



The chances of a successful nuclear terrorist attack in the decade that began in 2015 are better than even. —Graham Allison

Nuclear Terrorism

Did We Beat the Odds or Change Them?

By Graham Allison

It has been more than 13 years since the publication of *Nuclear Terrorism: the Ultimate Preventable Catastrophe*, which sounded the alarm about the clear and present danger of nuclear terrorism. The book made the case for two seemingly contradictory propositions: first, on the current path, nuclear terrorism is inevitable; second, nuclear terrorism is preventable by an agenda of actions that are feasible and affordable. Juxtaposition of these propositions presented a paradox that the book attempted to resolve.

By highlighting the gap between what the United States, Russia, and other nations had been doing in the decade prior to 2004, and what could be done if they made preventing nuclear terrorism a first-order priority, I argued that on the current path we would likely see terrorists succeed in their aspirations for an “American Hiroshima.” At the same time, I argued, there existed a feasible, affordable agenda of actions the United States and other civilized nations could take that would reduce this risk to nearly zero.

As reviewers later noted, the book “caught a wave.” During the 2004 Democratic presidential primary, the Nuclear Threat Initiative (NTI) led a concerted effort to raise the visibility of this issue. Former Senator Sam Nunn, a NTI co-chair, called the book “essential reading . . . calling citizens to arms against the real and rising threat of nuclear terrorism.” The world’s most successful investor, whose company’s share value has increased a thousand fold during the five decades he has managed the investment corporation, selected *Nuclear Terrorism* as the Berkshire Hathaway annual meeting’s “book of the year.” Warren Buffett declared: “Nuclear terrorism is by far the most important problem of our time. And this is the most important book that has been written on the subject.”

In the final months of the 2004 presidential campaign, the question of what the United States should be doing to address the threat of nuclear terrorism became a compelling issue. Both contenders—John Kerry and George W. Bush—declared in their first debate that nuclear terrorism is the “single most serious threat to the national security of the United States.” By the time he had won a second term, President Bush not only understood the threat, but he had embraced it emotionally. As he frequently stated, he was determined to do everything possible to “keep the world’s most dangerous technologies out of the hands of the world’s most dangerous people.”¹ His successor, President Barack Obama, also made preventing nuclear terrorism a priority, having read *Nuclear Terrorism* as a young senator who in 2005 accompanied Senator Richard

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Lugar on a congressional delegation to inspect Russian nuclear sites.²

Not surprisingly, the book attracted critics as well. The most common objection focused on what skeptics argued was an irresolvable contradiction between the core claims of “inevitable” and “preventable.” If something is preventable, then it cannot be inevitable, they said.

My attempt to answer their point was proving largely ineffective, since for the most part, I just kept repeating the argument stated in the book. But fortunately, I was rescued by none other than Buffett himself. In making judgments about buying stocks, and even more in owning and running several reinsurance companies, Buffett had become a legendary oddsmaker. Those businesses had also forced him to think seriously about nuclear terrorism as one of what investors call “fat tail” risks. He had concluded that such an event was virtually inevitable and that the consequences would be devastating. Thus he prohibited his companies from writing insurance against nuclear terrorism.

The following two charts clarify Buffett’s argument. Chart 1 demonstrates that if the probability of a successful nuclear terrorist attack in the year ahead

is 10 percent, and if that condition persists for 50 years, the likelihood of nuclear terrorism occurring is almost 100 percent (99.5 percent to be precise).³

But as Chart 2 illustrates, if actions were taken to reduce that likelihood from 10 percent a year to 1 percent, the probability that in the next 50 years there is no successful nuclear terrorist incident rises from almost zero to 60.5 percent. These extrapolations are, as Buffett explains, simple probability calculations.⁴

Prior to publication, a number of referees pointed out that even if one agreed that the risks of nuclear terrorism were much greater than had been previously recognized, the policy community would ask: how likely is such an event, now? As one wag put it, what moves most Washingtonians are consequences that could happen on their watch. Even those who found Buffett’s response analytically correct argued that it was too “academic” for many participants in the policy debate.

Thus at their urging, in the final published text of *Nuclear Terrorism* I offered my best judgment. Specifically, I wrote that on the trajectory we were following in 2004, absent significant additional preventive actions, the likelihood that terrorists would successfully explode a nuclear bomb somewhere in

Chart 1: Probability of Nuclear Terrorist Attack if Annual Odds are 10 percent.

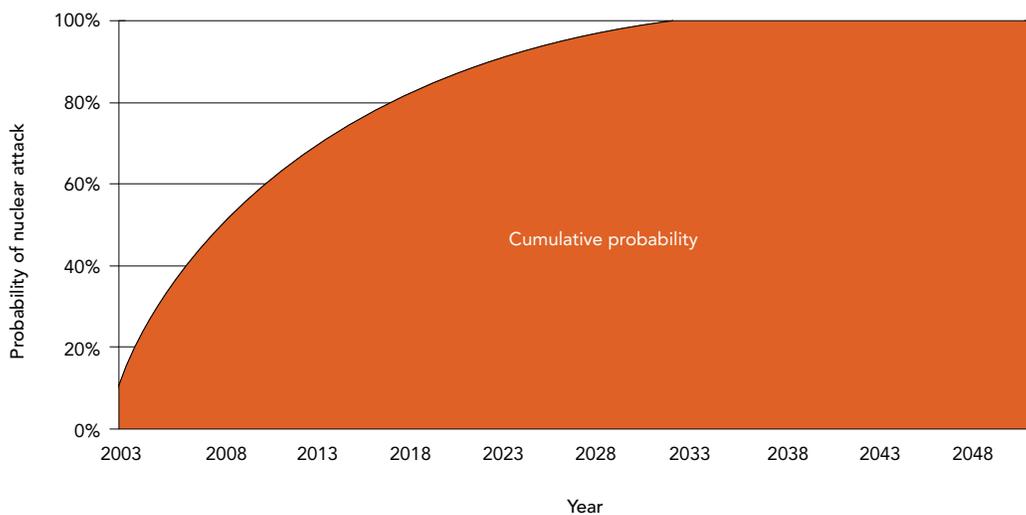
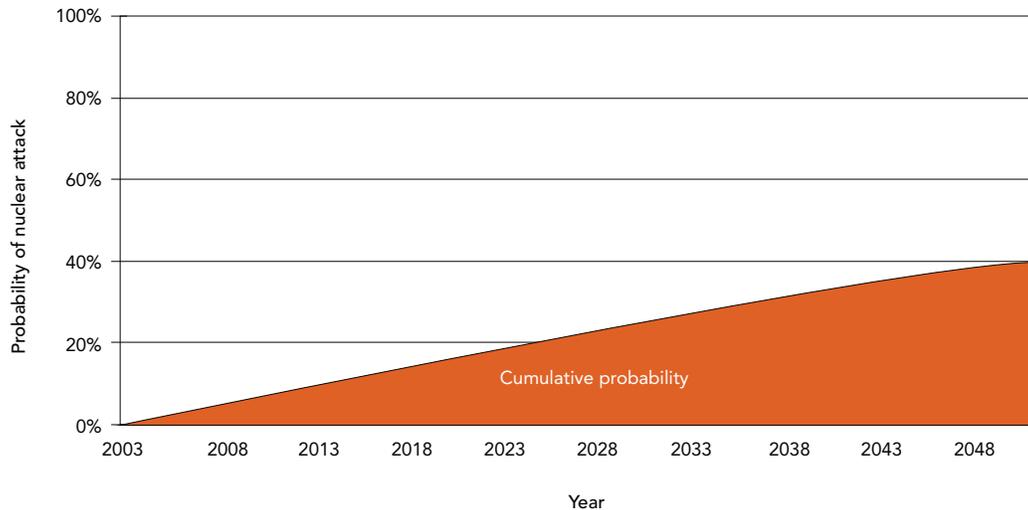


Chart 2: Probability of Nuclear Terrorist Attack if Annual Odds are 1 percent.

the world in the decade ahead was “more likely than not.” As a leading advocate of what I call “betable propositions”—putting one’s money where one’s mouth is—I made a number of bets with colleagues who were more skeptical.⁵ Operationalizing my estimate, I bet \$51 of my money against \$49 of theirs that before December 31, 2014 we would see an act of nuclear terrorism. Needless to say, I was happy to lose these bets.

With the benefit of hindsight, it is fair to ask whether my 2004 assessment of the risk was wrong. To begin to try to answer that question, it is necessary to start with candor about the larger question of which it is a component. The cosmic question is why there has been no mega-terrorist attack on the United States since September 11, 2001 when al-Qaeda operatives crashed commercial airliners into the World Trade Center and Pentagon.

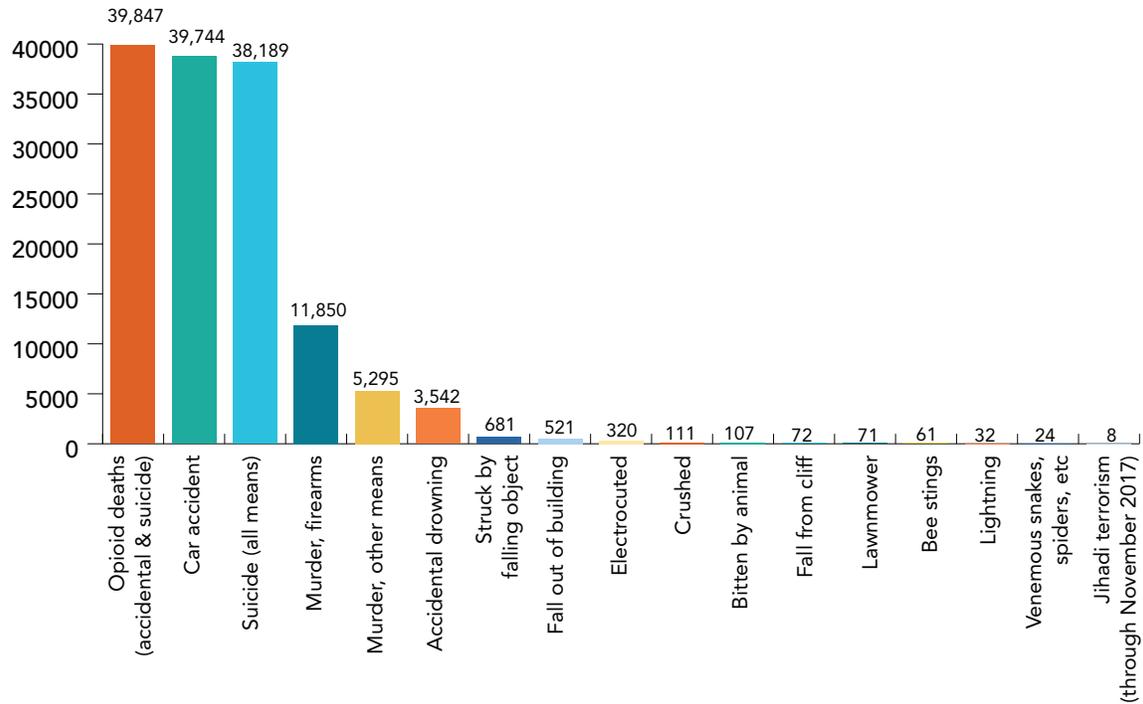
In the wake of that attack, anyone who had offered to bet that 16 years on there would have been no terrorist attack on the United States that killed more than 100 people would have been able to get 1000:1 odds. In each of the years since that attack, the annual threat assessment from the U.S. Intelligence Community (IC) has ranked terrorism

as among the top three threats to the United States. Polls find that more than 80 percent of Americans expect another major terrorist attack in the near future.⁶ Half of Americans expect that they or a member of their family will be killed by terrorists.⁷

How can we square these expectations with what has actually happened? Who or what has actually killed Americans here in the United States during the decade and a half since the al-Qaeda strike on 9/11? On the record, tree limbs and other falling objects have killed 100 times more Americans than terrorist attacks. As Chart 3 demonstrates, apart from old age and disease, the leading causes of death for Americans here at home have been opioid overdoses (40,000); car accidents (39,000); and suicide (38,000).⁸

Thus, to put it bluntly, it is hard to deny the gap between the expectations of the intelligence and policy analytic community who have been trying to understand terrorism and counter-terrorism, on the one hand, and the brute facts, on the other.

In attempting to understand the challenge of terrorism, analysts have used versions of Sherlock Holmes’s framework of “MMO”—motive, means, and opportunity. Identify actors who have the motivation, means, and opportunity to commit an act of

Chart 3: Average Annual Deaths in the United States, 2005–15.

terrorism, and one has the suspect list. My modified version of Holmes includes an additional “O” for organizational capability. Individuals or groups motivated to take an action but lacking the organizational skills to use available means to exploit opportunities remain only potential risks.

Employing this MMOO framework to the challenge of terrorism since 9/11, what do we find? Potential perpetrators motivated to conduct terrorist attacks on the United States have multiplied beyond anyone’s expectation in 2001. By invading and occupying Iraq and Afghanistan, and striking targets in many other countries with drones, the United States has created new enemies. In Iraq and Afghanistan, our counterinsurgency campaigns on behalf of one faction against others have given thousands of other people motives to seek revenge against us. In what the Bush Administration labeled the “Global War On Terrorism,” U.S. forces have conducted attacks on the territory of at least seven Muslim-majority

nations—killing individuals we labeled “terrorists,” but also civilians who are known as collateral damage. These actions have provided fodder that extremists have used skillfully to recruit and motivate payback. Indeed, the Osama bin Laden dream to ignite a “clash of civilizations” between Muslims and what he called the “Jewish-Christian crusaders” has more credibility today than anyone could have imagined at the beginning of the century.

While post-9/11 security measures have made it more difficult to hijack a commercial airliner, the means by which to kill double, triple, and even quadruple digit numbers of people have also expanded. As the Orlando and Las Vegas shootings suggested, in many states in the United States, it is not that hard to buy an assault rifle and ammunition that will allow a shooter to fire 1,000 rounds in two minutes. And recent truck attacks by ISIL-inspired fighters in Nice, Barcelona, and New York demonstrate that terrorists recognize

that modern life offers them many means by which to carry out their attacks.⁹ The internet has also expanded the availability of chemicals, deadly opioids like fentanyl, and even pathogens. Web-accessible information about how to make elementary bombs or acquire and use pathogens like anthrax has also increased.

Opportunities to kill hundreds or even thousands of Americans also abound. As military planners would put it, the United States offers a “target-rich” environment. Terrorists intent on killing large numbers could find them everywhere: from malls and movie theaters to sports stadiums and churches.

Organizational capability appears to have been terrorists’ Achilles’ heel. The planner of 9/11, Khalid Sheikh Mohammed, demonstrated extraordinary imagination and operational skills. Intelligence professionals gave his design and execution of the plan an “A.” Fortunately, he has been one of the few. Advances in al-Qaeda’s bombmaking appear to be traceable also to a single individual—Ibrahim al-Asiri. He developed the bombs for the failed underwear bomb plot in 2009 and cargo hold plot in 2010, as well as the laptop bomb that led the Trump Administration to temporarily ban laptops on flights.¹⁰

Terrorists have for the most part been “technically challenged.” Should that factor change, the overall picture could also change dramatically overnight.

In sum, the question about why there has been no nuclear terrorist attack is one piece of the larger puzzle about why there has been no mega-terrorist attack of any kind. And the deeper question behind that is whether we in the analytic community have a good grasp on the fundamentals of this challenge. Truth be told, I register my doubts.

Nonetheless, I am not ready to conclude that my 2004 estimate of the odds of a nuclear terror attack was incorrect. And contrary to the claims of a number of critics, as a matter of statistics, the

evidence of the past 13 years does not require me to do so. A brief aside on the logic of betting and odds will explain why. Imagine a coin that was slightly weighted so that it had a 51 percent chance of landing heads and 49 percent chance of tails. From a single toss of that coin that landed tails, what could one conclude? Statistically, the answer is—very little. Such a result would be expected to happen 49 out of every 100 times the coin was tossed. If we tossed the coin a second time, and again it landed tails, statisticians would again remind us that the chances of that occurring were 1 in 4. To conclude as a matter of statistics that my estimate was incorrect would take a lifetime of successive decades in which there was no successful nuclear attack.¹¹ Thus, I stand behind my assessment in 2004 that the odds of an attack in the next decade were greater than even. (As we all know, dozens of planned terrorist attacks have failed or been foiled—from the Christmas Day underwear bomber to the Times Square bombers.)

The issue this article addresses is whether in the past decade we have just beaten the odds, or whether actions we have taken have changed the odds for the better. To address that question, it is necessary to review the array of factors and actions that have reduced the risk of nuclear terrorism on the one hand, and those that have increased the risk on the other.

Consider, for example, what would likely have happened after 9/11 had Osama bin Laden and al-Qaeda been able to continue operating from their headquarters in Afghanistan. As the video bin Laden made after the attack demonstrated, he was thrilled by what Khalid Sheikh Mohammed’s operation had achieved. He later called on all faithful Muslims to join the jihad and top 9/11. At the pinnacle of his pyramid of destruction was a mushroom cloud enveloping one of the great cities of the world. What prevented that first and foremost was a relentless counterterrorism campaign that

killed or captured most of al-Qaeda's leadership and left the others spending most of their time trying to survive rather than perfecting plots for future terrorist attacks. Destruction of their headquarters and training camps meant that thousands of individuals who would have been planning, training, and then conducting terrorist attacks never got their chance. On the other hand, the failure to stop North Korea from developing a nuclear arsenal, as well as the collapse of U.S.–Russian nuclear security cooperation, have created new significant risks.

Section II of this article reviews actions taken that have reduced the risk of nuclear terrorism. Section III reviews factors and actions that have increased these risks. A concluding section offers an updated assessment of the risks posed by nuclear terrorism from the perspective of year-end 2017. While applauding thousands of actions that have been taken by hundreds of thousands of individuals in the past 13 years to reduce these risks, reviewing all the pluses and all the minuses, my gut tells me that the chances of a successful nuclear terrorist attack in the decade that began in 2015—in effect, the second flip of the coin—are better than even. Specifically, I believe the odds of a successful nuclear terrorist attack somewhere in the world before the end of 2024 are 51 percent or higher. While giving thanks that terrorists have failed to achieve their deadliest ambitions, in my view that is not grounds for complacency, but rather a reason for redoubling our efforts.

I am aware that on an issue about which I am passionate, I may have slipped from analysis to advocacy. The central point is not whether the odds of a nuclear terrorist attack are 51 percent or 15 percent. Threat equals likelihood times consequences, and in this case, the consequences would be devastating. Since the costs of actions to reduce these risks are modest, prudent policymakers should focus on the feasible agenda of actions.

Factors and Actions That Have Reduced the Risk of Nuclear Terrorism

In the past decade, the United States and its international partners have taken literally thousands of specific actions that closed what had been open doors to terrorists acquiring a nuclear bomb, or nuclear materials from which they could have fashioned an improvised nuclear weapon. In terms of the MMOO framework, U.S. counterterrorism and counterproliferation actions have significantly diminished both the means and the opportunities.

On the counterterrorism front, the terrorist groups that sought to attack the United States with nuclear weapons have been decimated. Osama bin Laden, Khalid Sheikh Mohammed, and most of the operational talent behind 9/11 have been captured or killed. While Osama bin Laden's deputy, Zawahiri, succeeded him as head of al-Qaeda, and while several of the key operatives including Abdel Aziz al Masri, who led the organization's nuclear program, remain missing, the deadly pursuit of the entire roster of the organization by collaborative intelligence, Special Operations Forces, and drones has severely diminished al-Qaeda's ability to mount a nuclear terrorist attack.

Al-Qaeda's successor as the greatest terror threat to the United States, Islamic State of Iraq and the Levant (ISIL), has also suffered heavy losses in recent months. In 2014, ISIL acquired a broad swath of territory across Iraq and Syria—a safehaven in which it could train militants, plot attacks, and compile resources. While we know less about ISIL's efforts to acquire nuclear materials, the fact that the Belgian police discovered that ISIL agents involved in the 2015 terrorist attacks had surveillance footage of a Belgian nuclear research facility is suggestive.¹² Furthermore, its ideological centerpiece—an epic final battle with the West—would seem to require nuclear Armageddon. By wiping out its safehavens in Syria and Iraq, the United States and its partners have diminished ISIL's ability to organize a major effort to acquire nuclear weapons.

FACTORS AND ACTIONS THAT HAVE DECREASED THE RISK OF NUCLEAR TERRORISM

- Relentless U.S.–led campaign to destroy terrorists who sought to attack the United States.
- Development of defenses against terrorism to include the standup of fusion centers within the Federal Bureau of Investigation and the new Department of Homeland Security, and improvements to the Transportation Security Administration and border security.
- Multi-billion dollar increase in funding for intelligence groups targeting terrorism.
- Heightened public awareness of terrorist threat.
- U.S.–Russian nuclear security cooperation.
- U.S.–led Nuclear Security Summit process that created action-forcing deadlines.
- Complete removal of nuclear-weapons usable material from over a dozen countries
- More than 50 civilian research reactors shut down or converted from highly enriched uranium to low enriched uranium.
- Iran nuclear deal that halted Iran’s nuclear advance.

FACTORS AND ACTIONS THAT HAVE INCREASED THE RISK OF NUCLEAR TERRORISM

- Inexorable advance of science and technology, diffusion of nuclear know-how.
- North Korea’s growing nuclear stockpile, seen as a validation for rogue states that nukes = security.
- Metastasis of terrorists: AQ → ISIL → Affiliates →?
- U.S. airstrikes and special forces raids in seven Muslim-majority countries.
- Pakistan’s growing nuclear arsenal and development of tactical nukes.
- Collapse of U.S.–Russia nuclear security cooperation after Russia’s invasion of Ukraine in 2014.
- Erosion of confidence in the nonproliferation regime.
- Potential for large-scale reprocessing of plutonium in China and Japan.
- Growing possibility that the Trump Administration will let Iran escape the constraints on its nuclear ambitions.

In addition to these offensive counterterrorism efforts, the United States has taken extensive defensive actions to fortify the American homeland. An array of new agencies including the Department of Homeland Security, Transportation Security Administration, FBI Fusion Centers, and counterterrorism units in major state and local police forces now have tens of thousands of people working every day to keep Americans safe. The budget of the Central Intelligence Agency (CIA) and the 16 other agencies that comprise the IC have doubled since 9/11, most of that increase enhancing their ability to find and stop terrorists before they act.¹³

Major upgrades in border and port security make terrorists’ entry into the United States and smuggling of nuclear material or a weapon much more challenging. For example, 1,300 radiation detectors have been installed at ports nationwide since 9/11.¹⁴ A major transformation of the FBI to expand its mission beyond fighting crime to also include counterterrorism, along with a three-fold increase in the FBI budget, has increased its capacity to detect and thwart terrorist efforts.¹⁵ And across the entire society, a heightened public consciousness about the threat of terrorism that has created a culture of “see something, say something,” and a readiness among

many citizens to follow the lead of courageous passengers on Flight 93 and “do something,” have made the job of prospective terrorists more difficult.

On the nuclear security front, post-Cold War U.S.–Russia cooperation has been decisive in securing loose fissile material. At the end of the Cold War, 22,000 tactical nuclear weapons were scattered across 14 of the 15 newly independent states of the former Soviet Union. Moreover, 3,200 strategic nuclear weapons, most atop missiles that targeted American cities, remained stationed in Belarus, Kazakhstan, and Ukraine. Many of these weapons seemed fated to become “loose nukes.”

In December 1991, as the Soviet Union was teetering on the edge of collapse, then Secretary of Defense Dick Cheney was asked on *Meet the Press* what would happen to these nuclear weapons. Cheney offered a fatalistic prediction: “If the Soviets do an excellent job at retaining control over their stockpile of nuclear weapons . . . and they are 99 percent successful, that would mean you could still have as many as 250 that they were not able to control.”¹⁶

Thanks to the leadership of Senators Richard Lugar and Sam Nunn, Congress focused attention on this threat and provided funding for the Cooperative Threat Reduction program (CTR). This provided the means for the United States to work with Russia and these host nations to ensure that all tactical nuclear weapons were returned to Russia and firmly secured, and that the strategic nuclear weapons in Belarus, Kazakhstan, and Ukraine were eliminated. Twenty five-years on, not a single loose nuclear weapon has been discovered.

Dangerously, these cooperative U.S.–Russia initiatives to secure nuclear weapons and materials were suspended after Russia’s 2014 invasion of Ukraine.¹⁷ Fortunately, several other U.S.–Russia initiatives on nuclear terrorism remain intact. The Global Initiative to Combat Nuclear Terrorism, co-launched by Presidents Bush and Putin in 2006, encourages states to share best practices and build

capacity to detect and respond to terrorist threats on their soils. Through the Proliferation Security Initiative, launched in 2003, the United States, Russia, and more than 100 other states cooperate to prevent the smuggling of WMDs and their delivery systems.¹⁸ The 2005 Bratislava Initiative, spearheaded by Bush and Putin, bolstered physical security at Russian nuclear facilities.¹⁹ In addition, the 2010 New START Treaty reduced the number of deployed United States and Russian nuclear warheads and delivery vehicles.

At the multilateral level, the most consequential nuclear security initiative of the past decade was the series of Nuclear Security Summits initiated by President Obama. During the course of his two terms, four summits gathered heads of state from more than 50 countries to spur commitments from these leaders to secure nuclear material. By focusing the minds of leaders on this threat and the steps they could take to address it, the Nuclear Security Summits created an effective action-forcing process. The agenda, the meetings, the deadlines, and the necessity to stand up and speak up all move governments to act. The success of this initiative has largely gone unnoticed—but it is worth pausing to consider what could have happened had the Summits never taken place.

In 1991, when the Soviet Union collapsed, 52 states had nuclear weapons–usable material. By 2009, that number had been reduced to 38. Between the first summit in 2010 and the final one in 2016, the number of states with nuclear-weapons material that could fuel a terrorist’s bomb had been reduced to 24. In 2010, when the first Nuclear Security Summit was convened by President Obama, there were 15 nuclear bombs worth of weapons material in Ukraine at sites including Sevastopol and Kharkov. Thanks to the initiative, this threat was identified and a combination of inducements and pressure led then-Ukrainian President Viktor Yanukovych to act. In 2012, at the second Nuclear Security Summit

President Yanukovich announced that all nuclear weapons-usable material had been removed from Ukraine.²⁰ Had these materials remained where they were, what would have happened to these potential nuclear bombs when just two years later, government authority melted away after Russia invaded Crimea and destabilized Eastern Ukraine? The armed groups that seized government buildings would now have the means to make nuclear bombs. And one or another of the various splinter groups could even have decided to sell the core of a bomb to others in the black markets of the world.

In addition to risks of terrorists buying or stealing weapons-grade material, there is a further danger of terrorists attacking a nuclear plant in order to cause a Chernobyl- or Fukushima-like disaster. The master planner of the 9/11 attacks had considered crashing a jumbo jet into a nuclear power plant, such as Indian Point near New York City. Al-Qaeda's training manual lists nuclear plants as among the best targets for spreading fear in the United States. Thus additional work is required to improve security at these plants, including, for example, requiring armed guards at all sites that hold weapons-grade material or enough low-enriched fuel to cause a major release of radioactivity.

Another major success from the summits was the agreement by more than 100 nations to provide additional layers of protection for all nuclear material in their possession, including during storage, transport, and use. This Amendment to the Convention on the Physical Protection of Nuclear Material became legally binding in 2016. It updated the requirements of the original 1987 Convention, which obligated protection during international transport, but not during domestic storage and use.

Furthermore, since 2004, more than fifty civilian research reactors that had been fueled by highly-enriched uranium—that could also be used for weapons—have been either shut down or converted to run on low-enriched uranium, which is not

weapons-usable.²¹ Because civilian reactors are often less strictly guarded and monitored than military facilities, this is a significant development. Terrorists now have fewer targets from which to attempt to steal fissile material for a bomb.

Beyond the Summits, the Obama Administration's other major achievement on the counterproliferation front was to cut off pathways to a bomb for one of the world's leading state sponsors of terror. During its march over the previous decade to the point at which it was approaching a "break-out capability," Iran had crossed a dozen red lines. Thanks to an imaginative and determined negotiating strategy led by the United States, in 2015 the Permanent Five members of the Security Council and Germany concluded with Iran the Joint Comprehensive Plan of Action (JCPOA). The JCPOA verifiably interrupted all of Iran's major pathways to a weapon by preventing Iran from reprocessing plutonium or enriching uranium beyond 3.75 percent (weapons-grade uranium is enriched to 90 percent). Furthermore, by eliminating two-thirds of Iran's current centrifuges and 98 percent of its enriched-uranium stockpile, the agreement pushed Iran back at least a year from a bomb.²² Though critics still complain that the JCPOA allows too much space for Iran to "cheat," the deal imposes the most intrusive verification and inspection regime ever negotiated. This inspection regime substantially reduces the likelihood that Iran either acquires nuclear weapons itself or sells nuclear material to terrorist groups.

Factors and Actions That Have Increased the Risk of Nuclear Terrorism

Despite these successes, there have also been numerous missed opportunities and structural shifts during the past 13 years that have increased the risk of nuclear terrorism. Obama's success in Iran is offset by his failure to stop North Korea's nuclear

advance. North Korea is today the world's leading candidate to become "Nukes 'R' Us." Long known in intelligence circles as "Missiles 'R' Us" for having sold and delivered missiles to Iran, Syria, Pakistan, and others, it has repeatedly demonstrated its willingness to "sell anything it has to anybody who has the cash to buy it," as former Secretary of Defense Robert Gates famously noted.²³ Indeed, anyone who doubts that North Korea would sell to others the wherewithal to make a nuclear bomb should pause and examine what they did in Syria. As we learned after Israel attacked and destroyed the Yongbyon-model reactor at al-Kibar in Syria in 2007, North Korea sold materials, designs, and expertise to help Syria build a plutonium-producing nuclear reactor.²⁴ By now that reactor would have produced enough plutonium for a dozen nuclear bombs.

Moreover, what price did North Korea pay for having proliferated nuclear-weapons technologies and materials? In 2006, after watching North Korea test its first nuclear device and fearing that it might do something this reckless, President Bush issued a solemn warning. Declaring that sale or transfer of any nuclear weapon or nuclear-weapons material and technologies would cross a bright red line, Bush warned that any sale that violated this prohibition would be held "fully accountable."²⁵ But after North Korea was found to have disregarded this warning, how did the United States respond? When Israel informed the Bush Administration that it had discovered this

facility as the project was approaching completion, the United States not only failed to take military action itself to stop it, but urged Israel to take the issue to the United Nations. Just weeks after Israel disregarded U.S. advice and destroyed the reactor, the United States returned to the Six-Party Talks with North Korea. And less than a year later, President Bush gave the Kim regime a significant concession by removing it from the list of state sponsors of terrorism in return for inspections on and initial steps to dismantle the Yongbyon reactor—a deal that Pyongyang reneged on just six months later when it kicked out the inspectors and announced that it would resume reprocessing at the reactor.²⁶

When *Nuclear Terrorism* appeared in 2004, North Korea had yet to conduct a nuclear test. Since then, it has conducted six nuclear tests, including one in September 2017 that produced a yield ten-times that of the Hiroshima bomb.²⁷ In Obama's two terms, Kim Jong Un and his father, Kim Jong Il, conducted 80 missile tests. In Trump's first year in office, Kim Jong Un has so far conducted 20 additional missile tests, including three ICBM tests.²⁸ Today, North Korea stands on the threshold of a credible nuclear threat to the U.S.

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homeland. If North Korea succeeds in completing its nuclear deterrent, leaders of other rogue states will certainly take note.

As North Korea has continued violating UN injunctions to halt its nuclear and missile programs, the United States and its allies have ratcheted up

sanctions on the Kim regime. The United States and China now insist that the most severe sanctions ever are “biting” and that “maximum pressure” on North Korea will force the Kim regime to relent and comply in order to avoid collapse. Those who have been watching this issue for the past two decades have heard that hope before. Moreover, tightening sanctions give a cash-strapped regime greater incentives to turn to the nuclear black market.

The United States has warned Kim Jong Un that selling nuclear weapons or weapons-usable nuclear materials would cross an inviolable red line. But as noted above, President Bush drew this red line a decade ago for Kim’s father—but to no effect. At this point, how credible will another threat from the United States to “punish” North Korea for selling nuclear weapons or material be? Indeed, our predicament today is even more difficult. If Kim Jong Un launches his next series of ICBM tests and the IC concludes that he has the capability to attack the American homeland, how credible will any U.S. threat to punish North Korea for anything short of a full-scale attack on South Korea or the United States be? As Kim’s advisers will ask, if the United States is not prepared to act on its threat to prevent North Korea from acquiring the ability to strike the American homeland, why would they act if North Korea sold nuclear weapons to Iran?

Even if Trump succeeds in halting Kim’s progress short of a credible ICBM threat to the U.S. homeland, which seems unlikely at this point, the threat of nuclear terrorism emanating from North Korea will continue to require a significant U.S. campaign to deter and prevent. Due to the inability of previous administrations to stop North Korea’s progress earlier, a nuclear-armed North Korea, with the capacity and perhaps willingness to sell, will remain a major challenge not only for Trump but for his successors.

Another major long-term challenge is the relentless advance of science and technology and the accelerating diffusion of nuclear and radiological

know-how. The proliferation of advanced manufacturing has made it easier to produce components needed for a bomb. For example, the A.Q. Khan nuclear black market network manufactured key parts for centrifuges in workshops in Malaysia.²⁹ Furthermore, the widespread availability of radiological material in medical and research settings has led to the recognition that it is simply a matter of when, not if, terrorists detonate a dirty bomb. This reminds us of one of the hardest truths about modern life: the same advances that enrich and prolong our lives also empower potential killers to achieve their deadly ambitions.

While those potential killers are not as cohesively organized as they were prior to 9/11 when al-Qaeda had a coordinated WMD effort, the terrorist threat has metastasized. Al-Qaeda morphed into ISIL and an array of affiliates like al-Shabaab in Somalia. These newer terrorist organizations will undoubtedly splinter further as a result of the loss of ISIL and al-Qaeda’s main safehavens. But these groups have demonstrated a remarkable ability to find hosts in other fragile states around the globe, from Niger to Yemen, and even within more stable states, like Indonesia.

Furthermore, the widening scope of U.S. counterterrorism operations has continued to create new mutations. The United States has now conducted drone strikes and Special Forces raids in at least seven Muslim-majority countries: Afghanistan, Iraq, Libya, Pakistan, Somalia, Syria, and Yemen. Furthermore, with the Trump Administration’s recent announcement that it will begin flying drone missions out of a new base in Niger, this number will likely rise to include at least Niger and Mali, along whose borders many terrorists operate.³⁰ Despite major efforts to avoid civilian casualties, many strikes have resulted in significant collateral damage, providing fodder for terrorist recruiters.³¹ Thus, while U.S. counterterrorism operations have been immensely successful in hunting down high-level

militants, these efforts in each area must be weighed against the risk that operations could create more enemies than they kill.

The battle against Islamic extremist ideologies and their adherents will be a generational challenge. This is less a problem to be “fixed” than a condition that will have to be managed. It will require constant vigilance for as far as any eye can see. And as long as there are states that are unwilling or unable to suppress terrorists or expel them from their borders, they will find safe havens in which to continue. We should never forget that most of the planning and preparation for the 9/11 attack was done by an al-Qaeda cell in Hamburg, Germany. Moreover, while al-Qaeda’s core has been decimated, its remaining leaders continue to find refuge in the nuclear-armed ticking time bomb called Pakistan.

While rarely featured in the American media, the India–Pakistan relationship continues to be one of the most dangerous dynamics in the world. Underlying the relationship is a deep-seated animosity and seemingly irresolvable dispute over the status of Kashmir, a mountainous region between the two countries claimed by both. Their armies continue to frequently exchange fire across the “Line of Control” that separates India-controlled Kashmir from Pakistan-controlled Kashmir. In addition to remnants of al-Qaeda and the Taliban, Pakistan also harbors (and has given active support to) terrorist groups like Lashkar-e-Taiba (LeT) and Jamaat-ud-Dawa (JuD) whose primary target is India.

There have been two major terrorist attacks emanating from Pakistan this century: on the Indian Parliament in Delhi in 2001, and in a dramatic attack on the Taj Hotel in Mumbai in 2008.



The India–Pakistan border is among the most heavily armed borders in the world; both countries possess nuclear weapons, including tactical nuclear weapons. The orange line snaking across the center of the image is a fenced floodlit border zone between India and Pakistan that is one of the few places on earth where an international boundary can be seen at night. (NASA)

The 2001 attack led to a massive military buildup and standoff along the Line of Control. This came just two years after the Kargil War in 1999, which was just a year after both states conducted nuclear weapons tests.

Both states have been building up capabilities to prepare for the next crisis. In the hopes of persuading the government of Pakistan to prevent further attacks by quasi-independent militant groups like LeT and JuD, India has unveiled a “Cold Start” doctrine that threatens to respond to future attacks with a quick, decisive incursion of ground troops into Pakistani territory. The concept is to punish Pakistan for any terrorist attacks and force it to take actions to dismantle terrorist organizations. The hope is that stopping the invasion after penetrating just 10–15 kilometers into Pakistan will avoid triggering nuclear retaliation. However, Pakistan has responded in a way that not only makes its threat of a limited nuclear response more credible; it makes the risk of loss of Pakistani nuclear weapons much higher. Pakistan has been aggressively developing and planning deployments of tactical nuclear weapons and short-range Nasr missiles near the Indian border.³²

Nuclear security experts have rightfully sounded the alarm bells. Tactical nuclear weapons deployed to the frontlines pose a clear risk of theft by a rogue field commander or terrorist group. Moreover, the larger the number of weapons, the smaller and more transportable their size, and the wider their deployment, the higher the probability some will go missing.

India and Pakistan are both also actively producing fissile material and enlarging their nuclear arsenals. The Nuclear Threat Initiative’s Nuclear Security Index ranks India and Pakistan among the four least secure countries in the world for nuclear material, along with Iran and North Korea.³³

Perhaps most concerning for the global nuclear order, however, is what has happened in U.S.–Russia relations. The United States for two decades after

the collapse of the Soviet Union provided assistance to Russia through the CTR, helping to secure weapons and fissile material before anything made its way to the black market. Three years ago, in the wake of Russia’s invasion of Crimea and the Obama Administration’s decision to punish Putin by imposing strong sanctions and cancelling cooperative programs between the Department of Energy and its Russian counterpart, these activities stopped. Thus, patterns of sharing and cooperation that had included exchange of technologies and practices for protecting nuclear weapons and materials, disposing of plutonium, and identifying potential terrorists halted.

Ninety percent of all the nuclear weapons in the world remain in the United States and Russia. Moscow’s active participation in preventing theft and sale of nuclear weapons materials and sensitive technologies has made the difference between failure and success in preventing the spread of nuclear weapons. Whatever the state of relations between the two countries and their leaders, this reality cannot be denied. Technology has imposed on the two countries an inescapable partnership and absolute requirement for cooperation at least to a level that can avoid nuclear use, either against each other or by terrorists. In a phrase, however insufferable, Russia is America’s inseparable Siamese twin.³⁴

Trends in U.S.–China relations are also impacting the long-term nuclear order. As Thucydides taught us, when a rising power threatens to displace a ruling power, alarm bells should sound: danger ahead. This is the central argument of my recent book, *Destined for War: Can America and China Escape Thucydides’s Trap?* China’s economy has already overtaken the United States to become the largest economy in the world (measured by the metric that the CIA and the IMF agree is the best yardstick for comparing national economies).³⁵ At the 19th Party Congress in October 2017, President Xi Jinping reiterated China’s determination to build a military

commensurate with China's economic power that can, in his words, "fight and win." China has long maintained a "minimum deterrent" posture, with only a few hundred nuclear weapons (as opposed to several thousand for the United States and Russia). However, along with the rest of its military, China is strengthening this arsenal.

In addition, China has the fastest growing nuclear power industry in the world, with plans to install more than 100 gigawatts of nuclear power by 2030. As part of this effort, China plans to reprocess spent fuel into plutonium fuel for nuclear reactors.³⁶ Furthermore, Japan, which already has a huge stockpile of plutonium (enough for 1,300 nuclear weapons), plans to add to this stockpile by reprocessing spent fuel at its long-delayed Rokkasho plant.³⁷ As plutonium is produced, transported, and used on an industrial scale, the risks of theft increase.

Together these developments have been eroding confidence in the nonproliferation regime. Widespread recognition that North Korea is not going to denuclearize and the prospect that its ICBMs could soon threaten the United States are stimulating debate in South Korea and Japan about the reliability of U.S.-extended deterrence commitments. Sixty percent of South Koreans now support development of their own independent nuclear deterrent.³⁸ With the scars of Hiroshima, the Japanese public has a deep nuclear neuralgia. But their recently reelected prime minister, Shinzo Abe, is determined to amend the pacifist constitution in order to rebuild a Japanese military commensurate with its economic standing. As Henry Kissinger has been warning: "As this [North Korean] threat compounds, the incentive for countries like Vietnam, South Korea and Japan to defend themselves with their own nuclear weapons will grow dramatically."³⁹

On the Iranian front, President Trump has raised doubts about the future of the JCPOA constraints on Iran's nuclear program. During his speech to the UN General Assembly in September

2017, Trump called the Iran deal "one of the worst and most one-sided transactions the United States has ever entered into" and "an embarrassment to the United States."⁴⁰ In October, he took the first step toward burying the agreement by refusing to certify that Iran has been complying with the deal. If Congress takes the next step and reimposes sanctions on Iran's nuclear program, this violation of U.S. requirements under the deal would free Iran from the constraints the agreement imposes on its nuclear activity, and we could see it moving again towards a nuclear bomb. Alarmed by Iran's earlier efforts, Saudi Arabia developed plans for a nuclear energy program that would provide the infrastructure for its own weapons program. It has so far been unwilling to follow in the footsteps of its neighbor the United Arab Emirates (UAE) in pledging not to build an indigenous nuclear fuel cycle. A full fuel cycle to enrich uranium and reprocess plutonium would also provide the critical infrastructure for a nuclear weapons program. While the Trump Administration has said that a Saudi equivalent of the UAE agreement would be "desired," it has not insisted that this would be a requirement for U.S. support.⁴¹ If the Saudis develop an indigenous nuclear fuel cycle and the deal constraining Iran's nuclear program falls apart, we should expect to see an arms race in the world's most volatile region in which Israel, and perhaps others, will be tempted to act before the Middle East becomes a nuclear tinderbox.

Outlook

Preventive actions taken since 2004, both in counterterrorism and in counterproliferation, have been extraordinary. From the decimation of al-Qaeda to the Iran Deal and the Nuclear Security Summits, difficult actions taken by courageous and hard-working Americans and others have prevented the future we feared. For all of these successes, however, there have been a matching number of failures and structural shifts that are increasing the risk of successful

mega-terrorist attacks. To put it metaphorically, while there can be no doubt that we have been running faster, we have also been falling further behind.

Attempting to weigh both pluses and minuses to make a net assessment, I stand by my 2004 conclusion. I still believe that the chance of an attack during the next decade is slightly greater than even. But there is a lengthy agenda of actions that the United States and other nations could take today to reduce this risk and even reverse trend lines moving in the wrong direction.

Nuclear Terrorism outlined a strategic framework organized around “three no’s”: no loose nukes, no new nascent nukes, and no new nuclear weapons states. On the first, while there is more work to be done, U.S.–Russian cooperation, the Nuclear Security Summits, and related efforts deserve credit for making significant headway. On the second and third, the record earned a lower grade. While the Iran Deal prevented Iran from becoming a new nuclear weapons state, it came close to legitimizing its nascent nuclear weapons capability. And North Korea sped right through a series of red lines to become an operational, if diplomatically unrecognized nuclear weapons state.

Taking the three no’s as a framework, we can consider future actions that build on the success of the past 13 years to address some of the missed opportunities and structural barriers. There are three immediate actions that the Trump Administration should take.

First, in order to prevent loose nukes, it is imperative that the administration revive nuclear cooperation with Russia. This should include restoring the High-Level Russian-American Presidential Commission working group on nuclear energy and security, as well as cooperation under the CTR, especially between the two countries’ nuclear weapons labs. In addition, the United States and Russia should look to bolster the Global Initiative to Combat Nuclear Terrorism,

which currently focuses primarily on theoretical responses to attacks but could be utilized more for prevention. And U.S.–Russian intelligence cooperation in countering proliferation and terrorism, while always complex and tricky, should be deepened—even as the two nations struggle against each other on many other fronts.

The United States must oppose Russia in places where their interests are opposed, such as Ukraine. The United States cannot let Russian interference in the 2016 election go unpunished, or fail to find ways to prevent Russia from interfering in future elections. But the two nations should remember that even in the deadliest days of the Cold War, we seized opportunities to cooperate where vital interests converged. Most importantly, as Ronald Reagan repeatedly reminded us, “a nuclear war cannot be won and must never be fought.”⁴² Avoiding a general nuclear war of which the United States and Russia would be the first victims is an absolute requirement for surviving to have the opportunity to do anything else. After that, the clearest area of common interest is preventing nuclear terrorism. U.S.–Russia cooperation can advance both nations’ goals not only on the nuclear security front, but also in the wars against ISIL and al-Qaeda. The difference between a relationship in which the Americans and Russians are sharing intelligence, and one in which they are withholding it, directly impacts Washington’s ability to prevent terrorist attacks here at home. Bostonians saw a deadly example of this in 2013 when the two Tsarnaev brothers from Chechnya exploded pressure-cooker bombs at the finish line of the Boston Marathon. After-action reviews found that Russian security services had previously tipped off their American counterparts about one of the individuals, but that the information had been discounted because of the distrust among the parties.

Second, despite Trump’s desire to pull out of the JCPOA, it is imperative that he find ways to keep its constraints on Iran. If the consequence of whatever

he does is to free Iran from the strict limits on its nuclear ambitions, historians will judge him harshly. Fortunately, Trump's October 2017 refusal to certify Iran's compliance with the JCPOA will have no operational consequences unless Congress reimposes sanctions. Whatever else the Iran agreement did not do, it extended Iran's breakout time to a year, and thus prevented it from producing fissile material (and in turn, from giving such material to terrorists). It also imposed the most intrusive monitoring and inspection system ever implemented. While Iran's hostile regime continues to take actions that harm U.S. interests, like sponsoring terror groups including Hezbollah, if we pause to think what a nuclear-armed Iran could be doing, our overriding interest in preventing that should be obvious.

Third, the Trump Administration must develop a coherent strategy for deterring North Korea from selling nuclear technology. While there is a real possibility that Trump decides to attack (20–25 percent in my best estimate), the most likely outcome of the current standoff is that Kim wins. He completes the tests he needs for a credible ICBM, forcing the United States to move to a posture of deterrence, defense, and containment. This would mean trying to deter North Korea from any use of nuclear weapons by threatening to erase North Korea from the map if it were to attack the United States or its allies; defending against its nuclear threat by deploying layers of missile defense; and containing the regime and encouraging its internal contradictions to hollow it out as we did in the Cold War against the Soviet Union.⁴³ But this will leave us for some years to come with the question of how to prevent Kim from selling nuclear weapons or materials to terrorists. The United States and its international partners will bolster monitoring of shipping in and out of North Korea and seek to persuade others to deny North Korean aircraft overflight rights so that it cannot transport weapons to potential buyers. We should also expect the Trump Administration

to communicate to Kim a clear message—if any nuclear bomb of North Korean origin were to explode on American soil or that of an American ally, the United States will respond as though North Korea itself had hit the United States with a nuclear-tipped ICBM. Despite these and other best efforts, however, the question will remain: in the aftermath of a failure to prevent Kim from developing the capability to attack the American homeland, what other threat for actions short of an attack on the United States or our allies will he believe?

In addition to these short-term steps, President Trump should embrace three long-term initiatives that he could pass to his successor. First, the United States should find a way to institutionalize the Nuclear Security Summit process. One of the most important elements of combatting nuclear terrorism is making it a top national security priority. By convening heads of state on a biannual basis, the Nuclear Security Summits raised awareness of this threat, galvanized high-level attention to actions nations could take to reduce risks, and spurred real commitments. There is much more work to be done in further reducing the number of states with nuclear weapons materials, securing loose fissile material, and securing civilian nuclear programs.

Second, the United States must continue to invest in new technologies to enhance our ability to detect and prevent the smuggling of nuclear materials. For example, advances in high-energy particle physics provide hope for improving port and border monitoring and security. These include, for example, muon detectors, which utilize the high-energy particles from cosmic rays to detect openings in structures. Using muon detectors, archeologists recently discovered, for the first time since the 1800s, a new room in the Great Pyramid of Giza.⁴⁴ Los Alamos National Laboratory and Decision Sciences are working on muon detectors that can identify nuclear materials concealed in shipping containers, with one detector already deployed in the Bahamas.⁴⁵ Technology offers

our best hope for managing the tension between our need for security and the flow of travelers and goods in a globalized world.

Finally, and perhaps most ambitiously, the Trump Administration should address the geopolitical conflict that fuels nuclear danger in South Asia. The growing stockpiles of fissile material in India and Pakistan, combined with lax nuclear security procedures, have created a serious and growing risk of loose nuclear material or weapons. The United States should work with its international partners—especially China, which is one of Pakistan’s closest patrons—not just to improve physical security, security culture, and border security, but also to deal with underlying issues. While direct nuclear security cooperation between India and Pakistan is perhaps too much to hope for, parallel efforts by the United States in India and China in Pakistan could help to reduce these risks. And increased cooperation on these issues would help the United States and China manage the larger Thucydidean tension between the two countries.

Confronting what *Nuclear Terrorism’s* subtitle called “the ultimate preventable catastrophe,” we cannot continue to count on beating the odds. A decent respect for civilization as we know it compels us to do everything we can to change them. Actions taken during the past 13 years have made a significant difference. Osama bin Laden did not die a natural death. But we need a new surge of imagination and sustained commitment by America’s brightest strategic and scientific minds to address the multiple dimensions of this most complex challenge. If we pause and reflect on what our lives will be like the day after a great city in the world is devastated by a single terrorist nuclear bomb, we can do no less. **PRISM**

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Photos

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Acknowledgements

The author would like to thank Mr. William Ossoff for his exceptional research assistance, and Mr. Matthew Bunn, Mr. William Tobey, and Mr. Rolf Mowatt-Larssen for their thoughtful review of early drafts of this article.