentation on the lessons learned from Iraq. Additionally, the conference owes its success to the following key participants: Kenneth W. Bernard, Lisa Bronson, Doug Bruder, William J. Burns, Joseph R. DeTrani, Lewis Dunn, Michael K. Evenson, Jane Fletcher, Charles R. Gallaway, Leonard A. Izzo, Robert Joseph, Kevin J. Kennedy, Susan J. Koch, Jeffrey B. Kohler, Christopher J. Lamb, Maureen McCarthy, Charles W. Neeley, Vayl S. Oxford, Brad Roberts, Guy Roberts, Mark B. Schneider, David H. Stephens, Richard L. Wagner, Jr., Forrest E. Waller, and Robert Walpole.

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Chapter One

The Changing Proliferation Environment

One need only glance at newspaper headlines each morning to appreciate that the weapons of mass destruction (WMD) threat environment is dynamic. President George W. Bush has identified WMD in the hands of rogue states and terrorists as the greatest security threat to the United States. The pace of WMD events in recent years has been truly remarkable. Taking stock of what has occurred since the *National Strategy to Combat Weapons of Mass Destruction* was issued nearly 2 years ago, it is clear that combating WMD is a difficult but far from hopeless task. Important progress has been made, though major challenges continue to confront the United States. The threats that dominate the near-term vision are those posed by hostile state and nonstate actors that seek or possess familiar forms of WMD. But the longer-term vision must remain focused on the ways in which technology potentially can transform the nature of the threat—perhaps in ways that will redefine the conception of weapons of mass destruction.

Rollback

Focused diplomacy enabled by concrete political, economic, and military leverage has yielded the promise of a comprehensive rollback of Libya's WMD and missile capabilities and programs. Whether Tripoli follows through on all its disarmament commitments over the long term remains to be seen, though U.S. officials who interacted with the Libyan leadership believe the regime is sincere in its intentions.[1] The question, then, is whether Libyan disarmament provides a model for the rollback of regional WMD that can be applied elsewhere. Administration officials have begun to promote Libya as just such a model for North Korea: in return for a "strategic commitment to disarm," North Korea could receive substantial political, security, and economic benefits.[2] The premise of this logic is that the motivations and behavior of rogue regimes can change under the right circumstances and in response to the right mix of risks and benefits. (North Korea is discussed in greater detail in chapter three.)

Developing New Tools

The interception in the Mediterranean Sea in October 2003 of a large shipment of centrifuge components bound for Libya from Malaysia was one important

element of success in Libya. This has been perhaps the single most important operation executed under the rubric of the Proliferation Security Initiative (PSI) to date. The success of PSI demonstrates that effective new tools to combat WMD can be created by like-minded nations prepared to cooperate on a sustained basis in response to U.S. leadership. It also underscores the important contribution military capabilities and operations can make to integrated combating-WMD strategies. (The Proliferation Security Initiative is discussed in greater detail in chapter three.)

Procurement Networks Complicate the Landscape

A second critical element of success in Libya was exposing the nuclear black market operated by Pakistani engineer Abdul Qadeer Khan, the principal supplier of Libya's still-embryonic uranium enrichment effort. U.S. intelligence was successful in penetrating this clandestine procurement network—a global enterprise that was a centralized source for nuclear fuel, uranium enrichment technology, and even weapon design for well over a decade.[3] Regardless of whether Khan was a rogue actor or an instrument of Pakistani state policy (or, as is most likely, something in between), the revelations of his activities carry important lessons. First, the efforts and ambitions of one individual can make a huge difference, whether in the development of state nuclear, biological, and chemical (NBC) weapons programs or the subsequent transfer of acquired knowledge and technologies. More importantly, the Khan network exposed major gaps in the nuclear control regime. *Secondary proliferation* by nonstate actors—entrepreneurs in this case—is outside the reach of existing international controls and is a problem that the drafters of the Nuclear Non-Proliferation Treaty (NPT) never anticipated. If there is a willing and politically unconstrained single source for virtually an entire nuclear fuel cycle, then the premise of supply controls—that is, slowing the transfer of critical technologies to buy time to address proliferation incentives diplomatically and politically—is fatally undermined.[4]

To the degree sub rosa procurement networks persist, they do hamper the ability of intelligence agencies to assess and warn about covert WMD programs. Moreover, it is unclear whether the United States and its allies have a complete picture of the Khan enterprise, even as they work to roll up the network. The United States must consider the possibility that significant and sensitive technical information is now widely spread to places and people not yet known. The international community must also acknowledge that the "loose nukes" model is incomplete. Since the end of the Cold War, the United States has focused on nuclear leakage from the former Soviet Union and devoted significant resources to address this important risk. Cooperative threat reduction programs may in fact have prevented serious nuclear leakage from Russia and other former Soviet republics. What is

unfortunate is that real—and systematic—leakage was occurring from an entirely different source: a country that ostensibly is an American ally.

This points to a larger lesson of the A.Q. Khan experience: there will always be policy tradeoffs as the United States seeks to combat proliferation in a complex and dangerous regional setting. The United States has accepted official Pakistani assertions that there was no government involvement in Khan's activities and did not challenge his pardon, which immunized him from criminal charges. For now, the war on terror and the search for Osama bin Laden seem to be more important imperatives in U.S.–Pakistan relations than nonproliferation.

A Stressed Nuclear Nonproliferation Regime

Even more so than the Khan network, the challenges North Korea and Iran pose have placed tremendous stress on the NPT regime. Indeed, the actions of both have created a confidence crisis. Without substantial progress in these two states, nations that to date have placed faith in nonproliferation treaties may find it necessary to reconsider the wisdom of abjuring not just nuclear weapons, but possibly chemical and biological weapons as well. A cascade of WMD acquisition decisions resulting from further erosion of the NPT regime cannot be ruled out. In parallel, closing the loopholes in the NPT that have allowed countries such as Iran to pursue a nuclear weapons capability under the cover of treaty compliance must be a priority for the United States and the international community. (These issues are discussed further in chapter three.)

Some Lessons of the Iraq War Seem Clear . . .

At the operational level, the United States and its coalition partners will simply never know whether their forces in Operation *Iraqi Freedom* were adequately prepared to operate successfully in a chemical or biological environment. But other lessons are apparent.

Key assets are high-demand/low-density. As senior leaders have already noted, there is a need to align force structure better with the diverse requirements of combating-WMD missions. In particular, the Armed Forces need more of the specialized chemical and biological defense forces that have become classic examples of high-demand/low-density assets. Moreover, too many of these assets reside in the Reserve components, which makes them less responsive to short warning or short duration contingencies.[5]

Regional partners will ask for help. Some coalition partners asked the United State to help make up shortfalls in basic defensive equipment such as protective suits, masks, and atropine. Additionally, the United States set aside anthrax and smallpox vaccine for tens of thousands of defense personnel from 18 countries.[6]

U.S. forces were not adequately prepared for the WMD elimination mission. The WMD dismantlement and elimination mission is more complex than the

Department of Defense (DOD) had anticipated and planned for. Had coalition forces encountered the large-scale WMD program they were expecting to find, they would not have been adequately prepared to perform the required operations to support this mission. (See chapter four for a more detailed discussion.)

. . . But Others Are Ambiguous

At the strategic level, the behavior of the Iraqi regime raises interesting and important questions for policymakers, but may not yield definitive lessons just yet. While Iraqi behavior can be viewed as rational in many respects, there is strong evidence of gross miscalculation in decisionmaking, owing both to the overly centralized, insular decision apparatus common to authoritarian regimes and what some highly placed regime officials describe as Saddam's detached and perhaps even delusional state.[7] Such a decision environment bodes poorly for strategies of deterrence and compellence, whose efficacy depends critically on the rational calculation of benefits and risks based on sound information. It also suggests the need for more systematic thinking about the culture of decisionmaking in countries such as Iraq that come under significant political, economic, and military stresses.

By the same token, some observers argued Saddam decided that the strategic and operational utility of weapons of mass destruction was limited—perhaps nil—when confronting the United States. Saddam certainly viewed chemical weapons as important for internal security and generally deemed WMD as key to regime survival in the regional setting. After all, chemical warfare was instrumental in surviving the Iran-Iraq war. But against the United States, it is entirely plausible that for Saddam, WMD had become weapons of neither first nor last resort, but of *no* resort. If so, this would have been the product of a profoundly rational calculation—that such weapons create extremely high risk in relation to their operational benefits and political costs. Even so, Baghdad's persistent refusal to come clean on its WMD activities suggests it perceived powerful regional political and deterrent benefits from even pretending to possess weapons of mass destruction or to maintain their programs.

Western strategists and policymakers need to avoid an overly deterministic view of rogue state proliferation. The value and utility of these weapons for the leaders of such states may evolve over time and may further vary depending on the nature of the rogue state leader and the perceived adversary (regional rival instead of U.S. or U.S.-led coalition). At any given time these weapons may be seen as centrally important, as one of several instruments of state power, or as limited or marginal in value.

The Iraqi Shadow on Combating-WMD Efforts

The lessons of Iraq will be debated for many years, but the war and its aftermath already may be affecting proliferation and counterproliferation dynamics in a number of dimensions.

The Role of Force. As a demonstration of American willingness and ability to act decisively to remove a perceived WMD threat, the U.S. military's speedy removal of Saddam's regime could have been expected to induce other rogue states to be more responsive to international concerns regarding their WMD activities. Indeed, this dynamic may have been in play in Libya's renouncement of its WMD programs and Iran's agreement to the United Kingdom–France–Germany nuclear initiative, both within the same year as the Iraq invasion. The durability of the Iraqi insurgency and attendant military and political burdens upon the United States since have become clear. Rogue states such as Iran and North Korea now likely see themselves at less risk of U.S. attack than at any time since President Bush's axis-of-evil speech and, accordingly, are less inclined to accommodate Washington's or international demands on WMD. Indeed, during 2004, Iran backed away from its first agreement with the United Kingdom, France, and Germany to suspend nuclear enrichment activities before reaching a second agreement, the durability of which remains to be seen, while early hopes for the Six-Party Talks on North Korea's nuclear weapons programs remained unfulfilled. Both Iran and North Korea have moved their nuclear weapons programs forward. Lacking a credible threat of force, implicit or explicit, so long as a large portion of U.S. ground forces is committed to Iraq, it is not clear that the United States or broader international community have alternative ways to induce Iran and North Korea to abandon or curtail nuclear weapons-related activities.

Sanctions and Inspections. The failure to find weapons of mass destruction in Iraq will likely fuel the debate over the efficacy of sanctions and inspections. Some argue that while sanctions may not have been a definitive long-term means to prevent Iraqi acquisition of WMD, they did constrain Baghdad's ability to advance its WMD and missile programs in the 1990s. Sanctions served to slow the reconstitution of Iraq's research and development (R&D) and WMD production infrastructure, and this arguably aided the work of inspectors from the United Nations (UN) Special Commission. Some observers also argued that the presence of inspectors from the UN Monitoring, Verification, and Inspections Commission in the period before Operation *Iraqi Freedom* constrained Iraq's ability to mobilize for the production of chemical or biological weapons—in effect denying Iraqi forces an operational capability on the eve of the coalition invasion. Ground truth on this matter may remain elusive, but the argument that sanctions and inspections have been undervalued and in fact were more effective in Iraq than commonly believed may well gain traction.

U.S. Credibility. The failure to find WMD in Iraq could also contribute to a credibility gap when the United States next seeks to focus international attention on or advocate action against those violating treaty commitments or otherwise engaging in threatening proliferation activities. Nations may exploit limitations in U.S. intelligence to shape the posture and response of the international community. Doubts about U.S.-provided information may be grounded in legitimate concerns, or they may be cynically exploited for advantage, as some suspect China of now doing vis-à-vis American claims of a North Korean covert uranium program. Regardless, the United States can expect its claims regarding proliferation threats to be subject to intensive scrutiny and in some cases outright skepticism in the international arena.

Coping with Uncertainty. The question of international credibility is the external manifestation of the fallout from the controversy over prewar intelligence on Iraqi WMD. Internal to the U.S. intelligence and policymaking communities, the principal counterproliferation lesson learned from Iraq should be the need for decisionmakers to accept the inherent limits of WMD intelligence. Policymakers cannot expect more certainty from the Intelligence Community than is possible and must confront the need to frame courses of action based on information that in many, if not most, cases will be deemed insufficient. For its part, the Intelligence Community cannot shy away from making judgments, but the period ahead may see an effort to raise the bar for WMD intelligence by ensuring that hard judgments are supported by hard data. Changes in how the Intelligence Community conducts analysis (for example, by giving analysts more complete information on sources) could instill greater confidence in analytical judgments, even when information is incomplete. But the larger implications of intelligence uncertainty should be clear. First, surprise is likely and a possibility that cannot be eliminated—though minimizing the likelihood of major surprise should be a priority. Second, an activist, forward-leaning strategy to combat WMD places a tremendous burden on intelligence—a burden that available information may not easily bear. Third, proliferators can exploit the public airing of intelligence controversies to enhance denial and deception practices. In turn, this may reinforce belief that strategic ambiguity in WMD programs and capabilities is not only achievable, but also can possibly serve to constrain U.S. decisionmaking or action.

Emerging technologies in the longer term may be able to reduce the uncertainty associated with clandestine WMD programs. In particular, there is significant promise in technologies for persistent intrusive sensing that may provide a close-in and ubiquitous look at activities beyond the capabilities of current sensors.[8] The most interesting possibilities here lie in the exploitation of micro- and nanotechnologies to create extremely small sensors that are intelligent, can swarm, and can observe activities outside the view of unmanned aerial vehicles and satellites.

Technology Is Changing the Nature of the Threat

Many believe that there is no decisive or lasting technological solution to WMD intelligence and that uncertainty will always outweigh certainty. It is through the prism of uncertainty that the United States must examine technological trends and developments that have the potential to transform or substantially alter the nature of the WMD threat.

Nuclear. As nuclear weapons technology and knowledge spread and as denial and deception capabilities become more sophisticated, the potential exists for a new or different model of nuclear proliferation, one in which the amount of fissile material required for entry-level weapon designs is significantly reduced and the facilities and activities required to produce such material are correspondingly smaller and less observable. Under these conditions, it may be possible for many nations to possess a latent capability to produce some number of nuclear weapons over a specified period of time in ways that could be difficult to detect. Increasingly, *latent proliferation* may fit the need of many nations to have access to strategic capabilities without the burdens associated with maintaining large industrial infrastructures or deploying large operational stockpiles. Degrees of latency and response times will vary in this model of proliferation, as nations position themselves in relation to their technical capacity and perceived threats. But whether a nation seeks to preserve the capability to produce a few weapons quickly or many weapons over a longer period (or something in between), the spread of relevant technologies is likely to reduce what constitutes a strategically significant amount of fissile material, the time needed to acquire that amount, and the observability of the associated science and engineering activity.

This potential paradigm of future nuclear proliferation is of great concern, as it could lead to rapid, competitive, "auto-catalytic" nuclear proliferation in volatile regions or in response to geopolitical upsets. It also poses challenges for intelligence and for traditional approaches to nonproliferation that focus on limiting, controlling, or monitoring fissile material and its production. Clearly, if the amount of fissile material required to create a credible nuclear device grows ever smaller, a strategy premised on fissile material control at some point will become obsolete. A better understanding of these issues is needed. How might this model of proliferation take shape, what choices will nuclear aspirants face, and how can the WMD community model the technological and political dynamics in key regions?

Biological. The combating-WMD community still lacks critical information about the biological weapons threat. Even for traditional agents that scientists believed they understood quite well, such as anthrax, there is growing awareness of gaps in the knowledge base. The scientific process to investigate and validate known concerns is lengthy, even though the implications for significant investment

in particular countermeasures are great. Equally, if not more, troubling, there is no process for scientific discovery in place focused on the implications of biotechnology, though the pace of developments in this area is likely to facilitate novel advances in threat capabilities. Increasingly, scientists in the United States and elsewhere in the developed world are demonstrating genetic engineering techniques that eventually will be within the capability of scientists everywhere. The growing diffusion of both advanced techniques in the biological sciences and the means to create sophisticated biotechnology industries is enabling the process. Indeed, the biotechnology industrial complex becomes more global every day, the result of countries making substantial investments to create what they view as a strategically important industry. As this phenomenon advances, these technologies will allow the creation of infrastructures that can support bioweapons programs, as well as increased opportunities for determined terrorists to access the expertise and materials needed to execute biological attacks.

As biotechnology creates more opportunities and a greater array of options for proliferators, what traditionally has been an inherently difficult intelligence target may become even more so, especially if intelligence assessments in the period ahead reflect a greater degree of caution. It will become more challenging to detect and monitor activities that could support proliferation and almost impossible to predict the full range of options available to nations pursuing a biological weapons capability. Even if the United States takes significant steps to improve intelligence capabilities in this area, a high degree of uncertainty seems unavoidable, and any future use of biological weapons almost certainly will come as a surprise. Developing countermeasures under these conditions is a major challenge. Thus, a serious and systematic effort to understand and better prepare for the future biological warfare threat can now be sustained with the national resources being devoted to biodefense.

Chemical. Information on novel or nontraditional agents (NTAs) is becoming more widely available in open sources. While not always factual or completely accurate, this information can enhance the appeal of NTAs to proliferators and may even help advance R&D programs. These agents, some of which are relatively easy to produce and weaponize, may be seen as offering the means to circumvent the chemical weapons arms control regime and may fit well into a model of proliferation that embeds and conceals agent production capability in legitimate civilian activities for later mobilization. This greatly complicates the task of the Intelligence Community, as it is difficult to monitor all legitimate production sites and determine where and when illicit activities may be occurring. If some NTAs require less specialized production equipment than traditional agents, the intelligence signature may be further reduced. For the warfighter, the potential advantages such agents may confer on an adversary underscore the importance of quickly gaining a better understanding of how NTAs

behave and how they can be countered. But the process of understanding, replicating, and developing countermeasures for NTAs is challenging and time consuming.

Emerging WMD-like Technologies. Over the next 20 years, a number of advances in science and technology will have the potential to transform major aspects of how people live—extending human life, reshaping the global economy—and how the world wages war. Devastating new weapons are possible through the application of these scientific and technological advances that rival the lethality of existing weapons of mass destruction. Indeed, the definition of what constitutes a weapon of mass destruction increasingly will be open to revision as these applications take shape. Three technology areas have the greatest potential to yield new kinds of WMD: biotechnology, nanotechnology, and advanced energy sources.

A new generation of biological weapons based on genomic research has the potential to create new capabilities not envisioned or restricted by existing arms control treaties. Examples include:

- Aptamers—strands of nucleic acid that act in a manner similar to antibodies. They bind and block cell receptors responsible for a variety of life-sustaining functions.
- Molecular poisons—nano-sized particles capable of working at the subcellular level and engineered to create specialized effects that could cross the blood-brain barrier, disrupt genetic material, or trigger counterproductive immune system responses.
- Genetic weapons—arms that target specific groups based on genetic characteristics. These weapons may be possible as an offshoot of ongoing research into assessing human health by reading metabolic signatures in human respiration. Preliminary results suggest that this technology could lead to ways of identifying race and ethnicity.
- Binary biological weapons—agents that are either chimera (combining genetic attributes of distinct pathogens); modified genetically to be more virulent, heartier, or resistant to therapy; or require two exposures of different kinds to trigger disease effects. Binary biological weapons would challenge current capabilities to detect, diagnose, and treat victims of an attack.

Nanotechnology can be both an enabler of highly lethal effects (for example, molecular poisons) as well as a discrete form of mass destruction/mass disruption warfare. Current research in nanotechnology includes the development of explosive microdust, an ultra-high-explosive/ultra-incendiary material several times more potent than an equivalent mass of TNT. Visionaries in the field theorize about destructive nanites or "nanobots" programmed to carry out antimateriel or antipersonnel missions. Recent experiments in the United States have demonstrated

that nanosized carbon particles can introduce respiratory distress or death in mammals.[9] Respected scientific associations in Europe also warned of the potentially toxic effect of existing nanoparticle contamination of the biological environment.

Advances in traditional nuclear energy production hold the promise of producing cleaner thermonuclear reactions, perhaps even pure fusion. While potentially a significant source of commercial energy, traditional nuclear research has obvious connections with the development of nuclear weaponry, including advanced nuclear weapons with much smaller yields and far less radiation than existing munitions.[10] Energy released from metastable chemical bonds or metastable atomic nuclei has the potential to produce potent ultra-high-explosive, ultra-incendiary materials. Although these materials will not yield energies greater than nuclear weapons, they may be able to release energies hundreds or thousands of times greater than current chemical high explosives.[11] High-power microwave weapons are in the prototype stage in the United States, and scientists are developing them for their antipersonnel and anti-electronics effects.

Existing technology would support astonishing new means to deliver novel munitions and payloads. Some possibilities include long-distance, ultra-light unmanned aerial and space vehicles, blast wave propulsion systems, and spiral mass accelerators. The common features of these concepts include significant range, precision, and the ability to launch hundreds or thousands of destructive devices at reasonable cost.

Anticipating Emerging Technology Threats. Can the U.S. intelligence enterprise effectively anticipate the range of threats emerging technologies are enabling? Some observers suggest that this challenge is beyond the means of the Intelligence Community alone and requires a more substantial and formal role for the Nation's science and technology (S&T) community. One approach would be to charter this community independently to develop models and assessments of the ways in which emerging technologies may shape the threat environment and prospects for major surprise.

WMD Terrorism: The Nightmare Scenario

If any one concept has taken hold in the last 2 years, it may be the nexus of WMD and terrorism. Experts recognize that jihadist terrorists are seeking such weapons, will not be deterred from using them, and have the potential to wreak catastrophic damage on the United States. This is *the* nightmare scenario, one that concentrates the mind on better understanding the nature of this threat. Among decisionmakers, there appears to be a working assumption that, with respect to terrorists and WMD, "possession = use." This is undoubtedly a prudent assumption, though as decisionmakers think more about the terrorist threat that the United States faces and as they learn more about al Qaeda in particular, there is an opportunity to refine thinking about the specific dimensions of the nexus that defines so many of the worst fears.

Chapter Two

WMD Terrorism

What we've learned continues to validate my deepest concern: that this enemy remains intent on obtaining, and using, catastrophic weapons.

—George Tenet, February 24, 2004

Gauging the Threat: Al Qaeda and Beyond

American intelligence agencies have learned much since September 11, 2001, about al Qaeda's interest in and pursuit of nuclear, biological, chemical, and radiological weapons—so much so that it sheds a sobering light on how little the United States knew before that day. Before September 11, intelligence agencies believed that al Qaeda was focused primarily on simple chemical warfare agents, guided by an overinflated sense of what these weapons could accomplish in achieving mass effects. The United States has since learned that al Qaeda had in fact made a major investment in a range of chemical warfare capabilities, both simple and advanced. Analysis of an al Qaeda document recovered in Afghanistan in 2002 indicates the existence of crude procedures for producing mustard agent, sarin, and VX.[12] In his testimony before the Senate Select Committee on Intelligence in February 2004, former Director of Central Intelligence George Tenet spoke of "a heightened risk of poison attacks" and the possibility of increasingly sophisticated delivery methods and tactics, including improvised chemical weapons that could create significant casualties in a crowded, enclosed area.[13]

A mystery prior to September 11, al Qaeda's biological weapons effort has since been described by senior intelligence officials as sophisticated. In Afghanistan, the group was successful in acquiring the expertise and equipment needed to grow biological agents, including a dedicated laboratory near Kandahar.[14] Anthrax was an area of emphasis, and while U.S. intelligence agencies still lack a comprehensive understanding of this program, the Intelligence Community views this as one of the most immediate terrorist WMD threats that the United States is likely to face.[15] It has come to light, for instance, that some of the 9/11 hijackers made repeated inquiries regarding cropdusters and that

national law enforcement authorities viewed these inquiries as sufficiently serious to ground cropdusters twice nationwide in the period after September 11 and to question more than 3,000 pilots and cropduster owners.

Also, the United States learned more in Afghanistan about al Qaeda's nuclear agenda, which is now described as ambitious in its pursuit of the materials and expertise required to construct a radiological dispersal device and possibly other kinds of nuclear devices. The Intelligence Community believes construction of a dirty bomb is well within al Qaeda capabilities if it can obtain the radiological material. Terrorists likely understand how such a device could be used.[16]

Increasingly, al Qaeda efforts to acquire WMD more closely resemble those of a state rather than those of a typical nonstate actor. Among terror groups pursuing nuclear, chemical, biological, or radiological materials, al Qaeda remains the most advanced and principal concern. Still, it is vitally important to look beyond al Qaeda, as there are two to three dozen other terror organizations believed to be interested in acquiring WMD of some sort, in particular chemical weapons. In fact, their interest may be driven in part not so much by an objective analysis of U.S. vulnerabilities but by the public and open discussions common in the United States about the fears of WMD and the relative ease with which terrorists could mount devastating attacks. Al Qaeda leadership shows evidence of this. According to press accounts, an April 1999 memorandum apparently written by Ayman al-Zawahri comments on al Qaeda's decision to acquire chemical and biological weapons: "despite their extreme danger, we only became aware of them when the enemy drew attention to them by repeatedly expressing concern that they can be produced simply."[17] Especially as the United States improves the ability to defend against the more classical forms of unconventional attack, terrorists increasingly will look to WMD as a way to achieve strategic effects. Along the way, the United States can expect more numerous—and more sophisticated—hoaxes that will command ever-greater response resources.

The challenge for the Intelligence Community is to think broadly and aggressively about the terror organizations that may seek WMD, agents, and materials of interest; possible tactics and delivery methods; and how to anticipate not just the more visible threats but also the "one-off" events that may not conform fully to existing mindsets. Exploring alternative assumptions and mindsets is therefore essential, not only because the threat is dynamic but also because even modest shifts in prevailing paradigms or models of the threat can lead to new and more effective approaches to prevention and defense.

Deterring al Qaeda?

Is there an argument that challenges the assumption that al Qaeda could not be deterred from using a nuclear, biological, chemical, or radiological weapon if it possessed one (or more)? Put differently, must "possession = use," especially for

nuclear weapons? This assumption appears to be strongly held, almost as strongly as the dominant assumption of the pre–September 11 era—that is, terrorist groups lacked both the motivation and means to mount WMD attacks. Positing a contrarian's view of the dominant mindset seems prudent given that many past U.S. proliferation surprises have stemmed from the failure to examine critically established models of the threat.

The totality of what the United States has learned about al Qaeda leaves little doubt that, with respect to chemical and at least noncontagious biological weapons, possession does in fact equate to use. The foiled poison plots in Europe, among much other data, attest to this. So there is every reason to believe that core al Qaeda or affiliated operatives—and not just those prepared to undertake martyrdom missions—would be prepared to use WMD if so ordered. It seems less clear whether this reasoning extends to all individuals or groups associated with al Qaeda. This broader infrastructure of supporters, even if highly active in their support, may nonetheless be less willing to execute WMD attacks, either for practical reasons (the risks are deemed too high) or for reasons of conscience or belief (based on a different reading of the Koran). This reluctance, if it exists, seems most likely to be operative with respect to nuclear weapons. And if it exists, then some elements of the al Qaeda universe—black market technical consultants, financiers and funders, affiliated organizations, and others—may be subject to deterrence. How to deter such actors successfully is no simple task, but doing so would center on signaling through multiple channels (for example, policies, laws, international consensus, information operations, operational actions) that the United States and international community will hold accountable individuals as well as the leaders of terror organizations known or credibly suspected to be linked to terrorist WMD use.

Are there potential points of deterrence leverage that can be directed at the al Qaeda leadership? Here some exploration is necessary of how the use of nuclear weapons may or may not conform to what the United States knows about al Qaeda's operational code. Nuclear use would appear consistent with important aspects of that operational code, including the emphasis on spectacular attacks, the patience shown in preparing complex operations, and the demonstrated use of "bombs, bombs, and bombs" in its major operations. On the other hand, the use of a nuclear weapon might appear inconsistent with al Qaeda's tendency to stick with what it does well and the possibility that, to date anyway, plots involving WMD may not have been designed to inflict truly mass casualties.

Looking beyond operational code, it is worth exploring the question of whether the use of a nuclear device would be seen by Osama bin Laden as advancing or hindering his strategic goals, including the establishment of a new Caliphate. He may see nuclear use as aiding his cause by demonstrating Islamic power, rallying support on the Islamic street, inflicting great damage on the United

States, disrupting the war on terrorism, and provoking potentially disproportionate U.S. responses. Conversely, he might calculate that nuclear use could harm the cause if it was widely viewed as too extreme an attack that would trigger a backlash in the Islamic world and a more united international front against jihadist terrorism. It is also possible that once in possession of one or more nuclear devices, bin Laden could decide to preserve them as an instrument of leverage, blackmail, and even deterrence. Such a strategy would require demonstrating possession, avoiding preemption, and expressing a willingness to exercise some restraint. How might the United States enhance the prospects for *self*-deterrence? Declarations by Islamic governments, clerics, and leaders forcefully condemning WMD use could help, though these would need to be part of a larger set of actions designed to shape bin Laden's overall risk-reward calculus. At the same time, the United States should prepare for the possibility of al Qaeda blackmail strategies.

Searching for possible deterrent leverage against al Qaeda may seem a case of hoping against fear, but the United States simply does not know whether nuclear weapons represent a special capability for Osama bin Laden that may in fact be subject to some degree of restraint or unique consideration. Prudence dictates that decisionmakers not accept this as a planning assumption. But reason suggests that if some possibility of deterrence exists, every effort should be made to exploit it through measures directed at both those who support al Qaeda and the leadership itself.

Terror Campaigns

Terrorists think and operate in terms of campaigns—an orchestrated series of violent acts intended to advance a strategic objective. It is hard to identify acts of terror that are not somehow part of a campaign, whether the timespan of that campaign is short or long. By contrast, crisis and consequence managers in the United States have tended to think in terms of single events. Responding effectively to single events is daunting enough, but responders have barely begun to think concretely about the challenges posed by multiple events. Yet this challenge must be faced in light of the risks and opportunities it presents.

The risks seem clear: a greater chance that policymakers and the responder community will make mistakes that exacerbate rather than ease fear and panic, impair response capability, or undermine the legitimacy of government at all levels. The opportunities presented by terror campaigns are principally those to learn and adapt, gain the initiative, and exploit mistakes that terrorists might make. How these possibilities play out will be shaped by a number of factors, such as the speed and degree of simultaneity of attacks and the degree of clarity about the who, what, when, where, and why of the attacks. At early points when uncertainty on these questions is greatest, risks are likely to dominate. As terrorist capabilities and intentions become

clearer, the prospects for an adaptive response should increase. It is important they do so; life under a prolonged state of emergency will undoubtedly create profound stresses in American society.

If decisionmakers assume prudently that after an initial biological or chemical attack terrorists are *reloading* for follow-on attacks, then it is equally prudent to expect the demands on consequence management to grow commensurately—perhaps *only* cumulatively at the state and local level but probably exponentially at the national level as national leaders confront an overwhelming volume of day-after demands.[18] At either level, the response to a biological terror campaign in particular will be resource-intensive in ways not fully understood today. Assistance from beyond U.S. borders almost certainly will be critical. The public information strategies necessary in the face of a terror campaign will be far more challenging as well. All the keys to public information success will be more difficult to achieve when the threat is characterized by multiple events, perhaps with a variety of agents, perhaps geographically dispersed.[19]

What are the possible elements of a strategy directed at countering and preparing for a biological terror campaign? In the context of an extended campaign, the United States must demonstrate its ability to adapt and steadily improve responses to multiple attacks, particularly with respect to public health, risk communication, and the maintenance of social order. Strengthening national resilience is also an important, if less tangible, imperative here, to include the psychosocial factors relevant to coping with prolonged stress and the ability to respond to incidents both efficiently and compassionately. Lessons from the British and Israeli experiences may be helpful in this regard. Just as important is attacking the adversary's ability to adapt (for example, by denying him information, funding, training capacity, and strategic partners). This may be a more effective strategy against a terrorist organization than a true terrorist network, which is likely to command greater resources and exhibit greater resilience. Additionally, certain topics that generally have been taboo need to be discussed seriously. Confronting issues such as quarantine, triage, and martial law may not be avoidable, however uncomfortable this may be.

Chapter Three

Threat Response

Proliferation events are constantly shaping and reshaping the combating-WMD agenda. As decisionmakers confront a dynamic proliferation environment, national policy must respond with agility and innovation. Responding effectively to both the risks and the opportunities that present themselves requires overcoming conceptual and organizational stovepipes and marshalling all aspects of national power and international influence. The pillars of the national combating-WMD strategy are important guidelines for organizing thinking, but the template for action increasingly cuts across these categories. The Proliferation Security Initiative is a good example. As this initiative demonstrates, the United States cannot go it alone. Allies and international institutions are indispensable, whether for strengthening the nonproliferation regime, deepening cooperation on interdiction, or pursuing rollback in specific countries. Equally indispensable is sensible investment to acquire the knowledge, skills, and technologies that will allow the United States to stay ahead of the threat.

Challenges of International Cooperation

Longstanding weaknesses in the international nonproliferation regime now demand serious attention. In light of the A.Q. Khan revelations, the continuing challenges from North Korea and Iran, and the likely consequences of WMD terrorism, gaps in the policy and legal framework for nonproliferation pose an unacceptable risk. The President's speech of February 11, 2004, at the National Defense University took direct aim at a number of these problems, particularly in the area of nuclear control mechanisms.[20]

Criminalizing WMD Proliferation. The President formally proposed what many observers have long called for—the criminalization by all nations of proliferation and the enactment of strict export control laws. Too few states have domestic laws prohibiting proliferation; those laws that do exist are not reliably enforced. This is part of the larger effort to delegitimize and stigmatize proliferation, and with the passage of United Nations Security Council Resolution 1540 (2004) on April 28, 2004, the international community now is on record calling on states to refrain from supporting nonstate actors in their pursuit of WMD and to adopt and enforce domestic laws and controls toward this end.[21]

Expanding Threat Reduction. The President also called for expanding the scope of international threat reduction efforts as one means to reduce the availability of materials that could support WMD acquisition efforts by state or nonstate actors. The functional scope of these activities must extend beyond the former Soviet Union, as there is a growing need to apply this model to other countries and regions, such as Iraq, Libya, and Southwest Asia. As more nations require this type of assistance, more donor states are required to underwrite the cost. The President called for more nations to contribute to the Group of Eight (G–8) Global Partnership against Catastrophic Terrorism. At the June 2004 G–8 summit at Sea Island, Georgia, seven new nations agreed to contribute funds to this effort.[22]

This proposal responds to some of the concerns expressed by serious commentators about the priority and resources attached to global threat reduction activities. Unsecured nuclear weapons material anywhere is a threat to all nations.[23] Getting this material under secure control must be a priority—and nowhere more so than in Russia. Even as the United States seeks to broaden the reach of the threat reduction enterprise, decisionmakers cannot lose sight of the overriding importance of securing Russia's vast arsenals of nuclear weapons and materials. In the post-9/11 world, the U.S. stake in this is dramatically increased. Yet nearly 3 years on, Russia's nuclear weapons and weapons materials are still no more than 50 percent secure. In 2003, the Russian government, in conjunction with U.S. Cooperative Threat Reduction programs, completed comprehensive security and accounting upgrades for an additional 35 tons of potentially vulnerable weapons-usable material.

By the Department of Energy's own accounting, security upgrade work has not even begun on more than 100 metric tons of plutonium and highly enriched uranium. While the pace of work has accelerated somewhat, at 35 tons per year, it will take about 13 years to complete the job. To be fair, it is important to note that 70 percent of the sites with weapons or weapons material now have upgrades in place, so progress is being made. This still leaves a significant security gap that some observers believe must be addressed at the highest levels with a greater sense of urgency, especially if bureaucratic battles over taxes, liability, site access, and other issues are to be overcome. Placing the fight against proliferation and catastrophic terrorism at the center of the U.S.-Russia security relationship, supported by closer presidential involvement, may be the only way to complete the threat reduction mission in Russia in a reasonable period of time.

Unity of effort in threat reduction is an additional concern. If WMD in the hands of terrorists is the single greatest threat the United States faces, it is possible that more centralized authority may be required to ensure that national resources are effectively marshaled. Today, several Cabinet departments manage major threat reduction activities, but no single senior official has the responsibility to coordinate

government activities, establish goals and priorities, direct resources, and measure progress. Perhaps designating a senior official (for example, a Deputy National Security Advisor) to coordinate government actions to deny terrorists access to weapons of mass destruction is warranted in light of the current threat environment.

Closing NPT Loopholes. Addressing the most important concern regarding the availability of WMD materials, the President's February 2004 speech proposed reforms to the NPT designed to make it harder for proliferators to acquire weapons grade nuclear materials under the cover of peaceful nuclear energy programs. Stating "enrichment and reprocessing are not necessary for nations seeking to harness nuclear energy," the President called for states pursuing civilian nuclear power to renounce enrichment and reprocessing in exchange for the reliable supply of nuclear fuel at reasonable cost.[24] Any nation not already possessing full-scale, functioning enrichment and reprocessing plants would not be allowed to acquire the means to develop them through legitimate trade with the 40 nations of the Nuclear Suppliers Group (NSG). This will make it more difficult for states intent on developing nuclear weapons to "cynically manipulate the NPT to acquire the material and information necessary for manufacturing illegal weapons."[25] And only states that have signed the International Atomic Energy Agency (IAEA) Additional Protocol would be allowed to import equipment from NSG nations for their civilian nuclear programs.[26]

In seeking to close an important loophole in the treaty, U.S. policy now acknowledges the current crisis in the nuclear control regime wrought by the behavior of states such as North Korea and Iran—a crisis that threatens its very legitimacy. While the President's proposal carries the risk of being seen as perpetuating (or deepening) the discriminatory nature of the NPT, it also recognizes the need for a sharper focus on restricting the production of fissile material as the center of gravity of the nuclear proliferation problem. In essence, the President has proposed to refashion the central bargain of the NPT—both to prevent the next Iran and to better align the treaty with post-9/11 realities.

With respect to the NPT, it is not an exaggeration to state that the United States is at an historical juncture that requires a fresh look and decisive action. How hard the United States will push this admittedly ambitious set of treaty reforms remains to be seen.[27] Post-Iraq, though, the President's remarks are at least a strong signal to the Nation and the world that the United States remains committed to nonproliferation and that American policy seeks an effective balance between traditional instruments of prevention (though strengthened significantly) and means that rely more heavily on the threat or use of force.

Advancing the Proliferation Security Initiative. PSI may be described as multilateralism with teeth. A growing coalition of like-minded nations is now planning, exercising, and executing interdiction operations aimed at disrupting the traffic in

WMD- and missile-related materials and technologies. The original 11 PSI partners have now grown to a group of nearly 30 participating and 60 supporting states. As PSI continues to expand its membership and activities, it is not only complicating the efforts of proliferators but also strengthening nonproliferation norms, providing a concrete means of security cooperation with allies and friends, and demonstrating that coordinated actions among like-minded states can be achieved without having to create new organizations or bureaucracies.

Progress has been made along several fronts in establishing the global network of PSI partnerships. Nations have committed to a statement of interdiction principles. Guidelines and processes are in place for the collection, analysis, and sharing of intelligence. New shipboarding agreements are extending available legal authorities.[28] Operational experts from participating nations are meeting regularly to develop improved intelligence, military, and law enforcement capabilities to support interdiction activities. These capabilities are being refined in a growing exercise program; nine maritime, air, and ground exercises have been completed to date, and nations have agreed to a systematic exercise program for 2005 based on scenarios that reflect trends of concern in WMD trafficking.

In his speech at the National Defense University, President Bush proposed broadening the work of PSI to address the problems highlighted by the revelations of the A.Q. Khan nuclear black market:

> I propose that the work of the Proliferation Security Initiative be expanded to address more than shipments and transfers. Building on the tools we've developed to fight terrorists, we can take direct action against proliferation networks. We need greater cooperation not just among intelligence and military services, but in law enforcement, as well. PSI participants and other willing nations should use the Interpol and all other means to bring to justice those who traffic in deadly weapons, to shut down their labs, to seize their materials, to freeze their assets.[29]

Moving forward, the goal is to extend both the functional reach of the PSI framework and the breadth of international participation. In tandem with other elements of the U.S. nonproliferation agenda, the solid diplomatic and operational foundation of the PSI provides a basis for making progress in strengthening prevention efforts.

Rollback of State WMD Programs

The idea of rollback has been part of the combating-WMD vocabulary since at least the Indian nuclear test of 1974. While no longer a realistic policy choice on the Indian subcontinent, where nuclear weapons appear to have taken hold, and not a term officially embraced by the Bush administration, rollback aptly captures what U.S. policy has sought to achieve in Libya, North Korea, and Iran. Each of these

cases is unique, of course, which means that the United States must guard against an overly deterministic concept of rollback in order to ensure that tailored rollback strategies can be developed.

Libya. Encouraging Libya to renounce both terrorism and WMD aspirations has been a longstanding U.S. objective. As Colonel Muammar Qadhafi intensified his efforts in recent years to "come in from the cold," the United States has made clear the central importance of the WMD issue in any process of normalization. Although Qadhafi may have believed he could achieve normalized relations and a lifting of U.S. sanctions while maintaining clandestine WMD programs, this position became increasingly untenable as he witnessed the U.S. reaction to the events of September 11, 2001. The campaigns in Afghanistan and Iraq demonstrated that the United States was prepared to marshal significant force to eliminate terror and WMD threats posed by rogue states and probably led him to conclude that even he could become a target of U.S. military action. The seizure of the *BBC China* in October 2003 demonstrated that his nuclear program was no longer clandestine and that his procurement effort could be penetrated and shut down. According to some accounts provided by Libyan officials, the capture of Saddam Hussein in December 2003 underscored to Qadhafi the personal risks associated with rogue status. In considering these factors, one can see how the post-9/11 environment shaped Qadhafi's calculus of the benefits and risks in pursuing WMD and led him openly to renounce WMD and accept comprehensive disarmament rather than attempt to maintain covert programs.

In this sense, WMD became a source of insecurity to Qadhafi and an impediment to his principal goal of reintegrating with the international community in order to address Libya's growing economic and social problems. By tying the removal of sanctions and the prospects for political and economic rehabilitation to Libya's WMD efforts and by demonstrating a credible threat of military action, U.S. policy presented Qadhafi a powerful set of incentives to disarm. In this carrot-and-stick dynamic, it is important not to underestimate the power of the carrot—that is, the promise of significant benefits. American and UN economic sanctions beginning in the early 1990s hit Libya hard, and the regime's poor economic management compounded the effects. Libyan oil production had fallen by more than half, with lost revenues estimated by the World Bank at $18 billion.[30] Plagued by outdated technology and mismanagement, the nation's oil infrastructure suffered, and the rising expectations of an increasingly young population were creating conditions that demanded a serious program of economic reform critically dependent on opening the Libyan economy to the outside world.

The circumstances of the Libyan case are unique, but the basic logic of rollback is evident: Presented with the right mix of pressures and promised benefits, the motivations and behavior of even rogue regimes regarding weapons of

mass destruction can change. It is this logic that informs current promotion of the "Libyan model" of disarmament to countries such as North Korea and Iran. But how viable *is* this model?

North Korea. In principle, this same logic of rollback would appear to fit the North Korean case. The basis for any agreement with North Korea is essentially the same: significant economic, political, and security benefits in exchange for comprehensive disarmament (though in North Korea's case limited to nuclear). North Korea, in far more dire economic straits than Libya, would seem to have significant incentives to reach an agreement. But in reality, circumstances in Northeast Asia are far different. Unlike Libya, North Korea has closed the nuclear fuel cycle (for plutonium) and may be a de facto nuclear weapon state based on activities before the 1994 Framework Agreement and since its withdrawal from the NPT in January 2003. Moreover, the United States believes that North Korea is pursuing a clandestine uranium enrichment capability whose scope, maturity, and location are essentially unknown. Pyongyang's failure to acknowledge this program remains an important impediment to progress. Here, rollback is a far more ambitious and complex proposition, further complicated by the regime's mercurial and unpredictable behavior and significant gaps in U.S. knowledge of North Korean intentions and capabilities.

While Qadhafi's intentions ultimately became quite clear, the United States really does not know whether Pyongyang is prepared to give up its entire nuclear weapons enterprise and submit to a process of complete, verifiable, and irreversible disarmament. The possibility cannot be ruled out that the regime's objective is to achieve normalized relations while retaining a covert stockpile or weapons production capacity. Certainly, the regime has demonstrated through word and deed how powerful a lever they view the possession of nuclear weapons and weapons production potential, and Kim Jong Il may well see nuclear weapons as key to regime survival. The intelligence challenges that North Korea continues to pose for the West may lead him to believe that a clandestine nuclear program can in fact be maintained.

Testing the North's intentions definitively is the objective of the ongoing Six-Party Talks, which by design seek to place the issue of North Korean nuclear proliferation in the broader context of East Asian regional security. A multilateral diplomatic approach is seen as increasing the pressure on North Korea to disarm and enhancing the prospects for successfully implementing any agreement. By engaging China directly in the negotiating process, the United States gives Beijing a significant stake in a successful outcome and leverages its longstanding relationship with (and knowledge of) Pyongyang. Administration officials acknowledge the critical role of China, and the U.S. approach to negotiations appears to depend heavily on China's sense of self-interest to positively influence North Korea's attitude and behavior.

Can this brand of diplomacy achieve rollback in North Korea? Realistically, there are few attractive alternatives, and policy options that would adopt a more confrontational approach toward North Korea are not likely to succeed without the active participation of the regional actors that the United States brought into the negotiating process. While all parties to the talks undoubtedly are frustrated with North Korea's posture, it is doubtful that U.S. regional allies are prepared to give up on diplomacy any time soon; all concerned have too much at stake in a peaceful resolution and see the risks associated with confrontation as high. The payoffs for North Korea would be substantial, providing political legitimacy, enhanced security, and the means to revive an utterly failed economy. Viewed through the prism of cold rationality, these payoffs appear compelling. Nonetheless, there clearly are countervailing pressures. Given the value the North Koreans appear to place on nuclear capability, the progress they appear to have made, and their ability to conceal proscribed activities, an important practical question is whether the United States may be compelled to consider outcomes short of "complete, verifiable, and irreversible disarmament" as the United States defines this term. Put differently, what degree of ambiguity, if any, is the United States willing to accept in North Korea's nuclear capabilities?[31]

Iran. The case of Iran is different still. Compared to Libya, Iran is much further along in assembling the infrastructure required to enrich uranium and reprocess plutonium on a large scale. It appears committed to closing both these fuel cycles and achieving an independent capability to produce fissile material suitable for making weapons. It claims the right under the NPT to do so and has made a huge investment over the last two decades to advance this effort. Compared to North Korea, Iran seems to take a less instrumental view of nuclear weapons; that is, they are not fundamentally a bargaining chip but rather are central to the regime's ambitions for regional influence, the requirements of deterrence, and safeguarding the Islamic revolution. Moreover, while it faces significant economic challenges, Iran's economic vulnerability is far less acute, given its indigenous energy resources and robust international trading relations. At the same time, the international community does not believe that Iran possesses nuclear weapons. Iran remains a member of the NPT and to date has worked within the IAEA framework to attempt to resolve compliance issues.

Given these conditions for Iran—a highly motivated, committed, and combative proliferator not facing dire economic circumstances—is there a credible rollback strategy premised on some achievable set of mutual benefits? The diplomatic track, while far from exhausted, has not yielded a satisfactory outcome to date. Led by European allies (France, Germany, and the United Kingdom), this effort has focused on getting Iran to suspend critical activities such as uranium enrichment in exchange for the supply of enriched uranium suitable to fuel power

reactors and economic incentives. Tehran does not view this as a compelling trade. Is there a more attractive bargain to be made with Iran, one that gives them a sufficiently powerful incentive to reconsider the nuclear path? There appears to be little official thinking about this, and, admittedly, it is difficult to map the contours of such a bargain. What can Iran be offered that will be of commensurate strategic value to the possession of a nuclear capability? What combination of political, security, and economic benefits could induce it to forego the bomb?[32] Would such an approach entail a broader strategy of reconciliation and engagement with Iran that addresses the full set of regional security issues, to include other nuclear powers in the Middle East and South Asia, terrorism, and the future of Iraq? Given that the United States does not even maintain diplomatic relations with Iran, the development of such a strategy would represent a major departure from U.S. policy hitherto, though the prospect of direct engagement with the United States is a "carrot" worth considering.

Accordingly, policy is increasingly characterized by an *active denial* strategy aimed at slowing and disrupting the Iranian program. Through the IAEA process and a variety of interdiction activities, the goal is to force Iran to bring more elements of its program under safeguards and prevent outside assistance from reaching the program.[33] If successful, such a strategy would complicate, make more costly, and delay Iran's acquisition of a weapons capability. Conceivably, these problems could influence a decision by the Iranian leadership on whether to take the final steps to manufacture weapons. Conceivably, the delay imposed by a denial strategy could be long enough to allow a process of internal political change to alter the nature of the Iranian regime and its basic security outlook.

Behind the denial strategy is the threat of punitive action. Pressure is growing on the IAEA to refer this matter to the UN Security Council, where Iran would come into direct confrontation with the United States and the threat of sanctions would become manifest. Beyond this, recent statements by U.S. officials have intentionally not ruled out the use of force to prevent Iran from going nuclear. Statements by Israeli officials have been less ambiguous. Threats of military action may not compel Iran to give up the bomb, but they could create internal pressures to consider stopping short of manufacturing weapons and developing an operational stockpile. Keeping Iran at threshold status may not sound like victory and may not accommodate everyone's view of rollback, but in the end—short of preventive war to keep Iran from going nuclear—it may turn out to be the least bad outcome. Decisionmakers should be prepared for that possibility, even as the United States pursues more attractive solutions.

Implementing the National Biodefense Strategy

National biodefense strategy is now embodied in *Biodefense for the 21st Century*, a Presidential directive that provides a comprehensive framework for threat awareness, prevention and protection, surveillance and detection, and response and recovery.[34] This directive is the result of a comprehensive end-to-end biodefense assessment led by the Homeland Security Council. Building on inputs from a wide range of departments and agencies, this assessment considered current investments, programs, and activities; the capacity of Federal, state, and local infrastructures to mobilize and absorb additional resources; current technology; and the benefits likely to be achieved through incremental efforts to redress vulnerabilities. The assessment identified the following high priority areas requiring *immediate* action to correct critical shortfalls:

- attack warning and characterization
- mass casualty care
- medical countermeasure development
- response planning
- biological weapons intelligence and scientific knowledge.

The following were found to require *urgent* action to correct vulnerabilities:

- attribution
- decontamination
- critical infrastructure and facility protection
- biological warfare net assessment
- disruption and interdiction.

In addition to the Presidential directive, the end-to-end biodefense assessment was successful in inserting in the fiscal year 2005 (FY05) President's budget some discrete programmatic plus-ups: $568 million for food and agriculture defense, $274 million for enhanced biosurveillance, and $20 million for mass casualty care planning. Table 1 indicates lead agencies for key biodefense focus areas.

Several of these areas are the focus of growing science-based activities at the Department of Homeland Security (DHS). Threat awareness is of particular importance, as it provides the baseline for the development of countermeasures and response plans. Awareness of current and future risks encompasses threat characterization and vulnerability assessments, knowledge discovery and dissemination, and forensics and attribution, with the overarching goal of integrating science-based assessments with intelligence analysis to create actionable and timely information for end-users.

Threat characterization that can provide genuine insight into adversary capabilities and likely courses of action is clearly a *force multiplier* for homeland security. Threat characterization is achieved through laboratory analysis, science-based intelligence assessments, and vulnerability assessments of infrastructure and countermeasures. As these capabilities improve, the goal is to prioritize the range of plausible threats, taking into account the sophistication required to execute attacks and the likely consequences, thereby informing policy, acquisition, and response-related decisions across the homeland security interagency community. In the biodefense area, the DHS Biological Threat Characterization Program has supported acquisition decisions in the BioShield program managed by the Department of Health and Human Services, initiated a systematic interagency risk analysis process, and supported the Strategic National Stockpile.

Table 1. Key Biodefense Focus Areas and Lead Agencies

Focus Area	***Interagency Lead***
Threat Awareness	
BW–related intelligence	Intelligence Community
Assessments	Homeland Security
Anticipation of future threats	Health and Human Services
Prevention and Protection	
Proactive—domestic	Justice
Proactive—international	State, Defense, Intelligence Community
Critical infrastructure protection	Homeland Security
Surveillance and Detection	
Attack warning	Homeland Security
Attribution	Homeland Security
Response and Recovery	
Planning	Homeland Security
Mass casualty care	Health and Human Services
Medical countermeasures	Health and Human Services
Decontamination	Environmental Protection Agency

In the area of knowledge discovery and dissemination, the DHS Biodefense Knowledge Program focuses on analysis and information management. This program has established the Biodefense Knowledge Center, which is an operational hub for enabling communication and collaboration within the homeland security community. The center will apply advanced information analysis tools originally

developed for the Intelligence Community in the areas of knowledge services, modeling and simulation, situational awareness, and accelerated research and development.

The DHS National Bioforensics Program has established the Nation's first dedicated bioforensic laboratory. The interim National Biodefense Analysis and Countermeasures Center (NBACC) is supporting ongoing Federal Bureau of Investigation (FBI) and other law enforcement investigations. The NBACC mission is to provide an integrated and responsive biosecurity enterprise for the homeland security, law enforcement, medical, and veterinary communities. Its specific goals are to:

- understand classical, engineered, and emerging biological terrorism threats
- develop deployable technologies and systems in partnership with operational end-users to protect populations and agriculture from bioterrorism
- provide the scientific basis and operational capability to prevent technology surprise, detect events rapidly, respond effectively, and attribute use.

A state-of-the-art facility will be built at Fort Detrick, Maryland, to provide modern, secure Biosafety Level 2, 3, and 4 capabilities. Jointly staffed by DHS and the FBI, this facility will be capable of performing operational analysis with chain of custody and surge capacity using validated methodologies supported by a reference repository. To support threat characterization and vulnerability assessments, the NBACC facility will have capabilities for specialized aerobiology, animal testing, and environmental sensor testing. The Fort Detrick facility will be part of a larger NBACC integrated biosecurity enterprise that will include Lawrence Livermore National Laboratory, Sandia National Laboratories, and Plum Island Animal Disease Center.

Developing a National R&D Strategy

The National Strategy to Combat Weapons of Mass Destruction notes the critical need for cutting-edge technology to support the spectrum of counter-WMD civilian and military missions. While the number of departments and agencies engaged in relevant research and development has grown substantially in recent years (and in particular since September 11), these activities lack strategic direction and coordination. Indeed, at no point in the last decade has there been an effort to assess comprehensively the range of ongoing R&D programs. The National Security Council (NSC) established the Counterproliferation Technology Coordination Committee (CTCC) in 2004 to improve interagency coordination of these activities. Co-chaired by the NSC, the Homeland Security Council (HSC), and White House Office of Science and Technology Policy, the CTCC has a twofold mission: to identify gaps

and overlaps in existing programs and to develop a 5-year comprehensive, national-level R&D investment strategy. The immediate goal of the CTCC is to direct funding in the fiscal year budget toward filling important S&T or R&D gaps.

There are a number of important challenges. It is noteworthy that few Cabinet departments that perform or fund R&D actually prepare 5-year plans, despite the level of resources being expended. The Departments of Defense and Homeland Security are exceptions. Not surprisingly, the lack of overarching departmental investment plans complicates the effort to assess and rationalize the full scope of government R&D activities and to develop a national-level program plan. One possibility is to formalize the requirement for 5-year R&D planning; another is to establish a special national funding activity for combating-WMD research and development, perhaps akin to the General Defense Intelligence Program.

Another area requiring attention is the Nation's physical, analytical, and intellectual infrastructure supporting the combating-WMD mission. Across the chemical, biological, radiological, and nuclear (CBRN) spectrum, there are significant shortfalls. It has become difficult to attract students to research in the nuclear and radiological disciplines, and organizations such as the Armed Forces Radiobiology Research Institute have been underfunded for years. In the chemical defense arena, there is a recognized need for a specialized facility to research nontraditional agents. There is an acute need to modernize and expand the technical infrastructure supporting biodefense. At Fort Detrick, Maryland, where the U.S. Army Medical Research Institute of Infectious Diseases performs the lion's share of DOD research related to medical countermeasures, the physical plant is aging (as is the workforce), conditions are increasingly crowded, and budgets have been flat at best. DOD is developing plans to recapitalize this and related facilities, and the national R&D strategy being developed will underscore the vital importance of this effort.

Accelerating the lab-to-field transition for new technologies remains a challenge. Much work needs to be done to master the basic science underpinning advanced technology solutions for combating WMD. But compared to the investment in basic science, the resources being devoted to early and advanced development of systems are too low. Predictably, this has slowed the process of bringing new products to the field. Any number of technology areas would be good candidates for spiral development. A good example is detection of improvised nuclear devices and shielded nuclear materials, a capability that currently is quite limited despite the Nation's extensive experience with nuclear weapons. Technologies can be developed to provide for an improved capability, but it requires substantial investment and rigorous exploration of technology alternatives.[35] Given the stakes, the situation warrants an intensive national-level effort.

Chapter Four

Challenges for Defense Strategy and Planning

In many ways, the challenge for combating-WMD defense planning is no different than the challenge facing other communities in the Department of Defense: how to navigate a highly dynamic planning environment characterized by shifting priorities, new analytic frameworks, competitive resource allocation, and the emergence of new technologies. Much of the new (and still evolving) infrastructure for defense planning is designed to better equip DOD to manage uncertainty in the security environment. The need to bound and account for uncertainty is the fundamental premise behind the shift toward capabilities-based defense planning. In turn, an essential test for the combating-WMD community is to frame its mission and requirements in terms consistent with senior leader conception of capabilities-based planning. Failing this, the task of institutionalizing new missions (such as WMD elimination), filling gaps in defensive and offensive capabilities, integrating new technology solutions, and meeting the specific needs of the combatant commands will be all the more difficult.

Capabilities-Based Planning

Capabilities-based planning (CBP) does not represent as sharp a break with past planning frameworks as is sometimes portrayed. Threats must still be considered; otherwise, deliberate planning becomes little more than a checklist function, and force sizing becomes near impossible. But CBP accounts for far more variability in the threat than in the Cold War or immediate post–Cold War period. For most of the 1990s, DOD refined in great detail just two major theater warfare contingencies. Today, the emphasis is on developing a far broader set of possible scenarios as the basis for planning, force sizing, and investment. The goal is to field a force capable of responding to a diverse range of plausible threats. DOD assumes some risk in that forces may not be tailored for any one specific contingency.

DOD is building an analytical and resource allocation infrastructure around this concept, which defines the arena in which the combating-WMD community must play. Senior leaders may be well aware of the WMD problem, but this alone hardly assures that combating-WMD requirements will receive priority attention. The

challenge is how to compete for the marginal defense dollar in a highly competitive resource allocation environment. If there were obvious silver bullets for counterproliferation, the task would be easier. But there are no cheap or easy solutions, and what constitutes the most effective integrated counterproliferation program is not self-evident. Given other critical defense needs and limited resources, the combating-WMD community's claim on defense resources is going to be subject to rigorous cost-benefit analysis. This means bounding and prioritizing the threat, assessing alternatives and associated risks, and helping senior leaders direct resources to the most important challenges. In short, the combating-WMD community needs a systematic approach to defense analysis consistent with CBP that will allow it to compete effectively inside the resource allocation process.

A systematic analytic approach should address at least these five areas:

Scenario discipline. While the combating-WMD community has aggressively and creatively worked to define the WMD "scenario space" over the years, these scenarios have not always provided a strong basis for operational and requirements analysis. Today, defense planning is coalescing around a core set of well-defined baseline scenarios that have sufficient variability to account for a wide range of WMD threat possibilities. Rather than develop and maintain a unique set of planning scenarios, it makes more sense for the combating-WMD community to work within the framework of the Defense Planning Scenarios and to ensure that WMD considerations are properly addressed.

Concepts of operations (CONOPs) and architectures. CONOPs not only provide the means by which technology is leveraged; in some circumstances, they also are the principal means for countering WMD threats on the battlefield. In other words, effective CONOPs are as important as equipment and new technology, and recommendations for combating-WMD investment need to be embedded in a concept of operations. The Joint Capabilities Integration and Development System process emphasizes the development of capability architectures to drive operations and define requirements.

Modeling and simulation. In the past, "gold standard" planning models such as TACWAR (Tactical Warfare) did not effectively integrate chemical and biological warfare and defense considerations. Today, the capabilities-based framework is increasingly open to a wider family of modeling and simulation tools that can explore difficult operational problems verifiably and transparently. The combating-WMD community has an opportunity to shape the landscape here.

Data standardization and basic testing. Historically, analyses of WMD impact on warfighting have produced widely varying results. The reason is the wide variance in assumptions and data inputs and insufficient transparency in methodologies to explain results. It will be difficult for the combating-WMD community to make its case in a sustained way without exercising analytic rigor

and transparency with respect to data and methodology. This includes basic phenomenology—that is, being able to explain with validated test or analytic data how threat agents will behave and the effects they will cause. This area warrants further investment.

Risk metrics. Weighing risk under conditions of uncertainty is in many ways the central task of capabilities-based planning. Senior leaders will always be looking for risk metrics to support tradeoffs and prioritization, even when such metrics are difficult to produce in reliable, quantifiable terms. The combating-WMD community needs to tackle this challenge analytically and contribute to the development of usable risk metrics. The community is making progress in some areas, such as defining at-risk populations and estimating casualties in attacks involving infectious biological threat agents.

Improving the Defensive and Offensive Toolkits

Combating-WMD capabilities across the board have improved over the last decade. Compared to the force that fought in Operation *Desert Storm*, today's force is unquestionably better equipped and trained to cope with WMD operational threats. But important capability gaps still remain for both the defense and the offense, and these gaps frame the near-term agenda for programming and technology development.

CBRN Defense. The 2004 Strategic Planning Guidance (SPG) directs that additional resources be allocated to CBRN defense to reduce risk by:

- closing identified capability gaps
- funding new missions for WMD interdiction and elimination
- recapitalizing CBRN defense technical infrastructure.

Specific funding options for the FY06–11 period emerged as part of the Enhanced Planning Process (EPP). Using a methodology approved by the Joint Requirements Oversight Council that integrates the Defense Planning Scenarios, the EPP study for CBRN Defense determined that an additional $5.1 billion is required over this period to meet the SPG risk reduction guidance.[36] Of this amount, $2 billion would go to procurement, and $1.6 billion would go to research, development, test, and evaluation to support the development of nine new capabilities and research into emerging chemical and biological threats. The remaining $1.5 billion would support needed improvements to the existing infrastructure for test and evaluation and modeling and simulation. Current infrastructure capabilities are simply inadequate to the task of performing state-of-the-art threat characterization and developing advanced countermeasures. For testing in particular, the CBRN defense community remains heavily reliant on simulants

and aging instrumentation and methodologies. Without additional investment, it will take longer to meet future requirements, and it will be more difficult to attract and retain high-quality personnel. To support new Defense missions for WMD interdiction and elimination, the EPP study estimated $242 million would be required in the FY06–11 period.

In parallel, the science and technology community is beginning to reexamine some of its strategies. At least some members of this community believe that expectations about what can be achieved are unrealistic, that S&T activities are spread too thin and lack adequate prioritization, and that there is insufficient emphasis on high-risk/high-payoff solutions. The effort to "re-baseline" the CBRN defense S&T enterprise is likely to yield a sharper focus on a smaller number of high-priority activities, with greater emphasis on pushing the innovation envelope. Additionally, some basic science requires a fresh look; there will be an effort to develop a more complete understanding of dose response and pathogenesis—that is, the basic physiological effects of chemical and biological threat agents. Despite decades of work in this area, there are still important gaps in the knowledge base. Finally, the S&T community will revisit some longstanding investment and acquisition strategies. As an example, the community is pulling back the ongoing program to develop a standoff biological detection system to determine if there is a more effective science and engineering solution based on a better understanding of the range of visible biological agent signatures.

Within this framework, medical S&T priorities include multiagent vaccines, early indicators of exposure and infection, short-term or expedient biological and chemical protection, antivirals for pox and hemorrhagic fever viruses, and effective treatments for nontraditional agents. Nonmedical S&T priorities include more effective approaches to biodetection (as noted above), sensor integration to support battlespace awareness, strengthening the scientific foundation for developing decontamination materials, tactical reconnaissance technologies, and nontraditional agent detection and identification. Supporting science priorities include developing an improved understanding of chemical and biological environmental fate, investigating the impact of low-level chemical agent exposure, and improving methodologies for animal testing.

Counterforce. Defeating WMD targets requires specialized capabilities and operational concepts that critically rely on fine grain intelligence—to locate and identify targets, understand the characteristics of structures, optimize munitions delivery to minimize collateral effects, and assess combat effectiveness. Increasingly, adversaries are using cover, concealment, and deception techniques to protect strategic assets. More than 70 countries have some capacity to operate underground, and the number of strategic underground facilities of concern continues to grow. As it does, the number of targets that are essentially invulnerable to existing conventional weapons

also grows. In some cases, the time window in which to attack a particular target or target set will be limited, placing a premium on timely strike operations.

Today, WMD defeat capabilities are simply not mature enough to provide senior leaders with high confidence in attack outcomes. There is too much uncertainty regarding how conventional strike weapons will interact with WMD targets; independent variables such as weather further complicate the decision calculus. Higher confidence will result from improved targetable intelligence, weapons and tactics that can both leverage improved intelligence and compensate for intelligence uncertainty, and improved predictive tools. Because WMD sites may be considered unique or niche targets, some of the programs that support the counterforce mission likely will be considered niche capabilities as well. The acquisition and warfighting communities need to do a better job developing, fielding, and sustaining such capabilities.

Munitions with greater built-in intelligence are one key to improved reliability and effectiveness. For instance, tests indicate that precision fusing can reduce the release of hazardous materials from a shallow buried target attacked with a penetrating munition. A hard target smart fuse, which has been under development for many years, would count layers, sensing initial impact through soil or concrete and entry into a void in the structure. This would allow for weapon burst at a precise location designed to limit the venting of toxic materials. While promising, this technology still faces challenges and an uncertain transition to operational status.

The technical challenges of hard and deeply buried target defeat remain formidable. Some improved systems and payloads have been developed to attack hard, buried, and tunneled targets more effectively. Some of these were developed for the recent campaigns in Afghanistan and Iraq (for example, thermobaric bombs, a penetrator variant of a cruise missile, and the massive ordnance air blast weapon). DOD is exploring a wide range of concepts informed by criteria for structural and functional defeat. The Defense Department will also establish a more robust capability built on improved intelligence, surveillance, and reconnaissance for target location and characterization, mission planning and practice (to include realistic field testing at tunneled facilities), and innovative kinetic, nonkinetic, and special forces defeat means.

Agent defeat is equally if not more challenging. Eliminating the risk of collateral hazards requires the near-instantaneous in situ neutralization of chemical or biological materials. Technology development here confronts major intelligence and science limitations. Many types of payloads can be delivered to chemical and biological targets, but there is a lack of complete understanding of the effects these payloads will have on the targeted materials. Technology investigation for agent defeat has identified a number of promising concepts. As an example, the

Agent Defeat Warhead Advanced Concept Technology Demonstration is exploring a high-temperature incendiary kinetic energy penetrator warhead.

Fleeting targets, assuming they can be located and tracked, will require rapid strike. DOD is developing and fielding higher velocity weapons, and there is significant interest in hypersonic propulsion (Mach 6 and above), though not all observers are convinced that such weapons require this level of speed. "How fast is fast enough?" is a question that warfighters will need to address.

The combat assessment challenge for WMD targets is twofold: prompt and reliable analysis of both target damage and collateral effects. As sensing technologies and architectures become more advanced, innovative concepts should emerge for weapon-borne, ground-based, and air-based sensors.

Nuclear Weapons. Nuclear weapons will continue to play a unique role in a number of ways—shaping the security environment (for example, by assuring allies and dissuading competitors), deterring conflict, deterring intrawar escalation to WMD, and, if necessary, achieving operational objectives. Nuclear weapons will continue to cast a long shadow in regional crisis and conflict. They are a powerful means to convey stakes, commitment, and resolve, and the possibility of uncontrolled escalation, which may be an important factor in deterring some adversaries. Nuclear weapons may be particularly important in deterring the use of biological warfare agents, in reassuring allies subject to coercion, and to achieve rapid war termination. Nuclear weapons also remain essential to deter higher-end strategic threats posed by adversaries that possess significant WMD capabilities. And, until nonnuclear strike capabilities are significantly more advanced, nuclear weapons provide the only means to hold at risk some critical targets. For purposes of deterrence, it is necessary to possess nuclear weapons capable of threatening a wide range of adversary targets, even though not all targets may require a nuclear solution. For all these reasons, the role and impact of nuclear weapons transcend the servicing of targets that cannot be threatened with conventional weapons.

U.S. nuclear forces should possess attributes that reinforce assurance, dissuasion, and deterrence under conditions of uncertainty. They should be operationally flexible, providing for a mix of capabilities that provide global range and regional responsiveness and promptness to support rapid strike missions. Adaptive planning capabilities will be a key enabler of nuclear force operational flexibility. To maximize their deterrent impact, nuclear forces should convey a credible threat to hold at risk the highest value adversary assets. To ensure maximum credibility, nuclear forces should be capable of limiting collateral damage as much as possible (consistent with operational objectives) and denying adversaries sanctuary from attack. If a rogue leader believes that the United States will not employ nuclear weapons because of concerns about civilian casualties, societal damage, and postwar reconstruction, deterrence likely has been weakened. Likewise, if a rogue

leader believes he enjoys physical sanctuary in an underground bunker, he will be less inclined toward restraint when contemplating the use of WMD. Finally, the U.S. nuclear deterrent should be of sufficient size to hold at risk the highest value targets of a number of potential adversaries; ensure a secure, comprehensive second strike capability against any adversary; and dissuade or discourage the pursuit of nuclear parity and competition.[37]

Institutionalizing WMD Elimination

In the last several years, the U.S. Government has come to recognize the need to reshape the traditional combating-WMD toolkit, reflecting concerns about the adequacy of traditional nonproliferation tools, as well as fears that some critical tasks are falling between the cracks dividing nonproliferation and counterproliferation. Not all tools can be soft when it comes to combating WMD at its source. As a result, the United States requires capabilities to hold at risk and, if necessary, to destroy reliably and safely the WMD capabilities of its adversaries. WMD elimination refers to the range of activities necessary to control, remove, or destroy systematically a hostile nation's or organization's capability to research, develop, test, produce, store, deploy, or employ CBRN weapons. Operation *Iraqi Freedom* proved that elimination operations are profoundly difficult. As Deputy Secretary of Defense Paul Wolfowitz commented in May 2003:

> In future conflicts we should not end up playing "pick-up games" when we are trying to put together forces for eliminating Weapons of Mass Destruction in the aftermath of a conflict. We must ensure that there are sufficient forces in peacetime, adequately trained, organized and equipped for that mission . . . but also ensur[e] that . . . well-equipped personnel have the proper concepts, doctrine, and training to use those capabilities effectively to accomplish their mission.

To mitigate and guide the WMD elimination institutionalization process, the U.S. Government must adhere to a number of key judgments:

Embed and Institutionalize the Mission. Elimination must be fully integrated into the deliberate planning process and reflected in all major base plans, the strategic planning guidance, contingency planning guidance, and the budget development process. DOD must create, observe, and embed clear, standardized definitions and terms of reference in planning and doctrine to ensure accurate assignment, understanding, and execution of mission tasks.

Organize for Success. Current and future threats require a standing peacetime elimination organization with a clear, established command and control structure headed by a general officer and staffed with trained personnel atop a combination of pre-identified and dedicated assets. This structure should be readily augmentable, deployable, and capable of operating, in one form or another, across all phases of conflict. This must be

a military organization, but one with strong and effective linkages with interagency and international partners, civilian experts, and the private sector to ensure effective operations. DOD cannot take a go-it-alone approach, nor can it concede its role.

Prepare for the Worst. The United States must be capable of conducting elimination operations, concurrent with major combat operations when necessary, to find, exploit, and secure WMD programs in potentially hostile and nonpermissive conditions. Viewing elimination as just another postconflict activity to be conducted at some later date in a largely permissive environment is simplistic and dangerous and increases the likelihood that such operations will ultimately be unsuccessful.

Plan for Surprise. While improving WMD intelligence is absolutely vital, gaps and surprise are the norm, not the exception, and elimination planning and operations must be sufficiently flexible and responsive. DOD must improve intelligence-sharing and collaboration with the Intelligence Community and incorporate a strong counterintelligence element into its planning and organization.

Train and Exercise. Forces tasked with eliminating WMD command and control must have the opportunity to test plans and procedures as well as to resolve key difficulties. Only through advance preparation can DOD address issues before they pose a threat to mission success. Units must be given time to test plans with one another so that problems can be mitigated or resolved. Moreover, intensive red-teaming of concepts and strategies prior to conflict will better prepare coalition forces for the aggressive counterintelligence and adaptive tactics, techniques, and procedures employed by hostile elements as they attempt to conceal or destroy evidence of WMD activities.

Target Programs, Not Places. Elimination missions need to follow a *program-centric* approach designed to achieve a full understanding and accounting of an adversary's WMD programs and capabilities. As such, efforts should balance between exploiting sites, people, and data/documentation to get at the best information as quickly as possible. Adopting such an approach puts a premium on fusing subject matter expertise, intelligence assets, security, linguistics, and other supporting capabilities—creating truly interdisciplinary units.

Employ and Improve Technology. DOD must look to technological innovation in the areas of detection, monitoring, analysis, communications, agent and weapon neutralization or defeat, and security to enhance the efficiency, speed, and overall effectiveness of elimination operations as well as to reduce the operational manpower requirements. Using technology to make more of these capabilities organic to elimination-specific units may be an effective way to align demands and resources more closely.

Maintain Focus. Directing senior-level military and civilian attention to the issue of institutionalizing and resourcing the elimination mission within DOD

and the broader national security community is itself a serious challenge. Yet without effective advocates at the upper echelons of government, adequate funding and prioritization simply will not materialize. Without knowledgeable and active senior-level advocates to ensure sustained funding, a significant elimination capability is unlikely to be developed.

In the time since major combat operations ended in *Iraqi Freedom*, the U.S. Government has learned many lessons and made progress in the elimination institutionalization process. The revised Joint Publication 3–40, *Joint Doctrine for Combating Weapons of Mass Destruction*, clearly identifies and defines *elimination* as an important element of combating WMD. Strategic Planning Guidance for FY06–11 now directs the Chairman of the Joint Chiefs of Staff to identify executive agents for providing operational support to WMD interdiction and elimination missions within 30 days of issuance. The Enhanced Planning Process identified $242 million in funding requirements for new WMD mission areas (elimination and interdiction) over FY06–11. Other planning guidance now makes extensive reference to the need for plans to account for finding, exploiting, and destroying weapons of mass destruction.

Unfortunately, critical gaps still remain in the system. First is the issue of ownership. DOD cannot begin to implement many of these recommendations until there is a clear organizational focal point. In part, assigning an executive agency to the appropriate command will mitigate this problem. Equally important, however, is ensuring clear oversight and advocacy within the Office of the Secretary of Defense, especially given the interagency complexities of this type of mission.

The second issue is force structure. The Bush administration put together much of the WMD elimination capability deployed to Iraq on an ad hoc basis. With the end of major combat operations there, DOD largely dismantled these capabilities, leaving nothing currently in their place. The United States needs to begin to take this issue on, sooner rather than later, or it will have no choice but to play another pick-up game, perhaps with even far more dangerous consequences. Finally, sustained, high-level attention is critical. Much of the work to date has bubbled up from the working levels. Higher-level attention from civilian and military leadership will be necessary to affect genuine change.

As important as it is for the United States to come away from Iraq having learned many lessons, it is even more crucial to avoid learning the wrong ones. Possible wrong lessons include:

- *Iraq is an outlier case, so the United States will not have to do this kind of work often*. Most foreseeable adversaries have actual or suspected WMD capability, and some terrorist networks are also seeking such capabilities.

DOD cannot afford to be any less prepared in this area than it is for general battlefield success.

- *Intelligence failure explains everything*. This implies that with the proper intelligence, DOD preparations for elimination operations would have been successful. This lesson is wrong on two counts. First, the WMD hunt in Iraq cannot be explained as a single point failure. Despite the valiant efforts of many people, the Defense Department uncovered substantial problems with its ability to conduct WMD elimination operations in all areas from planning and doctrine, to training and exercises, to capabilities and resources. Secondly, perfect intelligence is a nearly unattainable goal. DOD needs to be able to operate in uncertainty, and it needs forces that that can locate, exploit, and disable WMD programs in hostile states, even in the absence of clear, actionable intelligence.
- *This is* not *a DOD mission; this is somebody else's job*. Some argue that the WMD hunt in Iraq demonstrated how the Defense Department should not have these responsibilities, that military forces should do the minimum necessary to secure sites and areas, and that most elimination activities should be left in the hands of civilian or international organizations with expertise in these areas. When the United States engages a WMD-armed adversary or is required to undertake military operations in pursuit of WMD, finding, securing, and eliminating those weapons is first priority.

The United States cannot afford to be wrong when it comes to disarming its most dangerous enemies of the most dangerous weapons. WMD elimination can provide the means to confront and eliminate these weapons at the source.

Combatant Commands

The combatant commands recognize the WMD threat from both state and nonstate actors. Increasingly, the interrelated imperatives of combating WMD and fighting the war on terror are central elements in how these commands plan and operate, to include theater security cooperation and engagement activities, deliberate planning, and projecting force requirements. For the regional commands, perspectives and priorities vary and are specific to the unique challenges in respective areas of responsibility (AOR). But common concerns exist regarding the need for greater and more user-friendly, actionable WMD intelligence, as well as clarification of roles and responsibilities for interdiction, Global Strike, and other new missions.

U.S. European Command (EUCOM) plays a major role in the Proliferation Security Initiative. Most PSI partners are in this AOR, which has been the location of numerous exercises, workshops, and expert meetings. Interdiction is also an

important focus of the command's involvement in Project Caspian Guard, designed to enhance the capabilities of friendly states in the Caspian Basin in the areas of counterproliferation, counterterrorism, and counternarcotics. Additionally, EUCOM has an active foreign consequence management program to assist allied governments through capability assessments and improved awareness. The command partners with the Defense Threat Reduction Agency in this effort, which has focused on Italy, Poland, and Spain this year. The command's support to the 2004 Olympics in Greece emphasized consequence management preparations. Finally, EUCOM has been active in discussions with new NATO countries on WMD and terrorism issues. A number of states possess CBRN defense or consequence management capabilities that will add to the NATO capability in these areas.

U.S. Strategic Command (STRATCOM) has experienced major changes in its missions and responsibilities in the last few years. These changes are a direct response to new strategic realities, including rising powers with nuclear weapons, regional powers that see WMD as instruments of asymmetric warfare, and highly motivated terrorists prepared to use WMD to execute jihad. Whereas in the past the command concerned itself principally with deterring a major nuclear attack on the United States, there is a stronger focus now on deterring more limited NBC attacks in a theater of operations or against the homeland. The deterrence challenge is far more complex today than during the Cold War. Because the United States confronts a range of potential adversaries—each unique in its strategic outlook, decisionmaking style, and propensity for risk-taking—STRATCOM must emphasize the development of tailored and flexible deterrence strategies. One concern is how to deter in rapidly developing contingencies; another is the need to bring deterrent power to bear in regions or locations where force projection is difficult. The command's Global Strike mission is intended to address concerns of this type.

The United States requires a more diverse and dynamic set of capabilities—both offensive and defensive—to meet the demands of deterrence. Of particular concern are the means to respond to weapons that can change the character of a conflict once an adversary has crossed the WMD threshold—in order to restore deterrence in a way that is not only decisive but also consistent with a range of other strategic objectives (for example, assurance of allies, coalition cohesion, proportionality, limited collateral damage). Today, achieving this could be difficult given the large gap that exists between the effects that conventional and nuclear weapons can produce. Closing this effects gap requires fielding "mass ordnance" conventional weapons that can achieve strategic impact through highly lethal effects.

U.S. Pacific Command (PACOM) must consider WMD from both regional security and homeland defense perspectives, taking into account a wide range of potential threats from both state and nonstate actors. In addition to the direct and immediate threat posed by North Korea's WMD, there are flashpoints in East and

South Asia that could lead to the use of WMD, as well as increased terrorist activity. Command initiatives include improving actionable intelligence, advancing the Global Strike mission, and developing biological warfare countermeasures. In the intelligence area, PACOM is seeking to facilitate mission planning by developing a WMD installation matrix that will consolidate all available intelligence related to WMD facilities of concern in the AOR. The command is working closely with STRATCOM to coordinate Global Strike activities and exercise capabilities for rapid collaborative planning and execution. With respect to the biological warfare threats, the command expects this to be part of the operating environment in crisis and conflict. For this reason, biodefense has become a top priority, and there is an intensive effort under way to develop policies, capabilities, operational concepts, and tactics, techniques, and procedures to enhance the prospects for surviving and operating effectively in a biological warfare environment.

Chapter Five

Meeting the Challenges

The United States is learning all too well that WMD proliferation is not a static phenomenon but a complex and dynamic process for which there is no silver bullet solution and no single template for action. U.S. ability to respond to proliferation threats must be equally dynamic. At any given time, the United States is likely to be dealing with multiple proliferation challenges, applying several types of policy tools to advance a number of specific objectives. Though tactics will shift as circumstances dictate, the foundation for a coherent response to WMD proliferation in the years ahead rests on meeting four core challenges that shape how the combating-WMD community thinks and acts.

Managing Uncertainty

Uncertainty will persist as a defining feature of the proliferation landscape. New organizations, methods, technologies, and science will help provide greater insight into WMD threats. But the information decisionmakers have at their disposal—from adversary capabilities, intentions, and plans to the impact of U.S. counterforce weapons—probably always will seem insufficient. "Fixing intelligence" will not fully solve this problem, and it is important to guard against portraying intelligence reform as a panacea. To the contrary, both institutions and individuals central to combating WMD need to adapt mindsets, policy tools, and modes of decisionmaking to the reality of uncertainty.

Even as the United States strives to understand lessons learned from the past, some things may well remain mysteries. Why has there been so little state use of WMD? Does the U.S. Government ascribe too much value to these weapons from an adversary perspective? Have U.S. defensive preparations, however incomplete, affected the calculations of adversaries? Has the United States been successful in deterring such threats? The U.S. cultural imperative to understand these weapons based on traditional analysis (that is, information-driven rational causation) has helped address complex security challenges, but it is not clear that after a dozen years of analytic effort the United States really knows much more about what to expect from rogue states and terrorists armed with WMD. Traditional modes of analysis may not be capable of providing the answers.

Establishing Metrics

Just how important is combating WMD? Measured by what senior leaders have said, including successive Presidents, it is our highest priority and the greatest threat we face. It is a fair question, then, to ask whether this sense of urgency has been reflected in U.S. actions. Is there an effective organizational framework in place to manage the many combating-WMD activities, or is the effort fragmented and too dispersed around the bureaucracy? Is there sufficient senior attention given to these efforts, or is there a lack of leadership focus? Do senior civilian and uniformed officials have the necessary expertise to provide strong leadership, or is there an expertise gap that needs to be filled in the leader development process? Is the DOD budget devoted to nonmissile defense counterproliferation programs—less than 1 percent—about right, or does the magnitude of the threat demand greater investment? Were the Armed Forces adequately prepared to face an Iraq armed with the type and level of WMD suggested in intelligence estimates, or did they dodge a bullet?

These may be uncomfortable questions, and their answers may not be clear-cut. But it seems important to understand whether there is a gap between the rhetoric of combating WMD and the reality of how DOD acts—not only because adversaries will be alert to such a gap but also because it underscores the need for metrics to assess combating-WMD activities. One type of metric would attempt to gauge organization, investment, expertise, and operational readiness—in short, some indicator, however imperfect, of how seriously the Defense Department actually takes the WMD problem. Another type of metric would focus on measures of success for combating WMD—some set of criteria for determining how well DOD is doing. The same reasoning can apply to the preparations and performance of other departments, such as DHS and the Department of Health and Human Services, which have assumed important roles in combating WMD.

Integrating the Combating-WMD Enterprise

The National Strategy to Combat Weapons of Mass Destruction provides a sound framework for thinking about the different dimensions of the counter-WMD fight. But what does it mean to pursue a truly integrated combating-WMD strategy? Several levels of integration need to be considered. First, decisionmakers need to integrate approaches to state and nonstate threats effectively. There has been a tendency over the last decade for one or the other to dominate thinking at any given time. This is not to argue for a monolithic view of the threat but rather for an effective and sustainable balance in policies and plans for each type of threat that also appreciates the links between the two. This is essential if decisionmakers are to avoid the *single focus trap* and remain focused on the nightmare scenario of a rogue state transferring nuclear weapons to a terror group. Today,

it is not clear just how the United States would prevent a determined state from executing such a transfer.

Second, decisionmakers need to integrate nonproliferation, counterproliferation, and homeland security efforts in planning at the national level. These must be more than just pillars in a strategy document; they must work synergistically to manage the threat. It is self-evident that effective nonproliferation and counterproliferation policies enhance the security of the homeland. Less clear is the degree to which the significant investment now under way in homeland security and consequence management will benefit prevention and denial efforts. So as that investment continues, it will be important not to neglect those policy tools that seek to defuse the threat well before it reaches the homeland. Finding the right balance in investment across the pillars is an important challenge.

Third, combating WMD needs to be effectively integrated within the larger DOD planning framework. At a time of great ferment in defense planning, the Defense Department needs to examine systematically how combating WMD fits into its emerging priorities for and approaches to defense strategy and plans. Such an examination could well have important implications for both the substance and organization of combating-WMD activities. How well do these activities align with what appear to be important elements of emerging defense strategy? For instance, does combating WMD support transformation goals, and do senior leaders see counterproliferation as integral to the transformation agenda? Can counterproliferation be aligned with the risk framework that appears to be guiding senior-level deliberations on plans and resource allocation? Is there a means to ensure that the Joint Capabilities Integration and Development System effectively addresses combating-WMD priorities? Do Defense counterproliferation activities strongly support the war on terror—and how could this be demonstrated? Are these activities supportive of forward-leaning strategies that may rely on a new (and in some cases more austere) global basing structure, greater reliance on Special Forces, global strike, and more aggressive interdiction? Conducting an audit of DOD counterproliferation activities along these or related lines would be instructive.

Finally, success in combating WMD requires bringing to bear all the instruments of national power, which means conducting foreign and security policies that are fully integrated and mutually supportive. This may seem self-evident, but it is worth remembering that an effective foreign policy (including the exercise of soft power) will address some of the root causes of proliferation and sustain the relationships, institutions, and norms of behavior needed to take effective diplomatic and military action over the long term.

Demonstrating Leadership and Influencing Attitudes

Whether or not one believes that the United States stands astride a unipolar world, the reality is that the most challenging international security problems cannot be solved absent strong U.S. leadership. In turn, strong U.S. leadership will at times be the only way to influence attitudes and create new possibilities for problem-solving. One can argue that a cultural change has taken place in the last few years as the United States has adopted a more activist approach to the proliferation challenge, with a stronger focus on prevention and rollback. This has yielded some notable successes, though two important cases (North Korea and Iran) remain unresolved, and there has been some criticism of the administration's approach to the loose nukes and threat reduction problem.

Specific cases aside, though, Washington has conveyed to friend and foe alike that the United States intends to tackle proliferation threats seriously and proactively. Allies have taken note and been supportive of new initiatives, such as PSI, and have also adopted a more activist approach in their own combating-WMD efforts (for example, the European initiative vis-à-vis Iran). Are others acting at times in order to provide an alternative to what may be viewed as more aggressive U.S. policies, or to otherwise restrain the United States? Perhaps, but arguably more important is that the U.S. counter-WMD posture has catalyzed others in the international community to take the proliferation challenge more seriously. With respect to proliferators, results count. But at least proliferators should now understand that they cannot proceed unnoticed in their acquisition efforts, that these efforts carry significant risk, and that strategic ambiguity in their WMD intentions and capabilities is no longer a shield against action by the international community.

Endnotes

[1] Arrangements for Libya's disarmament involve the United States, United Kingdom, International Atomic Energy Agency (IAEA), and Organization for the Prohibition of Chemical Weapons.

[2] See John R. Bolton, "Lessons from Libya and North Korea's Strategic Choice," remarks presented to Yonsei University Graduate School of International Studies, Seoul, Republic of Korea, July 21, 2004.

[3] The Khan network, in addition to laboratories in Pakistan, involved suppliers and middlemen in Dubai, France, Germany, Italy, Japan, Malaysia, the Netherlands, South Africa, Spain, Switzerland, Turkey, United Arab Emirates, and United Kingdom. The network's business dealings are believed to be valued in the low hundreds of millions of dollars with countries that include Libya, Iran, and North Korea.

[4] See Sharon Squassoni, "Closing Pandora's Box: Pakistan's Role in Nuclear Proliferation," *Arms Control Today*, April 2004, 12.

[5] See remarks by Paul D. Wolfowitz at the National Defense University, Washington, DC, May 13, 2003. See also Center for the Study of Weapons of Mass Destruction, *At the Crossroads: Counterproliferation and National Security Strategy* (Washington, DC: National Defense University Press, April 2004), 37.

[6] Wolfowitz.

[7] Tariq Aziz has described Saddam's state of mind in these terms.

[8] See Ashton Carter, "Overhauling Counterproliferation," *Technology in Society* 26, nos. 2–3 (April-August 2004).

[9] "Nanomaterials Show Signs of Toxicity," *Science* (April 11, 2003), 243; available online at <http://www.ece.neu.edu/edsnu/mcgruer/nano/nanotoxicityscience0304.pdf>.

[10] "From the Lab to the Battlefield? Nanotechnology and Fourth-Generation Nuclear Weapons," *Disarmament Diplomacy*, October/November 2002; available online at <http://www.acronym.org.uk/dd/dd67/67op1.htm>.

[11] Andrzej Miziolek, "Nanoenergetics: An Emerging Technology Area of National Importance," *AMPTIAC Quarterly* (Spring 2002); available online at <http://amptiac.alionscience.com/pdf/AMPQ6_1ART06.pdf>.

[12] Central Intelligence Agency, "Terrorist CBRN: Materials and Effects," May 2003, 1.

[13] George J. Tenet, "The Worldwide Threat 2004: Challenges in a Changing Global Context," testimony before the Senate Select Committee on Intelligence, February 24, 2004, 4.

[14] George J. Tenet, "The Worldwide Threat 2003: Evolving Dangers in a Complex World," testimony before the Senate Select Committee on Intelligence, February 11, 2003, 4.

[15] Tenet, "The Worldwide Threat 2004," 4.

[16] Ibid.

[17] This memorandum was discovered in 2001 on a computer acquired by the *Wall Street Journal* that had been used by al Qaeda members in Afghanistan. Government officials are reported to have confirmed the authenticity of the files found on the computer's hard drive, which also contained a table of lethal doses for poisons according to body weight and a list of disease agents, including anthrax. See "Al-Qaeda: New Evidence of Chemical and Biological Weapons Pursuit," Global Security Newswire, January 2, 2002.

[18] The *reload* phenomenon is discussed in Richard C. Danzig, *Catastrophic Bioterrorism—What Is to Be Done?* (Washington, DC: Center for Technology and National Security Policy, 2003), 1–2.

[19] These arguments are drawn from Brad Roberts, "Defining the Requirements of Campaign-Level Responses to Campaign-Style CBW Terrorism" (Alexandria, VA: Institute for Defense Analyses for the Chemical and Biological Arms Control Institute, 2003).

[20] Remarks by President George W. Bush on Weapons of Mass Destruction Proliferation, National Defense University, February 11, 2004.

[21] UN Security Council Resolution 1540 (2004) was adopted by the Security Council at its 4956th meeting on April 28, 2004.

[22] Informally known as the "10 + 10 over 10" program, the G–8 agreed in 2002 to commit $20 billion over 10 years—half from the United States—toward WMD threat reduction in the former Soviet Union. Decisions made at the 2004 G–8 summit envision more nations contributing to an effort that extends beyond the former Soviet Union.

[23] According to the Nuclear Threat Initiative, under the Atoms for Peace Program 20 metric tons of highly enriched uranium was distributed in more than 100 civilian reactors and other facilities in 40 countries. While the vast majority of this material is not a security risk, some of it is.

[24] Ibid.

[25] Ibid.

[26] The Additional Protocol is designed to improve the IAEA's ability to detect clandestine nuclear programs in nonnuclear weapons states by providing the agency with increased information and expanded access to nuclear fuel cycle activities and sites. The Additional Protocol grants the IAEA the right to conduct no-notice inspections at any facility, declared or not. See "The IAEA 1997 Additional Safeguards Protocol," Arms Control Association Fact Sheet, September 1999.

[27] President Bush proposed the creation of a special committee of the IAEA Board of Governors to focus intensively on safeguards and verification and denying rotating membership on the board (and the special committee) to any state under investigation for proliferation violations.

[28] On February 11, 2004, the United States signed a shipboarding agreement with Liberia, a major flag of convenience state. This agreement provides authority on a bilateral basis to board vessels suspected of carrying WMD and delivery means materials. Similar agreements are being pursued with other flag of convenience states.

[29] Remarks by President Bush on Weapons of Mass Destruction Proliferation, Lisbon, Spain, March 5, 2004. PSI partners endorsed the President's call for an expanded mission.

[30] Libya claims losses of only $3 billion.

[31] Bolton spoke on this point in remarks in July 2004, particularly in reference to North Korea's clandestine uranium program and its insistence on maintaining a "peaceful" nuclear program: "We are interested in a lasting and meaningful solution to the threat posed by North Korea's nuclear weapons program. . . . [H]alting ongoing nuclear programs can only make sense when it is explicitly and credibly part of a clear plan leading to rapid dismantlement. . . . North Korea's continued denial of its uranium enrichment program precludes a solution . . . and the United States knows that North Korea's nuclear programs are primarily intended to support its nuclear arms program. This is why we insist that the dismantlement of their programs must be complete, verifiable, and irreversible."

[32] According to British press accounts, in August Iran issued an extraordinary list of demands to its British, French, and German interlocutors. These demands included access to advanced nuclear technology, provision of conventional weapons, and "security assurances" against nuclear attack (presumably from Israel). What concessions Iran would make on the nuclear issue was not clear. See Anton La Guardia, "Hand Over Nuclear Weapons and Know-How, Iran Tells Britain," August 11, 2004; available online at <www.telegraph.co.uk>.

[33] Speaking in August 2004, Condoleezza Rice stated, "I do think that there are very active efforts underway . . . to undermine the ability of the Iranians under the cover of civilian nuclear cooperation to get the components that would help them for nuclear weapons developments." *Meet the Press*, August 8, 2004. In the context of the interview, this comment implied that Israel is engaged in such efforts.

[34] Formally promulgated in Homeland Security Presidential Directive 10 and National Security Presidential Directive 33 on April 28, 2004. These directives are classified. An unclassified version can be found at <www.whitehouse.gov>. See "Biodefense for the 21st Century."

[35] One ongoing program in this area is the Defense Threat Reduction Agency's Unconventional Nuclear Warfare Defense effort, which seeks initially to leverage existing technologies to detect nuclear and radiological materials at DOD installations.

[36] The EPP study identified both lower and higher funding options as well.

[37] The 2001 Nuclear Posture Review refers to this as the "second to none" standard.

John F. Reichart
Director

STAFF

W. Seth Carus
Deputy Director

John P. Caves, Jr.
Senior Research Professor

Rebecca K.C. Hersman
Senior Research Professor

Richard A. Love
Research Professor

Geoffrey D. Kiefer
Research Project Specialist

Creighton Hottinger
Research Project Specialist

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Center for the Study of Weapons of Mass Destruction
National Defense University
Fort Lesley J. McNair
Washington, DC