

Assignment before next class

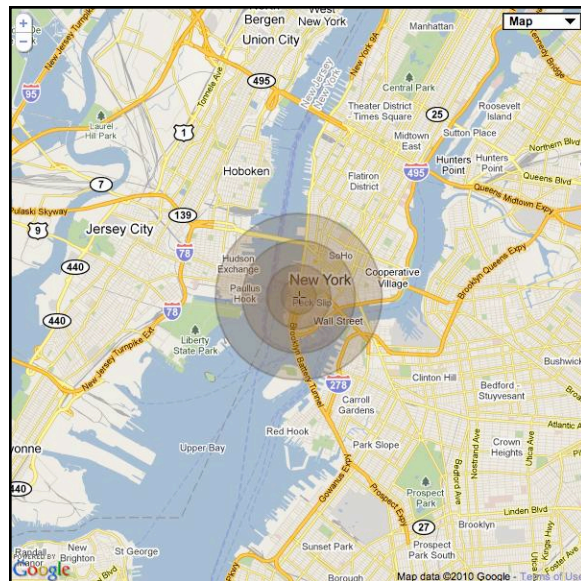
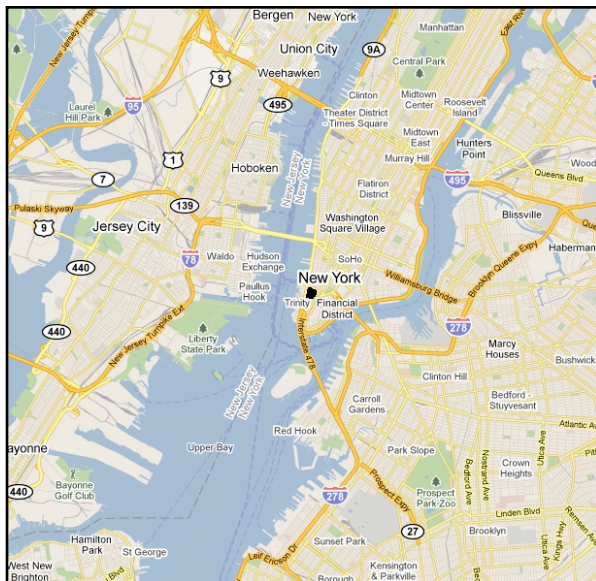
Read this handout. If not already done, finish reading handout #1's section on "The Physics of Nuclear Weapons," which starts on page 13.

Watch a [short video](#) of an above ground nuclear test and another about "[duck and cover](#)." Note how the film tries to normalize a nuclear attack by likening the damage to sunburn, fires, etc. While duck and cover may sound like a joke, I was shown that film in elementary school, and we practiced duck and cover on a regular basis, just like fire drills.

Optional reading: Prof. Hecker's [2008](#) and [2010](#) papers quoted later in this handout.

How destructive are nuclear weapons?

An [online tool](#) allows you to assess the damage that would occur for different size detonations at different locations. I used this to produce the second map shown below, reproduced from Handout #1. The two maps contrast the damage caused by the 9/11 terrorist attack on the World Trade Center (the small black area under the E of New York, near the tip of Manhattan, on the first map) with a 10 kiloton nuclear terrorist attack, centered at the same location. Terrorists probably would attack a more central location, wreaking even more havoc.



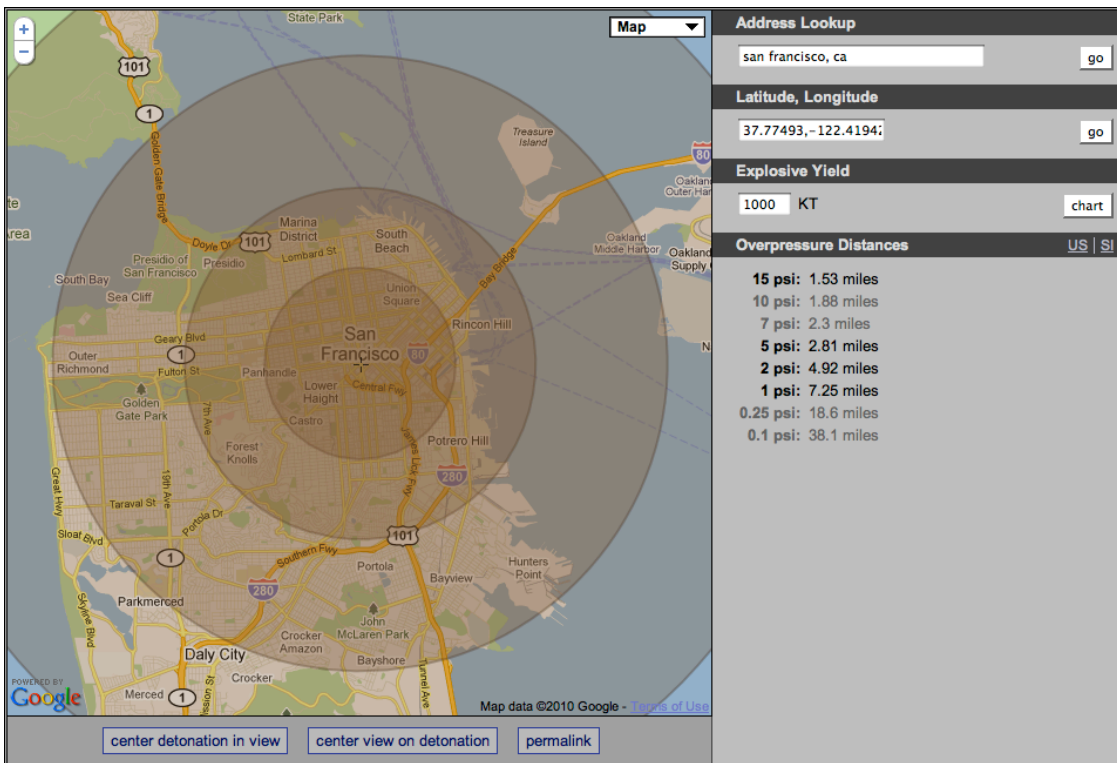
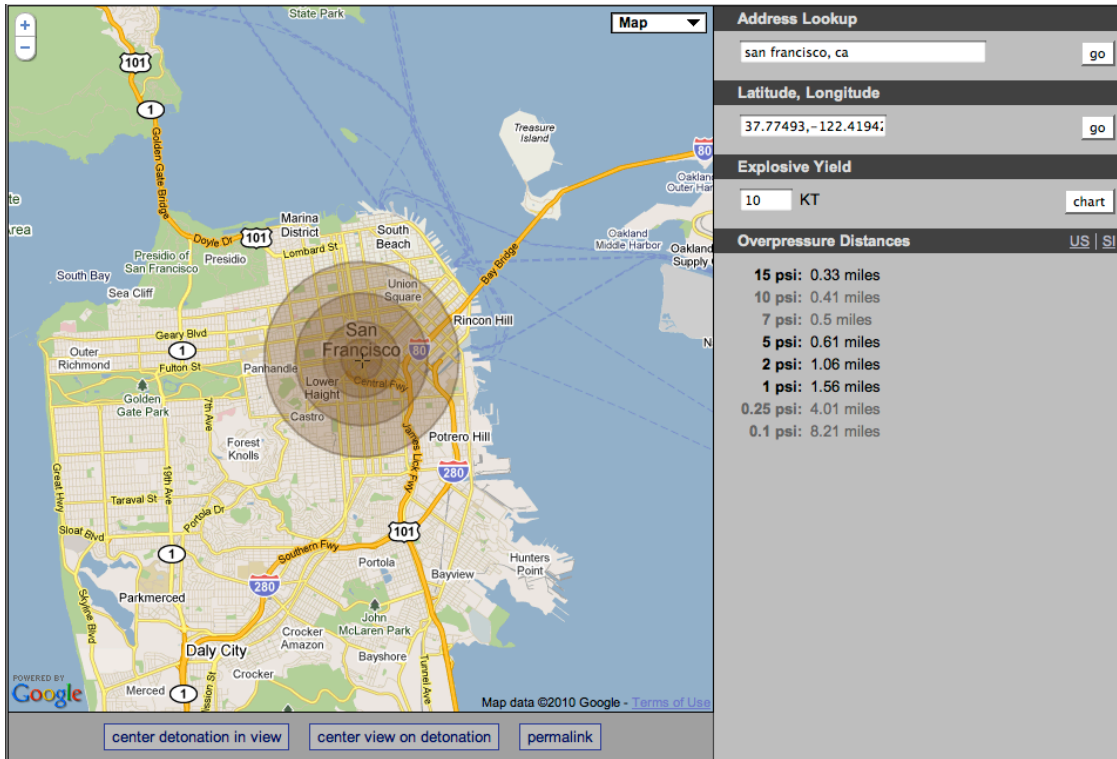
The weapon used on Hiroshima had a yield of approximately 15 kilotons, in the same ballpark as the nuclear terrorist attack depicted above. The next page has three pictures showing the physical and human devastation wreaked by that one, relatively primitive weapon. (Col. Paul Tibbets, whose name appears on the first photo, piloted the plane that dropped the bomb. It was named the *Enola Gay* after his mother.)



While, as shown in the figure on page 20 of Handout #1, the Hiroshima bomb was much larger, over time we learned how to miniaturize warheads to the point that by the late 1950's they were "suitcase size," as shown in this picture of the Davy Crockett nuclear gun. The nuclear weapon is the bulbous device at the end of the tube.



To make this a bit more personal, the next page shows the blast circles for an attack centered on San Francisco's financial district. The first map is for a 10 kiloton weapon, the same as shown earlier for an attack on New York, and typical of what terrorists might mount. The second map is for a strategic warhead with a yield of 1 megaton, typical of what might be expected in a nuclear war. In both maps, the innermost circle shows 15 psi overpressure, causing complete destruction even of reinforced concrete structures, such as skyscrapers. The second circle shows 5 psi overpressure, causing complete destruction of ordinary houses. The third circle shows 2 psi overpressure, enough to cause severe damage to ordinary houses, and light to moderate damage to reinforced concrete structures. The fourth circle (which extends almost to the limits of the second map, so look carefully) shows 1 psi overpressure, which will cause light damage to all structures, and light to moderate damage to ordinary houses. To put "light damage" in context, only 0.25 psi overpressure (one-quarter that shown in the last blast circle) is required to shatter most glass surfaces, such as windows, some with enough force to cause serious injury.



All of the above was focused on a single nuclear detonation, as in a terrorist attack or an accidental launch of a single missile. If India and Pakistan were to use their arsenals (about 150 weapons in total) in a war, recent research has indicated the possibility of a “nuclear autumn,” in which the firestorms caused in those nations’ megacities would put massive amounts of smoke into the stratosphere, where it would remain for years. (More normal fires don’t reach that altitude and their smoke dissipates much more rapidly when rain washes out their smoke.) Computer modeling estimated a billion deaths worldwide due to starvation as agriculture collapsed due to the reduced sunlight reaching the earth. While this was a model and may have overlooked factors that would change the results, prudence would seem to dictate paying more attention to this threat and trying to reduce its risk.

With the United States and Russia each having on the order of 10,000 nuclear weapons in its arsenal (roughly 70 times what India or Pakistan has), a full-scale nuclear war is almost beyond imagination and conjures up images of mythic proportions. In a 1961 speech to a Joint Session of the Philippine Congress, General Douglas MacArthur, stated, “Global war has become a Frankenstein to destroy both sides. ... If you lose, you are annihilated. If you win, you stand only to lose. No longer does it possess even the chance of the winner of a duel. It contains now only the germs of double suicide.”

In 1986, former Secretary of Defense Robert McNamara expressed a similar view: “If deterrence fails and conflict develops, the present U.S. and NATO strategy carries with it a high risk that Western civilization will be destroyed.”¹ In January 2007, George Shultz, William Perry, Henry Kissinger and Sam Nunn [echoed those concerns](#) when they quoted President Reagan’s belief that nuclear weapons were “totally irrational, totally inhumane, good for nothing but killing, possibly destructive of life on earth and civilization.”

DoD and related studies, while couched in less emotional terms, still convey the horrendous toll that a full-scale nuclear war would exact: “The resulting deaths would be far beyond any precedent. Executive branch calculations show a range of U.S. deaths from 35 to 77 percent (i.e., from 79 million to 160 million dead) ... a change in targeting could kill somewhere between 20 million and 30 million additional people on each side ... These calculations reflect only deaths during the first 30 days. Additional millions would be injured, and many would eventually die from lack of adequate medical care ... millions of people might starve or freeze during the

¹ Robert S. McNamara, *Blundering Into Disaster*, Pantheon Books, New York, 1986, page 6.

following winter, but it is not possible to estimate how many. ... further millions ... might eventually die of latent radiation effects.”²

On page 9, that same 1979 OTA report also noted the possibility of serious ecological damage, a concern that assumed a new potentiality when the “TTAPS Report”³ noted that the ash and dust from so many nearly simultaneous nuclear explosions and their resultant firestorms might usher in a “nuclear winter” that could erase *homo sapiens* from the face of the earth, much as many scientists now believe the dinosaurs were wiped out by an “impact winter” caused by ash and dust from an asteroid impacting the Earth 65 million years ago. The TTAPS report produced a heated debate, and there is still no scientific consensus on whether a nuclear winter would follow a full-scale nuclear war.

In summary, a full-scale nuclear war would devastate civilization, and possibly bring an end to human life.

How likely is nuclear terrorism?

Osama bin Laden has made no secret of his desire to obtain nuclear weapons and [kill millions of Americans](#). This threat is more serious than most people realize because the main obstacle to making a bomb is obtaining the nuclear fuel, and that is not always as well guarded as it should be. As noted in Handout #1’s overview, the apartheid regime in South Africa had a small nuclear arsenal that was dismantled as that regime came to an end. The highly enriched uranium (HEU) fuel from about a dozen bombs is stored in their Pelindaba facility, which was successfully [attacked and entered](#) by armed men in November 2007. Watching the 13 minute [video interview](#) with the survivors of that attack was assigned in Handout #1, and conveys the risk of nuclear terrorism more powerfully than anything else I’ve seen.

In light of such information, it should not be surprising that former Secretary of Defense William Perry has quoted the odds of a nuclear terrorist attack within the next ten years as roughly 50-50. Republican Senator Richard Lugar conducted [a survey](#) of 85 national security experts that reached a similarly alarming conclusion. (See pages 14-15 of that document for the relevant data.) In *Nuclear Tipping Point*, former Secretary of State and former National Security Advisor Henry Kissinger states that “If the existing nuclear countries cannot develop some restraints

² Office of Technology Assessment, "The Effects of Nuclear War," May 1979, page 8. Available from NTIS, order #PB-296946. Also accessible [online](#).

³ Turco, R.P., Toon, A.B., Ackerman, T.P., Pollack, J.B., and Sagan, C., "Nuclear Winter: Global Atmospheric Consequences of Nuclear War," *Science*, vol. 222, 1983.

among themselves – in other words, if nothing fundamental changes, then I would expect that the use of nuclear weapons in some 10-year period is very possible.”

Matthew Bunn's MIT thesis, [Guardians at the Gates of Hell](#): provides additional reasons for concern, for example:

Page 38: Al Qaeda has ... explicitly set inflicting the maximum possible level of damage on the United States and its allies as one of their organizational goals. Intercepted al Qaeda communications reportedly have referred to inflicting a “Hiroshima” on the United States. Al Qaeda's spokesman, Sulaiman Abu Ghaith, has argued that the group “has the right to kill 4 million Americans – 2 million of them children,” in retaliation for the deaths the group believes the United States and Israel have inflicted on Muslims. Bin Laden sought and received a religious ruling (fatwa) from an extreme Saudi cleric in May 2003 authorizing the use of weapons of mass destruction to kill American civilians

Page 15: The al Qaeda terrorist network and elements of the global network it has spawned have made repeated attempts to get nuclear bombs or weapons-usable nuclear materials to make them, and they have repeatedly tried to recruit nuclear weapons scientists to help them.

Page 20: Osama bin Laden has made his desire for nuclear weapons clear in public statements. Al Qaeda launched a focused effort to get such weapons ... long before the 9/11 attacks, and this effort has continued.

Pages 36 and 44-45: terrorist teams [have been] carrying out reconnaissance at nuclear weapon storage sites and on nuclear weapons transport trains in Russia, whose locations and schedules are [supposed to be] state secrets; [There have also been] reports that the 41 heavily armed terrorists who seized hundreds of hostages at a theater in Moscow in October 2002 considered seizing the Kurchatov Institute, a site with enough highly enriched uranium (HEU) for dozens of nuclear weapons ... Aum Shinrikyo, the Japanese doomsday cult [responsible for the 1995 poison gas attack on the Tokyo subways which killed 12 and injured over 1,000] ... reportedly recruited staff members at the Kurchatov Institute.

While the threat of nuclear terrorism is often viewed as independent from that of nuclear war, there are at least two important areas of overlap. First, large arsenals assembled for fighting a nuclear war make it more likely that terrorists will get their hands on one. While most Americans worry primarily about “loose nukes” in the former Soviet Union, we also need to pay greater

attention to laxity in our own procedures. The US Air Force [lost six nuclear warheads](#) in August 2007, when a B-52, supposedly loaded with twelve cruise missiles with dummy warheads, flew from Minot AFB in North Dakota to Barksdale AFB in Louisiana. After a day and a half it was discovered that six of the twelve warheads were real – a major error. Until that mistake was uncovered, these six nuclear weapons were inadequately protected from theft by terrorists and others intent on obtaining such a prize. It's hard to keep track of 10,000 nuclear weapons (the approximate size of the American arsenal), making the terrorists job easier.

Another connection between nuclear terrorism and nuclear war is the danger that a nuclear terrorist incident could act as the catalyst for starting a nuclear war. This idea was treated fictionally in Tom Clancy's *The Sum of All Fears*, but also has a factual basis as detailed by CISAC's Dr. Pavel Podvig in a [2006 blog post](#):

[Is it possible that] Russia would believe, if only for a brief moment, that the United States might attack it? Normally, the answer is no. After all, the cold war has been long over and there has been no shortage of declarations of partnership between Russia and the United States. However, we should not overestimate the ability of the militaries to change and to adjust their operational practices and plans to the new realities. The strategic weapon systems that they operate were built with cold-war missions in mind and it is only natural that they impose cold-war thinking on their operators.

Here are some examples. One of the fighter pilots who was scrambled into the air on September 11, 2001 was reported to testify that: "I reverted to the Russian threat – I'm thinking cruise missile threat from the sea. You know, you look down and see the Pentagon burning and I thought the bastards snuck one by us."

If on September 10, 2001 someone would suggest that a U.S. pilot would assume that Russia might attack the United States, that person would have been laughed out of the room. But this is exactly what happened. Two more "coincidences" of that day – NORAD was scheduled to conduct an exercise, known as Vigilant Guardian, "which postulated a bomber attack from the former Soviet Union" (look for Note 116 in the 9-11 Commission Report), while Russian strategic bombers were indeed conducting an exercise that involved flights in the direction of the United States. As far as we know, NORAD never began the exercise that day and the Russian military grounded the bombers as soon as they learned about the events in the United States, but the number of coincidences is quite alarming.

Not that there are any signs that the military on both sides have changed their plans and no longer practice attacking each other. Just recently Russia conducted a large-scale exercise of its strategic bombers, in which they got close enough to the United States to be intercepted by NORAD fighter planes. The United States also routinely conduct exercises that involve a nuclear exchange with Russia.

How likely is nuclear proliferation?

The United States became the charter member of the “nuclear club” when it tested an atomic bomb at Alamogordo, New Mexico on July 16, 1945. It cemented its status as the world’s sole superpower the next month when it used these weapons on Hiroshima and Nagasaki. Not willing to live in the shadow of an all-powerful America, the Soviet Union accelerated its own nuclear program and conducted a successful test in 1949. The United Kingdom and France, both eager to regain some of their former power, joined the club in 1952 and 1960 respectively. China, which had split with the Soviet Union and fought the United States in Korea, conducted its first test in 1964. India, which had fought a border war with China in 1962, joined in 1974. That led Pakistani Prime Minister Zulfikar Ali Bhutto to declare that, if need be, Pakistanis would “eat grass” in order to acquire their own bomb.⁴ Pakistan conducted a successful test in 1998. North Korea, after initially ceasing its nuclear weapons program under the 1994 Agreed Framework, restarted that effort in 2002⁵, and conducted its first nuclear test in 2006.

Israel, while not a declared nuclear weapons state, is [estimated to have](#) approximately a hundred warheads. [South Africa](#) was also an undeclared nuclear weapons state, but as the apartheid government prepared for majority rule, signed the Nuclear Nonproliferation Treaty (NPT) in 1991 and dismantled all of its nuclear weapons. This is one of the most stunning success stories in nonproliferation history. Unfortunately, we are currently facing a possible proliferation avalanche. In addition to Japan and South Korea’s concerns over North Korea’s nuclear weapons, Iran appears to be on a course to become, at a minimum, a virtual nuclear weapons state – meaning that it would have the ability to create nuclear weapons in short order should it decide that was in its vital interests. A nuclear Iran would put immense pressure on the nonproliferation regime throughout the Middle East.

⁴ The United States originally pressured Pakistan not to pursue a nuclear weapons program. But, following the Soviet invasion of Afghanistan in 1979, America put non-proliferation concerns on hold because Pakistan played a key role in funneling supplies to the *mujahideen* (including Osama bin Laden and what became *al Qaeda*). A [Congressional research report](#) provides more details in its section on “Alternating U.S. Policy Priorities Towards Pakistan.”

⁵ As we will cover later, there is strong evidence that, if the United States had not taken certain actions in 2002, North Korea probably would not have the bomb today. That statement was made by former Los Alamos Director, and now Stanford Professor, Siegfried Hecker in this seminar in the Winter of 2010.

There is also significant danger in the large number of nations that have commercial nuclear power reactors, and in the predicted renaissance of nuclear power to reduce emissions of greenhouse gases. This problem was highlighted in [an essay](#) by Dr. Theodore Taylor⁶ that appeared in a book I co-edited with Anatoly Gromyko back in 1987. Taylor wrote:

Deterrence, the cornerstone of national security in present strategies, fails against nuclear terrorism simply because there are no well-defined targets against which to retaliate. ... Even where there is no current diversion of nuclear materials, the worldwide spread of plutonium produced in civilian nuclear power reactors has produced “latent proliferation” — the ability to produce nuclear weapons in short order — in every country with a nuclear power plant. Nuclear explosives can be made with less than 6 kilograms of plutonium, in size about enough to fill a coffee cup. The world’s present [1987] inventory of plutonium produced in civilian reactors is roughly 700,000 kilograms, greater than the total amount in the world’s nuclear arsenals. This plutonium is being produced in thirty-six countries. By the year 2000, there will be more than 3 million kilograms of plutonium in the world, enough for at least 500,000 nuclear weapons.

In summary, nuclear proliferation is a serious issue that deserves much greater attention than it receives. It would also be wise to revisit past decisions, such as the one made by the United States after the Soviets invaded Afghanistan, that nuclear nonproliferation was less important than aiding the Pakistani-based *mujahideen*, many of whom we are now fighting after our own invasion of Afghanistan.

Can the U.S. reduce the likelihood of nuclear proliferation?

When most people think of nuclear proliferation, their minds focus on ways to pressure Iran, North Korea and other potential proliferators to stop their programs or, in the case of North Korea, to give up its nascent arsenal. Little attention is directed to ways that we in the United States could change to help prevent nuclear proliferation. The following personal story explains why I believe, if we start to think that way, we can not only help stop nuclear proliferation, but make ourselves more powerful in the process:

About 25 years ago, as my wife Dorothea and I were getting our relationship in order, we had a number of highly charged disagreements. (Straightening things out usually involves conflict.)

⁶ Dr. Taylor was one of America’s most brilliant nuclear weapons designers, and is the subject of John McPhee’s book *The Curve of Binding Energy*. When I was editing Taylor’s essay, he told me that he originally worked on nuclear weapons in the belief that they made war impossible. During Viet Nam, the fallacy of his belief system became evident and he decided to try and “undo with the second half of my life what I had done with the first half.”

During one of these fights, after we had disengaged temporarily, but while both of us were still deeply hurt, it was infuriating to me that she had treated me so badly, yet was mad at me. In my mind, I had done nothing wrong. Then I thought: “Would I rather that my perception reflected reality, in which case I was powerless and had to wait for Dorothea to come to her senses? Or would I rather that I bore some of the responsibility for this fight, in which case I had some power to help end it by correcting my part?” Clearly the latter! With that motivation, plus some training⁷, I came to see my part in the fight. That, in turn, helped me to see that Dorothea’s perspective had much more validity than I had been able to see before, when I was feeling self-righteous. My doing that totally changed the dynamic and things got better rapidly.

That same kind of critical thinking is needed at a national level to avoid international – and especially nuclear – catastrophes. As with my marriage, that doesn’t mean that the United States is solely at fault, just that moving past self-righteous anger has the potential to help us solve the problem. And, rather than emasculating us, such introspection has the potential to give us greater power, albeit of a different form from the usual. At times, we may face a true madman (e.g., Hitler), but always assuming that is the case – as we now tend to do – is a recipe for disaster.

With that preamble, let’s briefly review how I define critical thinking and then apply it to arguments that, even though the United States is opposed to nuclear proliferation, we have played an unwitting role in encouraging such behavior.

Critical Thinking

There are many ways to practice critical thinking, but perhaps the most important first step is to recognize that many seemingly absolute truths are, in fact, mere beliefs. It is easy to see this in terms of past errors in human thinking, such as believing the earth was flat, or that the sun revolved around the earth, but harder to see in terms of society’s currently cherished beliefs.

At times, critical thinking requires that we discard perspectives that turn out to be false. But, more frequently, critical thinking involves adding a perspective that our previous world view lacked. In that case, rather than forcing us to discard our old idea, critical thinking adds a new dimension to our understanding.

A good example from science is the nature of light. In the 17th and 18th centuries, scientists argued whether light was a particle or a wave. Newton, for example, was in the particle or

⁷ We were exposed to this training through an organization called Creative Initiative Foundation, which was founded by [Prof. Harry Rathbun](#) and his wife Emilia. The [Rathbun lecture series](#) was established to carry on Prof. Rathbun’s tradition at Stanford. My relationship to the Rathbuns was mentioned briefly in Handout #1, and is covered in more detail [on my web site](#).

corpuscular camp. In the late 19th century, Maxwell developed a set of four elegant equations that clearly showed light was a wave. The particle nature of light came to be seen as a quaint theory that no educated individual could possibly embrace. Thus, when in 1900, Max Planck could only explain “black body radiation” by assuming that light was emitted in packets of a fixed size, he saw this as “a purely formal assumption,” and did not recognize its importance. Giving the particle nature of light any more prominence probably felt like going back to the incorrect thinking of two centuries earlier. Five years later, Albert Einstein’s work on the photoelectric effect helped him recognize that light, while at times exhibiting wave-like behavior, at other times behaved like a particle. By expanding his world view from one where light must be either a wave or a particle to one where light could exhibit both properties, Einstein laid the foundation for quantum mechanics, a branch of science that has given us many modern marvels, including integrated circuits that power personal computers and the Internet. Such paradigm shifts always involve embracing what previously seemed to be patently false or impossible. My invention, joint with Diffie and Merkle, of public key cryptography, while not in the same league as the discovery of quantum mechanics, also involved breaking out of a mindset that had restricted thinking in the field. Roughly 100 years prior to our discovery, the field had been modernized by (correctly) requiring that all secrecy reside in the key. With that requirement, how could the key be public? The answer lay in recognizing that there could be two keys, one public and one secret.

The value of critical thinking also can be explained by the story of the three blind men and the elephant:

Three blind men who have never experienced an elephant stumble onto one – literally. The first one finds the tail and is sure that the elephant is a rope. The second, who has run into the leg, is sure this is a tree. The third touches the trunk and knows it is a serpent. As frequently happens when people with such incompatible perspectives meet, they start to argue and eventually come to blows. Each has a piece of the truth, but so long as they assert that their perspective is the whole truth, it becomes a falsehood. Only by opening their minds to new perspectives can they come closer to the truth.

The story of the blind men and the elephant helps explain a saying that otherwise might be enigmatic: *The greatest value is in the opposing point of view*. If you and I agree on something, we cannot learn from one another. But, if we disagree, there is a chance that we can learn something new from one another. Note that the saying was not: *The greatest value is always in the opposing point of view*. Sometimes the other point of view really is wrong. But, until we truly open our minds to the opposing point of view, it is impossible to determine whether the other person is wrong or merely appears wrong from our vantage point. I can attest that often this is not easy to do, but well worth the effort.

Having defined what we mean by critical thinking, let's now apply it to nuclear proliferation by Iran and North Korea. As you read those two sections, please remember why I emphasize little known facts that help put some of those nations' actions in a more positive light. I do not do so out of a mistaken belief that these nations should be coddled. Rather, I do it because understanding their perspective will allow us to more effectively address the legitimate elements of their security needs, so that we have a greater chance of halting, and later, reversing their nuclear programs that threaten world stability.

Iran⁸

We view our relationship with Iran through the prism of 1979 when, in violation of all international norms, Iranians stormed our embassy and took its personnel hostage. In contrast, the Iranian viewpoint revolves around 1953, when a CIA-backed coup overthrew the popular, democratically elected Mossadeq government and installed the Shah, beginning what many Iranians regard as a twenty-six year reign of terror under a police state. (Of course, when that regime disintegrated, it led to an even worse reign of terror under the ayatollahs.)

In spite of the antagonism and fear that Iran and Israel bear for one another, there is a surprising parallel between their world views which is described by Iranian emigre Trita Parsi in his book, *Treacherous Alliance: The Secret Dealings of Israel, Iran, and the United States*:

And like Israelis, Iranians are deeply suspicious of the outside world. While Jews have been persecuted and have survived a Holocaust, Iranians have fought colonization, annexation, decades of foreign intervention, and, last but not least, an eight-year war with Saddam Hussein's Iraq, in which virtually the entire world – including the United States – sided with Iraq. When Saddam invaded Iran in 1980 ... it took the Security Council more than two years to call for withdrawal of the invading forces. (Compare that to Saddam's 1990 assault on Kuwait, when a Security Council resolution passed within 12 hours of the invasion) ... Another five years passed ... before the UN addressed Saddam's use of chemical weapons against Iranian soldiers and civilians. (The United States and Western European countries either directly sold components for chemical weapons to Saddam or knew and quietly approved of such sales.) ... The United States later cited the same crimes to justify its invasion of Iraq in 2003. For the Iranians, the lesson was clear: When in danger, Iran can rely on neither the Geneva Conventions nor the UN charter for protection. Just like Israel, Iran has concluded that it could rely only on itself.

⁸ Ms. Sarah Mantels, a student who took this seminar in the Autumn of 2010, contributed to this section.

Our practice of threatening Iran, particularly with nuclear weapons, has the unintentional effect of increasing its motivation to develop a nuclear capability. In 2006, Seymour Hersh wrote in [The New Yorker](#):

A senior Pentagon adviser on the war on terror expressed a similar view. “This White House believes that the only way to solve the problem is to change the power structure in Iran, and that means war,” he said. The danger, he said, was that “it also reinforces the belief inside Iran that the only way to defend the country is to have a nuclear capability.” ... One of the [American] military’s initial option plans [for destroying Iran's nuclear program] ... calls for the use of a bunker-buster tactical nuclear weapon, such as the B61-11, against underground nuclear sites.

Jeffrey Goldberg’s [September 2010 article](#) in *The Atlantic* also had the unintentional effect of adding urgency to Iran’s nuclear program. Goldberg interviewed Israeli leaders, including Prime Minister Benjamin Netanyahu, and concluded that either American or Israeli military action against Iran was likely if sanctions did not work (as they have not) before December 2010:

Netanyahu's belief is that Iran is not Israel’s problem alone; it is the world’s problem, and the world, led by the United States, is duty-bound to grapple with it. But Netanyahu does not place great faith in sanctions ... based on my conversations with Israeli decision-makers, this period of forbearance, in which Netanyahu waits to see if the West’s nonmilitary methods can stop Iran, will come to an end this December. ... Several Arab leaders have suggested that America’s standing in the Middle East depends on its willingness to confront Iran. They argue self-interestedly that an aerial attack on a handful of Iranian facilities would not be as complicated or as messy as, say, invading Iraq. ... Benjamin Netanyahu feels, for reasons of national security, that if sanctions fail, he will be forced to take action.

Somewhat ironically, the father of the Iranian revolution, Ayatollah Ruhollah Khomeini, shut down the Shah’s nuclear program as un-Islamic when he first came to power. *Newsweek* columnist Fareed Zakaria [wrote in 2009](#):

Everything you know about Iran is wrong, or at least more complicated than you think. Take the bomb. ... President Mahmoud Ahmadinejad has quoted the regime's founding father, Ayatollah Ruhollah Khomeini, who asserted that such weapons were “un-Islamic.” The country's Supreme Leader, Ayatollah Ali Khamenei, issued a fatwa in 2004 describing the use of nuclear weapons as immoral. In a subsequent sermon, he declared that “developing, producing or stockpiling nuclear weapons is forbidden under Islam.” Last year Khamenei reiterated all these points after meeting with the head of the International Atomic Energy Agency, Mohamed ElBaradei. Now, of course, they could all

be lying. But it seems odd for a regime that derives its legitimacy from its fidelity to Islam to declare constantly that these weapons are un-Islamic if it intends to develop them. It would be far shrewder to stop reminding people of Khomeini's statements and stop issuing new fatwas against nukes.

Following a civilian nuclear strategy has big benefits. ... And if Tehran's aim is to expand its regional influence, it doesn't need a bomb to do so. Simply having a clear “breakout” capacity⁹ – the ability to weaponize within a few months – would allow it to operate with much greater latitude and impunity in the Middle East and Central Asia.

Only after Iraq used chemical weapons against Iran in the early 1980's and the world was silent, did Iran restart its nuclear weapons program. Henry Sokolski's article “The Bomb and Iran's Future” in the June 1994 issue of *The Middle East Quarterly* (Vol. I, No. 2), notes that in 1988 (after Iraq had used chemical weapons in its war with Iran), Ayatollah Akbar Hashemi Rafsanjani, then speaker of Iran's Parliament and commander-in-chief of its military, in a speech delivered to Iranian soldiers, said:

With regard to chemical, bacteriological, and radiological weapons training, it was made very clear during the [Iran-Iraq] war that these weapons are very decisive. It was also made clear that the moral teachings of the world are not very effective when war reaches a serious stage and the world does not respect its own resolutions and closes its eyes to the violations and all the aggressions which are committed in the battlefield. ... We should fully equip ourselves both in the offensive and defensive use of chemical, bacteriological, and radiological weapons. From now on, you should make use of the opportunity and perform this task.

To summarize, here are the main ways that the United States has unwittingly encouraged Iran's nuclear ambitions:

- Aiding the 1953 coup that replaced the democratically elected and popular Mossadeq government with the Shah's police state.
- Aiding Iraq during its 1980's war with Iran, even though Iraq was the aggressor.

⁹ As noted in Handout #1, uranium enrichment is particularly well suited to a breakout capacity. Once a nation has enough highly enriched uranium (HEU) to make a bomb, it is possible to build a usable weapon without testing, much as the Hiroshima HEU design was never tested before use. Only the more complex plutonium-based weapons, such as that used on Nagasaki, require testing to have high confidence that they will work as designed. This is why Iran's uranium enrichment program, although also applicable to its peaceful nuclear program and allowed under the Nuclear Nonproliferation Treaty, is of such great concern. It is one of the reasons why I believe that “atoms for peace,” at least in its current form, is an oxymoron.

- Continuing to aid Iraq in that war even though it used chemical weapons against both Iran and its own Kurdish minority.
- Threatening Iran with both conventional and nuclear weapons. This was particularly pronounced during George W. Bush's presidency, but was reiterated implicitly in President Obama's 2010 Nuclear Posture Review.¹⁰

None of the above should be construed as meaning that I favor a nuclear-armed Iran. On the contrary, I see such a development as extremely dangerous. But we need to start formulating our foreign policy based on reality, not myths. The most popular – and the most dangerous – myths are those that demonize adversaries and glorify ourselves. When done by both sides, as is often the case, it results in each side seeing itself as duty-bound to prevent evil from triumphing.

So, what can be done about Iran's nuclear ambitions? Given all the past mistakes, we do not have any really good options at this point in time. We need to learn from our past mistakes so we do not repeat them, and hope we can make it through an interim period until Iranian-American relations improve to the point that real solutions become possible. One thing we could do would be to stop publicly threatening Iran. I realize that domestic politics currently makes that impossible – Obama would be skewered as an appeaser and weak on national security. But, if more Americans understood the reality that empty threats (and even pregnant ones) only intensify Iran's nuclear efforts, that would change. Another action we could take to reduce the risk of a nuclear-armed Iran is to improve our relationship with Russia. That relationship is in much better shape, and much easier to repair. And, as noted by Dimitri Simes, a former advisor to President Reagan in an [April 2010 essay](#) in TIME:

There is no mystery of what might make Moscow more cooperative on Iran. Far-reaching sanctions would cost Russia billions. To compensate Russia, Washington would need to facilitate greater economic cooperation, and as Prime Minister Vladimir Putin has stressed on several occasions, this would require canceling the Jackson-Vanik amendment and helping Russia gain membership in the WTO. However, these moves would face opposition in Congress. The Administration has indicated that this would be the right direction to take but has not yet made an effort to make that happen.

If it wasn't so serious, this matter would be even more comical because the Jackson-Vanik amendment is a holdover from the Cold War that no longer has any real purpose. It was enacted in 1974 to punish communist nations for preventing free emigration. Now that several million former Russian Jews live in Israel and the United States, it is an anachronism that convinces Russia that Cold War thinking is still alive and well in the United States.

¹⁰ Also see my August 2010 blog, "[Two Takes on Attacking Iran.](#)"

North Korea

Applying critical thinking to North Korea requires going back at least as far back as August 1945, when the war in the Pacific ended. As explained, in a [report](#) sponsored by the United States Army¹¹, the very existence of South Korea was a concession on Stalin's part:

On August 8, 1945, during the final days of World War II, the Soviet Union declared war against Japan and launched an invasion of Manchuria and Korea. By then, Japan had been depleted by the drawn-out war against the United States and its Allies and Japanese forces were in no position to stave off the Soviets. ... Although the United States president, Franklin D. Roosevelt, and Marshal Josef V. Stalin of the Soviet Union had agreed to establish an international trusteeship for Korea at the Yalta Conference of February 1945, no decision had been made on the exact formula for governing the nation in the aftermath of Allied victory. The landing of Soviet forces, however, compelled the United States government to improvise a formula for Korea. Unless an agreement were reached, the Soviets could very well occupy the entire peninsula and place Korea under their control. Thus, on August 15, 1945, President Harry S. Truman proposed to Stalin the division of Korea at the thirty-eighth parallel. The next day Stalin agreed. Evidently Stalin did not wish to confront the United States by occupying the entire peninsula. He may also have hoped that the United States, in return, would permit the Soviet Union to occupy the northern half of the northernmost major Japanese island, Hokkaido [which we did not].

A statement by Secretary of State Dean Acheson just prior to the Korean War, also provides a different perspective from the usual belief that North Korea's attack came out of the blue. His January 12, 1950, [speech](#) at the National Press Club, has led some to say that he gave North Korea a green light¹² to invade the South in an attempt to reunify the country:

So far as the military security of other areas in the Pacific [including Korea] is concerned, it must be clear that no person can guarantee these areas against military attack. But it must also be clear that such a guarantee is hardly sensible or necessary within the realm of practical relationship. Should such an attack occur, one hesitates to say where such an armed attack could come from, the initial reliance must be on the people attacked to resist it and then upon the commitments of the entire civilized world under the Charter of the

¹¹ Andrea Matles Savada and William Shaw, Editors, *South Korea: A Country Study*, Washington: GPO for the Library of Congress, 1990. I am indebted to Prof. Barton Bernstein for pointing out this fact, of which I had previously been unaware.

¹² A similar accusation has been made with respect to the first Gulf War. A week before Saddam Hussein invaded Kuwait, the American Ambassador to Iraq, April Glaspie, appears to have told him: "We have no opinion on your Arab-Arab conflicts, such as your dispute with Kuwait. Secretary Baker has directed me to emphasize the instruction, first given to Iraq in the 1960s, that the Kuwait issue is not associated with America."

United Nations, which so far has not proved a weak reed to lean on by any people who are determined to protect their independence against outside aggression.

The Korean War followed Acheson's speech by six months, during which the United States [repeatedly entertained](#) using nuclear weapons.

Fast-forwarding to the current decade, a leading expert on Korea, Prof. Bruce Cumings of the University of Chicago, [wrote](#) in 2003:

In June 1994, Bill Clinton came close to launching a 'pre-emptive strike' against North Korea's nuclear reactors at Yongbyon, about sixty miles north of Pyongyang. Then, at the last minute, Jimmy Carter got North Korea to agree to a complete freeze on activity at the Yongbyon complex, and a Framework Agreement was signed in October 1994. The Republican Right railed against this for the next six years, until George W. Bush brought a host of the Agreement's critics into his Administration, and they set about dismantling it, thus fulfilling their own prophecy and initiating another dangerous confrontation with Pyongyang. ...

Every year since [1993] the CIA Director has told Congress that 'the chances are better than 50:50' that North Korea has one or two bombs (not devices), and newspapers have routinely reported this assumption as fact. Yet in 1996, nuclear experts at the Livermore and Hanford laboratories reduced their estimate of how much fuel North Korea possessed to less than the amount needed for a single bomb¹³: the North, they concluded, could only have seven or eight kilograms of fuel, whereas 'it takes ten kilograms of weapons-grade plutonium to fabricate a first bomb,' and eight or nine kilograms for subsequent ones. ... In other words, the CIA's educated guess, endlessly repeated in the media, appears to have been mistaken. A less obvious consequence of this mistake has been its role in strengthening the North's position in negotiations with the US.

Adding to North Korea's fears, a July 2006 essay in TIME by Prof. William Perry (formerly Secretary of Defense under Bill Clinton) [advocated a pre-emptive American attack](#) on North Korea's missile program:

Although the July 4 [2006] test of the Taepo Dong 2 missile—which is intended to carry nuclear warheads to U.S. territory – appears to have failed, North Korea ... has crossed a line in the sand clearly drawn by the U.S. and its partners. We anticipated that North Korea would ignore the U.S.'s warnings. That's why, in an opinion piece published in the *Washington Post* on June 22, we urged the Bush Administration to strike the Taepo Dong 2 on its launchpad before the test could be conducted. ... Critics of our article, including

¹³ Prof. Hecker's estimate, detailed later in this section, is in rough agreement with Cumings'.

members of the Bush Administration, say that a pre-emptive strike is too risky. But if the U.S. is ever going to defend a line in the sand with North Korea, that is the least provocative way to do it, and next time it will only be riskier. Such a strike could be seen by the North Korean leadership for what it is: a limited act of defense of the U.S. homeland against a gathering threat, and not an overall attack on North Korea. For the U.S., the risk of inaction will prove far greater. The Pyongyang regime will view its stockpile of missiles and nuclear material as tipping the regional balance in its favor and providing a shield behind which it can pursue its interests with impunity.

A [related threat](#) was made in September 2009 when North Korea stated that it planned to launch a satellite, but its adversaries feared it was really testing a missile:¹⁴

In unusually blunt remarks, Admiral Timothy Keating, commander of the US Pacific Command based in Hawaii, said that interceptor ships were ready "on a moment's notice. Should it look like it's something other than a satellite launch, we will be fully prepared to respond as the president directs," he said in a recent interview with ABC News.

Even when North Korea has cooperated, it has felt unrewarded. Prof. Siegfried Hecker, former Director of Los Alamos, has been a major player in attempts to resolve the disputes between our nation and North Korea, and has made seven trips there since 2004. His paper "[Denuclearizing North Korea,](#)" in the May-June 2008¹⁵ issue of the *Bulletin of the Atomic Scientists* indicated great hope for stopping that nation's nuclear weapons from advancing, *if* the United States would take certain actions, which it did not:

... During the past four years, I've visited North Korea's Yongbyon nuclear complex three times with nongovernmental teams of scientists and observers. My visits to the complex and my meetings with North Korean officials have convinced me that the elimination of North Korea's plutonium production capacity is within reach. ...

From 1994 to December 2002, International Atomic Energy Agency (IAEA) inspectors monitored the freeze of production facilities, while Yongbyon technical specialists were allowed to conduct periodic maintenance of the facilities. After the United States accused North Korea of operating a clandestine uranium enrichment program in October 2002, Pyongyang expelled the IAEA inspectors, withdrew from the Nuclear Non-Proliferation Treaty (NPT), and restarted its nuclear facilities.

¹⁴ [According](#) to U.S. envoy to North Korea Stephen Bosworth, a missile test would be a violation of a U.N. resolution. Not surprisingly, the North views such resolutions very differently.

¹⁵ This was after North Korea's first nuclear test (October 2006), but before its more successful, second test (May 2009). The first test is estimated to have had a yield of under a kiloton, while the second is believed to be in the 5 kiloton range – almost as destructive as those used at Hiroshima and Nagasaki.

Based on my February visit, I judge the disablement actions to be serious and in good faith. I believe that Pyongyang has made the decision to permanently shut down plutonium production if the other parties do their part. However, they have retained a hedge to be able to restart the facilities if the agreement falls through. ...

The Six-Party process has put within reach the possibility of permanently shutting down the entire Yongbyon plutonium production complex; it is highly unlikely that North Korea has clandestine plutonium production facilities. Eliminating Yongbyon's plutonium production is the highest technical priority for the parties negotiating with North Korea because doing so would dramatically reduce the risk posed by the North Korean nuclear program. To do so, these countries should put the burden on North Korea to finish disabling the Yongbyon complex and to begin dismantling it. During my February visit, North Korean Ministry of Foreign Affairs officials said that they have slowed the discharge of fuel from the reactor (one of the last disablement actions) because the other five parties had not lived up to their October 3, 2007 commitments. Specifically, as of February 14, 2008, only 200,000 tons of the promised 500,000 tons of heavy fuel oil had been delivered, and South Korea and China had provided very little of the promised 500,000 tons of heavy fuel oil equivalent. In addition, the United States had not removed North Korea from the states sponsoring terrorism list and had not terminated application of the Trading with the Enemy Act—two other conditions of the October agreement.

Early in 2010, I asked him if his view had changed in light of North Korea's second nuclear test on May 25, 2009. He told me he was working on a paper that would answer that question, and it is [now available](#). Here are the parts of that paper that are most relevant to our approach:

Security concerns have been the central driver of the North Korean ruling regime since the birth of the nation after World War II. ... The devastating Korean War, resolved only by an armistice, and the U.S. threat to use nuclear weapons likely moved Kim Il-sung to pursue nuclear weapons early on. ... The late 1960s were turbulent times in Pyongyang's relations with the West. South Korea's military was bolstered by U.S. troops and U.S. nuclear weapons on its soil. Pyongyang watched the Cuban missile crisis unfold in a manner that shed doubt on Soviet commitments to its allies. It witnessed the Sino-Soviet split and the Chinese Cultural Revolution. Each of these developments reinforced the notion that Pyongyang could only rely on itself for the North's security. Although Pyongyang fielded an immense conventional army and its deadly artillery along the Demilitarized Zone (dmz) was poised to destroy Seoul, nuclear weapons would help to balance the U.S. nuclear presence in the South. ...

By the early 1990s, Pyongyang's security environment deteriorated dramatically. ... Pyongyang was devastated by these changes and began seriously to explore accommodation with the West, especially with the United States. [Carlin](#) and [Lewis](#) believe that Kim Il-sung made the strategic decision to engage the United States and even accept

U.S. military presence in the South as a hedge against potentially hostile Chinese or Russian influence. ...

However, reconciliation between Washington and Pyongyang proved difficult, as Washington saw the Agreed Framework primarily as a nonproliferation agreement. ... the Agreed Framework was opposed immediately by many in Congress who believed that it rewarded bad behavior. Congress failed to appropriate funds for key provisions of the pact, causing the United States to fall behind in its commitments almost from the beginning. ... The Agreed Framework, which began as a process of interaction and cooperation, quickly turned into accusations of non-compliance by both parties. ...

the diplomatic crisis resulting from its 1998 rocket launch over Japan was resolved by the Perry Process ... The follow-up meeting between Secretary of State Madeleine Albright and Kim Jong-il that was held in Pyongyang a couple of weeks later appeared to put the nuclear crisis on a path to final resolution.

With the change in administrations in Washington, hope for a settlement was quickly dashed. Whereas Pyongyang was waiting for a U.S. response to the Perry Process, it ran into the Bush administration's adamant opposition to the terms of the Agreed Framework and to political accommodation. Pyongyang practiced restraint with the incoming Bush administration until North Korea was accused of a covert uranium enrichment program and saw the Agreed Framework come to an end. During the confrontation over enrichment in October 2002, First Vice Minister of Foreign Affairs Kang Sok-ju told his American counterpart, "We are a part of the axis of evil....If we disarm ourselves because of U.S. pressure, then we will become like Yugoslavia or Afghanistan's Taliban, to be beaten to death." Pyongyang withdrew from the npt [Nuclear Nonproliferation Treaty] and restarted its dormant Yongbyon facilities to produce fuel for a plutonium bomb.

Pyongyang's security fears were further heightened by the invasion of Iraq. Pyongyang now believed the bomb would assure its survival, so it no longer hid its nuclear weapons aspirations. ...

What can we learn from how and why North Korea built the bomb? North Korea is unlikely to give up its nuclear arsenal anytime soon because it has become crucial to how the regime assures its security. Nuclear weapons also play a supportive role domestically and provide diplomatic leverage. Pyongyang views its security concerns as existential. ...

As undesirable as it may sound, the best hope is a long-term strategy to contain the nuclear threat while tackling the North Korean problem comprehensively, but in discrete steps. Both Beijing and Seoul favor taking the long view. Time is not on Pyongyang's side. The greatest threat to the regime is not from the outside, but from within. ... And it is essential to stop Pyongyang from doing additional damage around the world through nuclear cooperation and exports. ...

The lessons of North Korea will not be lost on other potential proliferators, particularly Iran. Pyongyang broke new ground in defying international norms and took advantage of the international community's inability to respond effectively....

The Bush administration killed the Agreed Framework for domestic political reasons and because it suspected Pyongyang of cheating by covertly pursuing uranium enrichment. Doing so traded a potential threat that would have taken years to turn into bombs for one that took months, dramatically changing the diplomatic landscape in Pyongyang's favor. ...

The United States plays an indispensable role in proliferation prevention, but it can't go it alone. It cannot afford to sit at the sidelines as it has done with Iran. We found that Pyongyang was willing to slow its drive for nuclear weapons only when it believed the fundamental relationship with the United States was improving, but not when the regime was threatened. ...

The more divided we are at home, the more we yield advantage to the adversary. Political divisions in Washington in recent years resulted in our inability to negotiate the nuclear crisis effectively. American diplomats lament that it has been more difficult to negotiate in Washington than at the six-party table.

Perhaps the best summary of the above situation is contained in a question that Prof. Hecker answered when he was a guest lecturer in this seminar early in 2010. At the end of his talk, one of the students asked, "Are you convinced that if the Bush administration hadn't broken the agreements with North Korea in 2002 and accused them, then they wouldn't have a bomb now?" His unedited reply follows:

I think there's a good likelihood that what you just said is true. We still don't know that for sure because it's very hard to dig back into the early history of what they did with the reactor, when they operated that reactor, what they made. And the best analysis that we have is that prior to 1994, which is when they froze everything. [*MH Note: Between 1994 and 2002 they shut down their plutonium production under the Agreed Framework.*] In 1994, prior to that, they may have made two to ten kilograms of plutonium, as we look at the reactor, the operations. But we're not sure. It's also possible that actually they didn't even make two kilograms. And since we need about six for a bomb, it's quite possible that they never had a bomb. In 1993 to 1994, you go back, and the Director of Central Intelligence, actually one Bob Gates, said at that time that they believed that North Korea has the possibility of having one or two nuclear weapons. That was the intelligence community's judgment in 1993, 1994. As we look back today, we say that's the upper end, and it's possible that they had nothing.¹⁶

¹⁶ Even enough plutonium for one or two bombs would be a minimal threat since two tests were needed for North Korea to achieve a reasonable yield. Additional tests will be needed before they can place a warhead on a missile.

In that same guest lecture, Prof. Hecker made several key points:

- While North Korea is ruled by a despotic regime with horrible human rights abuses, its record of adherence to nuclear agreements is relatively good.
- We have failed to meet many of our obligations under those same agreements.
- American accusations of illicit uranium enrichment have some basis, but are not materially important. If a nation can master the plutonium bomb, as North Korea has done, enriching uranium is of secondary importance. [This is also applicable to understanding the implications of the North's recently revealed uranium enrichment, which have been over-sensationalized in the media. For Prof. Hecker's original statements, see my [November 22, 2010 blog post](#) on his trip report.]
- North Korea has been existentially threatened by the United States. They will not give up their crude nuclear deterrent under current conditions. But if we will return to the negotiating table and treat them with respect, Hecker believes it is possible to induce them to do no further nuclear testing. That is very important to our national security because their current nuclear weapons are crude and probably not missile-capable. More testing will be needed to achieve that goal, so stopping it is of the utmost importance. Unfortunately, American domestic politics makes such an approach impossible.
- Contrary to the popular view that negotiations with the North failed because it now has the bomb, diplomacy made significant achievements from our perspective, but much less so from North Korea's. Under the 1994 Agreed Framework, they stopped construction of two large nuclear reactors. Without the Agreed Framework, Hecker estimates that North Korea would now have enough plutonium for 100 bombs, instead of the 4-8 that they have. As noted in the question and answer above, there is even a "good likelihood" that the North would have no bombs today if we had not taken the actions that we did in 2002.

One additional incident that deserves our attention is the sinking of the South Korean naval vessel the Cheonan in March 2010. While the prevailing view in the United States is that North Korea sunk that ship with a torpedo, serious flaws have been found in the investigation that came to that conclusion. For details see my blog posts on the subject dated [May 29](#), [June 5](#), [June 7](#) and [June 29](#). While the North may well be guilty as charged, there is a real possibility that is not the case. If so, imagine how that regime will react. Even if the North did sink the Cheonan, the incident occurred in [disputed waters](#), near where South Korea sunk a North Korean vessel four months earlier. When war and peace hang in the balance, we need to be much more careful in accepting arguments, especially from parties to the dispute. See my May 29 blog post on the subject for a *mea culpa* in that regard!