THE BROOKINGS INSTITUTION

BLINDSIDE:

HOW TO ANTICIPATE FORCING EVENTS AND

WILD CARDS IN GLOBAL POLITICS

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Introduction:

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P R O C E E D I N G S

MR. FAHERTY: (In progress) -- Director of the Brookings Institution Press, and today we are very glad to be launching a new book, "Blindside: How to Anticipate Forcing Events and Wild Cards in Global Politics," edited by Francis Fukuyama. "Blindside" results from an event that was sponsored by *The American Interest* magazine, and we are very glad to be collaborating with *The American Interest* on the publication of this book. Charles Davidson, the publisher of *The American Interest* is here with us today and he and all of his colleagues at *The American Interest* have been just a delight for us to work with.

I am going to now introduce Adam Garfinkle who is the editor of *The American Interest* and he will be introducing the book, the panelists, and then moderating the discussion that will take place this afternoon. As you can tell from your handouts, Adam has a very distinguished background. Before assuming his current post at *The American Interest*, he was the speechwriter to the Secretary of State and the editor of The *National Interest* magazine. He has been a professor of American foreign policy at several prestigious universities including Johns Hopkins SAIS and the University of Pennsylvania, and he is the author of six books, one of which, the book, "Telltale Hearts: The Origin and Impact of the Vietnam Antiwar Movement," was named a Most Notable Book of

1995 by *The New York Times* Book Review. So I am very pleased to introduce Adam who will take over.

MR. GARFINKLE: Thank you, Bob. I also wanted to say that the Brookings Institution Press was also a delight to work with. It was an absolutely seamless and beautiful relationship, and we have now as a result it the book, we have "Blindside" here. It is very fortuitous that this event occurs in this season after Thanksgiving and before Christmas, the holiday shopping season, and maybe for the more serious minded of your colleagues, family, or friends, this would be a wonderful gift, and a subscription to *The American Interest* of course also.

I am not going to take up much time because we have a very distinguished panel to talk with you today, so I am just going to very briefly all of the panelists and then sit down and shut up. Francis Fukuyama will speak first. Frank is right over there as you all know. Frank is the Bernard Schwartz Professor of International Political Economy at the Paul H. Nitze School of Advanced International Studies, of Johns Hopkins University, and the Director of SAIS's International Development Program. Frank is also the author of many very well-known and justifiable esteemed books which I will not repeat the titles of because I think most of you know what they are. And important to this event, he is also both the brainchild of the "Blindside" concept and the concept of the conference which gave rise to the materials that went into the book. And he is also of course the editorial board chairman of *The American Interest* magazine.

After Frank, I think Gregg Easterbrook will go next. Gregg has written many books of which I am sure all of you are aware. He is a contributing editor to *The Atlantic*, *The New Republic*, and *The Washington Monthly*, and he is a Visiting Fellow right here at the Brookings Institution. He is also a columnist for Espn.com. Gregg's role in the conference was one of the more entertaining parts of it. We set up a debate between Pollyanna and Cassandara between Gregg and Jim Kurth of Swarthmore University, and I for one enjoyed it immensely.

Next is Scott Barrett. Scott Barrett is Professor of Environmental Economics and International Political Economy, Director of the International Policy Program, and Director of the Global Health and Foreign Policy Initiative, at the School for Advanced International Studies, SAIS, Johns Hopkins. Then Gal Luft is Executive Director of the Institute for the Analysis of Global Security which is a Washington-based think tank focused on energy security. And he is also a co-founder of the Set America Free Coalition, an alliance of national security, environmental, labor, and religious groups, promoting ways to reduce America's dependence on foreign oil. I recently received an email from Gal indicating that he had named one of the most hated man in Saudi Arabia, which is not an honor that many of us can claim.

Having introduced our four panelists that way, as I promised, I will indeed sit down and shut up. Frank?

MR. FUKUYAMA: Thank you very much. I am really delighted to be able to talk about this subject and the book which came out of a conference as was mentioned that took place about a year-and-a-half ago sponsored *by The American Interest*. The reason that I picked this topic for discussion was that, first, we had just gone through a number of big surprises, the collapse of the Soviet Union, the Asian financial crisis, we were just on the heels of Hurricane Katrina, and it seemed to me that both in politics and business, there was not enough attention paid to systematically thinking through the problem of low-probability, high-impact risks and that it was worth getting people to review systematically how they thought about it, why they were surprised by certain historical events that had occurred, and really what strategies existed for dealing with it.

This also came a little bit out of my own crossing over between several different domains, between on the one-hand people in this town who deal with intelligence, foreign policy, and national security, and on the other hand, people in the financial community, in Wall Street, who deal with business risks. Both of them have to deal with risks, but I think in many respects there are certain systematic biases that enter into the way that these different groups as communities anticipate the future and that if you were not aware of these biases, you actually would have problems making certain kinds of predictions. I think in the Washington foreign-policy community you have what I would call the Husband Kimmel risk which is a bias toward excessive pessimism because if you think

about all of the career incentives for an intelligence analyst or a secretary of state or a secretary of defense, they are all in favor of crying wolf at the possibility of terrible things happening because the one thing you do not want to be is Husband Kimmel who was, as you may be aware, the admiral in charge of Pacific Command prior to Pearl Harbor. They had broken the Japanese "winds" code, they knew there was going to be a Japanese offensive somewhere in the Pacific, but they were still caught with their pants down and he was cashiered for that. He was actually resurrected and his name was restored a few years ago after the fact, but I think being in that position of not anticipating a terrible event is not matched on the up side by failing to anticipate a good event. So as far as I know, nobody was cashiered from the CIA for failing to anticipate the collapse of the Soviet Union, although in many respects it was as intellectually as grave a failure as Husband Kimmel's.

I think that in the investment community, I would say actually watching this whole subprime mortgage meltdown, we had held a conference last month and we probably should have included a chapter on that one as well, but there it seems to me probably the bias is in the opposite direction, toward excessive optimism, and I think that is simply a regulatory phenomenon because the government itself creates a certain degree of moral hazard by ensuring financial institutions on the down side and then letting them keep all of their gains on the up side and so you get this repeated phenomenon where the financial community comes up with

inventive new ways to escape the existing regulatory structure and create messes for itself that then people have to clean up. But in certain ways there is I would say probably overall a better balance in the biases there because you can make money or lose money both by being excessively optimistic or excessively pessimistic. So those are some of the general parameters.

Peter Schwartz, the founder of the Global Business Network, contributed to this volume and was at the conference but could not be on the panel. In a certain way, I want to carry his load for him because I think that he has thought through in a certain way and actually made a successful business out of thinking about the future in what I think is probably the appropriate manner, and it really has to do with your ability to envision future scenarios, even ones that you cannot hedge against but that are really different from the future that your dominant set of assumptions would predict to be the case.

Peter, as some of you may know, actually got into the scenario business when he was a planner at Shell in the 1980s. He has this very nice presentation where he shows the future predictions among the Shell economists for oil prices back in the year 1981. At that point oil was only $17 a barrel or something and the high said it will go to $60 and the low estimate said it will go to $50. Of course, as we know, oil dropped to close to $10 a barrel within the next 3 or 4 years, and it taught this very valuable lesson that sometimes the actual scenarios that unfold are

completely outside of anybody's existing worst-case or best-case as it were assumption. So in thinking through how to do this, there is a very important insight into this which is that most decision makers whose time is costly and who are risk averse like most decision makers are, if they are told that something is a low-probability scenario, 5 percent or 1 percent or whatever, they will simply stop thinking about it and it really does not matter intellectually how much they may realize that this is something they ought to pay attention to, but it is just psychologically a fact of life, so the methodological question is how do you actually get people to take seriously certain very low-probability events. Actually, Richard Posner, the federal judge who has written a book called "Catastrophe" talks about some of these including things like asteroid strikes, and there is a finite probability that an asteroid will hit the Earth within the next few-hundred years, if it happens it will be absolutely catastrophic, there are things you can do to hedge against that that will probably prevent the catastrophe from happening, but that is costly and how do you wrap your mind around getting current-day decision makers who have budget constraints and a lot of other things on their plates to actually make the kinds of investments for that sort of scenario.

I think the answer that I have is that, first of all, you cannot hedge against all of these low-probability events. I will give a possible and point out that is not possible at the end because hedging itself is costly. What you can do is to put yourself in a position where you can visualize

certain scenarios that run completely counter to the prevailing assumptions that you and your like-minded group of people are operating under, and actually hopefully it should be a range of scenarios without probabilities being attached to them and if you work through the scenarios, it at least creates a certain kind of mental flexibility where you can envision to yourself a world that it substantially different than it was.

The problem of the prior points of reference comes through in many of the chapters in this particular collection as to why people were blindsided by the Asian financial crisis or the collapse of the Soviet Union. I think actually one of the best books written on this was by a woman who just passed away in the last year, Roberta Wahlstetter who wrote a classic book on one big intelligence failure, "Pearl Harbor: Warning and Decision." I think the basic message of that book was that you are always dealing with signals that are buried in a lot of noise that can be interpreted a lot of ways and in the case of Pearl Harbor the signal was there, and the reason it was not interpreted was that there was a prior set of assumptions about Japanese behavior that contradicted the actual scenario that came about.

The problem with these prior frameworks is I think extremely difficult to overcome. If you think about why we got it wrong with weapons of mass destruction in Iraq, it was the result actually of two cumulative failures. In 1991, the intelligence community guessed wrong on the downside as to Saddam Hussein's nuclear capabilities and when UNSCOM actually got in there and was able to look around Iraq after the

first Iraq war, they discovered they were much closer to a weapons program than anyone had realized and I think this was what convinced not just Cheney who was SECDEF at the time, but many people in the intelligence community that they would never fall for that kind of thing again and it gave them a permanent bias over the next decade toward overestimating what the Iraqi arsenal was, and the rest of that is all history.

So I think one of the keys to dealing with this is in a way a psychological strategy of being able to vividly think through some of the low-probability events and some of the implications of this might be just in the National Intelligence Estimate process. Having been the consumer of these when I was in government many years ago, it seems to me that they were always pointless. You did not really need to open the cover because they were always consensus views that would just give you a one-point forecast as to what they thought the probability state of the world was and if you could not guess that ahead of time, you probably should not be in government in the first place. What would have been a much more useful exercise would have been to give you forecasts of a variety of different alternative states of the world and, you would have to assign probability ratings and I think there is just no way of getting around that, but in order to actually force the decision makers through some of those.

Having just said that it is important to visualize the low-probability events, I think it is probability also important to visualize an

adequate range of them because it is also the case that excessively vivid visualization of one particular low-probability event is also a pretty big danger, and I will you another recent example of that which was September 11th. September 11th I believe in retrospect was a pretty lucky one-of event that they managed to pull off that speculator a terrorist attack and get all the planes going in the right direction and coordinated and so forth. What it did was it made extraordinarily vivid to every American alive that day the possibility of mass-casualty terrorism. This led to the so-called 1-percent solution where people said even if it is an extremely low probability of this happening, it is so catastrophic that it is worth taking extraordinarily large measures to hedge and defense against that. The problem with that is intellectually extremely difficult. I actually think that the likelihood of a mass casualty, pick some near-time period, but the probability of a nuclear weapon exploding in an America city, it matters a great deal if you think that is a 1-in-10, a 1-in-100, a 1-in-1,000, or 1-in-10,000 chance and there are things that you are going to do if you think it is a 1-in-10 or even 1-in-100 that you will simply find too costly to do if it is 1-in-1,000 or 1-in-10,000 and we frankly actually do not know what the actual probabilities are so you cannot even begin to make that probabilistic cost-benefit calculation. But let's say that the actual probability of this kind of an event was 1-in-5,000 over some near-term time period. There are a lot of 1-in-5,000 probability events that could be quite catastrophic that could also happen, but everybody in the United

States could visualize this one particular event which then in my humble opinion led to a great overinvestment in a hedging strategy to deal with that one particular event which in retrospect I think was a terrible mistake.

So these are some of the I think kind of practical problems in dealing with this category of problems. I think it is inevitable that we are going to use our existing frameworks to think about the future, we cannot avoid this problem of this sort of bias, but what we can force ourselves to do is to think a little bit systematically about alternative worlds that could occur in which those assumptions are decidedly wrong and then think through ahead of time, maybe there are certain hedges you actually will want to make in the near-term, but you can certainly try to think through responses so that when the blindsiding happens as it inevitably will, you are at least prepared to move more quickly than decision makers who are bound to these prior frameworks have typically done in the past. Thank you.

MR. GARFINKLE: Gregg Easterbrook?

MR. EASTERBROOK: Thanks. I am supposed to talk about forecasting, and you would only need to be able to see about 5 minutes into the future to be able to tell that I am going to tell you that forecasting is not very practical. Let me give you some favorite examples of just recent examples of forecasting.

In *The Wall Street Journal* on the first business day of every year, the lead story is always forecasts for the year by famous

economists, and especially corporate New York economists who all make 10 times a year or 100 times a more a year than we do. In the first issue of 2006, *The Wall Street Journal* ran this incredibly gloomy story saying that all major economists agreed that the stock market was going to crash that year. This was 2006 we are talking about. Of course, the stock market rose 16 percent in 2006. It was a year when everybody except hedge fund managers made a lot of money for their clients. I actually had the courage of my convictions that year when I opened my *Wall Street Journal* and it said that all major economists think the stock market is falling, I called up my 401(k) manager and shifted money into stocks. I was very proud of myself because I knew for sure that it meant that the market was going to rise, and of course I did. But my heart sank on the first business day of 2007 because *The Wall Street Journal's* main lead story said that all major economists agreed that this would be a record-setting year for stocks, and I thought I should have followed through and called my 401(k) manager and said get my money out of stocks. I was not smart enough to do that. But of course you know what has happened this year, the stock market is still slightly up for the year, it has not been a crash year by any means, but it has not been the boom year that people expected. The January 2007 *Wall Street Journal* consensus of famous economists' predictions was that today the euro would be $1.30, it is $1.47 this morning, that today oil would $60, it was trading at $92 just before I left my desk, and that the Dow would finish the year at 13,234, actually a

few minutes ago the Dow was at 13,241, so if you make enough predictions, one of them is bound to be right. I will also tell you just in a short-term focus, you will remember that Thanksgiving week was a real bad week for the market with a lot of losses and Monday of this week the market lost again, and when I opened my *Washington Post* on Tuesday morning the banner headline was "Stock Market Set to Plunge, Experts Say." Boy did I breathe a sigh of relief when I read that because I knew that meant for sure that the worst was over, and in fact, the market has been up about 400 points since *The Washington Post* said that the experts agreed that the market was set to plunge. So this conforms with my general rule of life that whenever all experts agree that something is certain to happen, there is no chance at all that it will happen. Let me give you a couple of other recent examples of predictions.

In 2005, of course, Frank mentioned Hurricane Katrina, and not just Katrina, but there was also Hurricane Rita and three other highly intense hurricanes that hit landfall in the United States. Coming into 2005, the National Hurricane Center had predicted a calm season and 2005 was the worst hurricane year ever. So I guess to compensate for that, beginning with the 2006 season, the National Hurricane Center predicted a hyperactive hurricane season, that was their word, hyperactive, with as many as 10 Atlantic hurricanes. There were five that year, exactly the 20th century average and none of them touched the land of the United States. Coming into 2007, the National Hurricane Center predicted a far-

above-normal hurricane season with seven to 10 hurricanes, there were six this year and one of them touched the land of the United States. We forgot to predict it before, so now we are really predicting it which is how we handled Saddam Hussein and the weapons.

I will give you two other examples of ridiculous predictions that I particularly like. Last fall, the British government's Stern Report forecasting the effects of global warming on the global economy which I think is wildly pessimistic, but then I am basically a Pollyanna, I think we are going to end up solving artificial climate change much more cheaply than people expect, but if you read the Stern Report it predicted that global warming would cause the global economy to decline by 13.8 percent in the 23rd century. Two-hundred years from now they were not only predicting what the economic result would be, but it was not by 13.9 percent, it was not by 13.7 percent, it was 13.8 percent, they were doing decimal places 200 years from now. And of course the Stern Report is not even valid today, it did not even last one year.

I think my all-time favorite prediction from *The Washington Post* a couple of years ago was they ran an article in which physicists and cosmologists predicted how the universe would end. The forecast went out to 30 billion years. The story contained this wonderful caveat, "It remains impossible to predict the fate of the universe with certainty," so we cannot be certain what is going to happen in 30 billion years. I always thought that they were worried about getting snippy letters to the editor, if

30 billion years pass and the universe does not end, *The Washington Post* is going to get some letter to the editor that says, "Dear Editor: Thirty billion years ago, your supposedly respectable newspaper predicted that," and so they were really worried about that so they threw in a caveat.

Let me tell you quickly what I think the worst things that we have no ability to predict are. The worst thing that worries me the most is, as Frank has mentioned, a comet or an asteroid strike. The reason that it worries me the most is we are absolutely certain that it is going to happen, we do not know when it is going to happen, but we certain that a large object will strike the Earth and it would be cataclysmic in a way that is hard to put into words. As recently as about 20 years ago, I am working on piece for *The Atlantic Monthly* right now so it is all fresh in my mind, researchers thought that comet strikes happen only in the primordial mists and that major impacts on the Earth had not happened in millions of years, but we now know they are distressingly frequent. There was a very large comet impact about 1,400 years ago that hit the Indian Ocean. If a comet of the same size hit any major landmass in the world today, hundreds of millions of people would die potentially and the world could be plunged into a global depression that would last for decades. That worries me because we are doing absolutely nothing about it. NASA has no meaningful program to research the orbits and positions of near-Earth objects, and they are doing no work whatsoever on how to counter them, although the technology that would be used to counter space rock strikes

is imaginable given current levels of knowledge. This one worries me the most because although the likelihood of it happening in my lifetime is fairly small, we know for sure it has happened in the past, we know for sure it is going to happen again, we know for sure it would be cataclysmic, and there are reasonable things that we could be doing at reasonable prices today to prevent it and we are instead not doing anything at all. So that is my number one.

My number two is that a crude atomic warhead will go off in some Western city, most likely this one, sometime during my lifetime. I think the chances are a lot higher than 1-in-5,000. I do not have any idea of what the exact chance is, but I think that it is a very real and worrisome concern and I think we are not doing anywhere near as much as we could about it especially with the former Soviet Union and other rogue nuclear states. There is no way we can assure that this will never happen, but we could do a heck of a lot more than we are doing now and at relatively low prices compared to the size of the defense budget.

My third big worry is economic collapse, but I do not think this is going to happen. I am an optimist. I think the economy is going to boom as never before during the next few decades, but I cannot guarantee that. However, I do not think there is anything at all to prevent an economic collapse. In fact, I think we try to manipulate the economy too much already as it is, that the less we try to manipulate the economy the better things will be.

In general, we live here in Washington in a city of experts and the lesson of experts is that experts are not content to be knowledgeable at a subject, experts want to believe that they can see the future of a subject. I would certainly like to believe that I could see the future and most experts want to believe that, the track record is that they cannot, and predictions on anything other than what the weather will be tomorrow are barely better than random chance and sometimes can be disastrously wrong. So those are my only points. Thanks.

MR. GARFINKLE: Scott Barrett?

MR. BARRETT: What that last talk reminds me of I think was John Kenneth Galbraith's admonition about forecasting which is you can give a number and you can give a date, but never give both in the same sentence.

And Frank's introduction reminded me of another story. Years ago there was concern about depletion of stratospheric ozone and the U.S. government had very sophisticated satellites in space measuring the quantity of ozone. The satellites were collecting just tremendous volumes of data and to make computation economic, they were throwing out outline data. The British Antarctic Survey which works pretty much with duct tape and more simplified instruments had discovered dramatic depletion in the ozone layer over Antarctica. They at first did not publish the results because they were at odds with the U.S. data, and of course, the U.S. data was the most sophisticated available, and they went to the

Americans and they said there must be something wrong with your data and the Americans said, no, we have the most sophisticated technology in the world, you have to go back and check yours. So they went back and they did the experiment all over again the next year and they found exactly the same thing. Then they published the data and the burden then fell on the U.S. to respond and the U.S. then discovered that all along they had been throwing out the outline data which were the most-interesting data that were there. They were the data that was pointing to dramatic depletion of the ozone layer. So there is a lesson here that we often look for things and our screening process can leave out what is really significant.

In 1981, there was an unusual increase in requests for a very rarely used antibiotic that came through to the Centers for Disease Control. Normally a few requests would come each year in all of the United States, but this time there were a few requests coming from one particular place at one particular time, and that was San Francisco in 1981. The CDC then investigated because when you look for abnormalities in the data, that tells you that something may be brewing, and that is when we discovered the virus we now know as HIV/AIDS.

What is interesting about this is that subsequent research shows that HIV probably emerged around the year 1931 in Southeastern Cameroon, that it probably began that a man was butchering a chimpanzee infected with a related virus called simian, the SIV version of

the virus, that he became infected, there was a mutation, he moved to an urban area like Kinshasa and then came in contact with other people and the disease spread. What is interesting about this story is that the plague of HIV/AIDS actually emerged 50 years before we identified it, thereabouts, had been circulating all around the world for quite a period of time and we never saw it, we were blindsided.

Nature is going to continue to blindside us. I will not give a number and I will not give a date, but it will continue to blindside us. The question really arises then what can we do about it. I am not going to be thinking so much about predictions, I am going to be thinking much more about institutional considerations over how we can deal with this kind of risk.

The first thing we can do is try to prevent the risk. That seems a little surprising. How can you prevent something like this when you do not know it is going to happen? There are some forms of emerging infectious diseases that we can anticipate and those relate to the problem of drug resistance. If you expose a pathogen to a drug repeatedly, certain pathogens will mutate rapidly in any event, but if you expose them to a drug, of course evolution will select the mutations that perform well in that environment comprising the drug. So if you expose the pathogen to a lot of the drug, you eventually are going to get mutations.

One example of this is for malaria. There is a very effective drug called chloroquine, very cheap, very effective, very few side effects. Resistance to chloroquine emerged independently in two different places, in the Cambodia-Thai border, and in Colombia in South America, in the 1950s. As it incubated it spread, and in the late-1970s it entered East Africa and then it spread throughout Africa. The most lethal of the malaria parasites, the falciparum parasite, is a particular killer in Africa, and the consequence of all this is that people in many parts of Africa are no longer able to rely on this very effective antimalarial.

Fortunately there were alternatives for replacing the chloroquine, one is an artemisinin-based antimalarial, and this drug was produced in a monotherapy form. When you expose the parasite to the monotherapy version, you are creating the conditions where resistance will emerge eventually. If you combine that one artemisinin-based drug with other antimalarials, however, you are hitting the parasite from different kinds of directions and it is more difficult for the parasite to sustained fitness in the face of that barrage. So combination drugs always work much better when resistance is a threat.

The problem with the combination drug is that it is more expensive and so individuals and indeed governments may have incentives to use the monotherapy version. There are two things you need to do to prevent this problem. The first is you need to ban monotherapies, and the second thing you need to do is to make it more

attractive for people to use the combination drugs so that you do not have a black market emerging in the face of the ban. There is an effort underway now, and I know the World Bank is playing a role, to do just that.

Another example of emergence is H5N1, the bird flu strain that we have been hearing about for quite some time. Where might this new pandemic influenza virus emerge? The most likely place will be where there are a lot of birds in contact with a lot of people and a candidate location would be Indonesia. The issue we really have here is that if you were to get a pandemic influenza emerging that would be infectious from person to person, that would of course threaten the whole world, it is more likely to emerge in these places where you have lots of birds in contact with lots of people, but our policies tend to be oriented toward domestic measures and what you really want is a global policy. For this you really want global standards just like you want global standards for drugs to avoid the problem of resistance emerging, and currently there are no global standards for things like animal husbandry. So one thing you want to do is prevent emergence where you can.

Another thing you want to do is prepare for outbreaks. One example of that, thinking again about pandemic influenza, is stockpiling of the antiviral medicine Tamiflu, and the U.S. has a stockpile. The problem, as I mentioned before, is that pandemic is more likely to emerge in a poorer country. We do not know exactly how effective Tamiflu or the other

antivirals will be against an emerging pandemic influenza, but there is some evidence that it would not only offer some protection for the individuals who are infected, but would also help to limit spread. So if you get emergence in some place, let's just say Indonesia, the best way to prevent the disease from spreading, and what you are really thinking of here is slowing down the spread long enough that you can develop an effective vaccine and you know what the virus looks like to do that. You want to actually use the antiviral where the outbreak occurs. So imagine though that we have limited stockpiles, every country that has a stockpile has a limited stockpile, are they going to give up their stockpile at that time to target where the outbreak is occurring or are they going to want to keep their stockpile to offer some defense at home, and we know that politically the pressure would be too great for countries to want to use their stockpiles to try to put out the outbreak, instead they would want to use them defensively and that just leaves every country in the world vulnerable.

The one way to address this is to have a global stockpile, and there is a global stockpile. There are enough doses to protect about 3 million people held by the World Health Organization. That stockpile, by the way, was donated by the manufacturer Roche, it was not financed by countries. The United Kingdom has enough doses to protect 15 million people. So if a little island of 60 million people thinks it needs to have 15 million doses to protect its population, the world is saying that 3 million

doses is enough for all of the poorer countries, and that is clearly inadequate. So there is an example where again our approach to dealing with this threat tends to be more defensive and local and we need to be thinking more globally.

One thing the U.S. is doing now that is extremely helpful is research on how to make a vaccine for influenza from a cell-based culture as opposed to egg manufacturing. This has other benefits, but it would speed up dramatically the time in which you could actually produce a large volume of vaccine. The knowledge of how to do that, if we do learn this, would be of universal benefit to the rest of the world. So we are doing this to benefit ourselves, but all countries will benefit, and here the incentives are right and so is the policy.

Another issue is the importance of surveillance. The example I gave you before of HIV, detecting that unusual request for that antibiotic by the CDC, was an example of a surveillance system. Where in the world is surveillance best? Surveillance is best not surprisingly in the richer countries. Even in the richer countries mistakes are made. There was another version of avian flu, H7N7, that was circulating among poultry in the Netherlands some years ago and it took many months before that spotted by the Dutch authorities, BSC circulated in cattle for some time in the U.K. before it was discovered by the authorities there. The biggest problem though will always be the poorest countries, and indeed, it will be with the countries that are more in the category of being failed states.

One example of that is polio, and there is an effort underway now to eradicate polio. Polio remains an endemic disease in a number of places including the border region between Afghanistan and Pakistan, Northern India, and Northern Nigeria. Sudan was declared free of polio some years ago, and then a new sample was discovered, easy to identify if you can find a crippled child and do the lab testing. It turned out though that that virus that that child had had been circulating within Sudan for years without anyone seeing it. So some of these things are very hard to find. The problem again is that all countries are vulnerable to the emergence of these new diseases but we do not have a global surveillance system, we have individual countries carrying out their own surveillance.

Another issue that is important is reporting. It is only of interest to the rest of the world if you do the adequate surveillance and you tell them what you find. If you find something and you do not tell them is as if you never looked in the first place. The example that everyone remembers here is about SARS. SARS emerged in China in late-2002 and China did not make that information known to the authorities of the World Health Organization or to other countries until much later, indeed until the information had already leaked out through private sources. One reason that China held on to that information, not the only reason, is that it was under no legal obligation to do so. The international law of infectious diseases is encapsulated in something called the International Health Regulations and these regulations require that countries report infectious

disease, but the regulations in place at the time of the SARS outbreak required reporting only of three diseases, cholera, yellow fever -- people are all guessing now. In any event, there were three diseases that were notifiable. There used to be four including smallpox, but after smallpox was eradicated that was taken off the list which was probably an extremely dumb thing to do because there is still a possibility that smallpox might reemerge.

The important thing to know is that the SARS experience was really a great experience of understanding how international law is made. For years the International Health Regulations were up for renegotiation and there were lots of meetings to do that and lots of drafts that were circulating and so on, and again, this went on for many years. But when there was this outbreak, all of a sudden the world's interest peaked, and also the World Health Organization in Geneva responded in a way it was not allowed to do but that the rest of the world was very pleased it did, not the mayor of Toronto, not the government of China, but other countries were very happy that the WTO responded in the way it did, that it made the information public and that it issued travel warnings because those actions served to limit the spread of SARS. The nice thing here is that that experience gave new energy to the negotiation process and the health regulations were renegotiated and ended up doing much more than anyone had really expected was possible early on.

There are a number of aspects to the health regulations that were warmly welcomed when they came into force earlier this year, but there are still vulnerabilities. For example, the International Health Regulations say that all countries must have adequate surveillance capacity. They tried to explain in some way what this actually means, but they do not go into detail about that. But more importantly, they say, and this is true of a lot of the international legal writings, that this has to be done using existing domestic capacity. So if you compare a country like the United States where we spent over $5,000 per head on health care with a country like Congo, the region where HIV first emerged, they spend $14 per head, and the world is saying that $14 is adequate. Fourteen dollars is not adequate, so in thinking very parochially about this problem of surveillance, we need to be thinking more globally.

The last thing that we need to do about these kinds of problems is to respond to outbreaks when they arise. The incentives for response are quite strong and there have been successes. Again you might be thinking of the SARS epidemic. SARS emerged and it spread to quite a large number of countries, but the total number of cases was limited and only just over 900 people died from SARS, so you might draw some comfort from that. But then if you think to the earlier influenza pandemic from 1918 to 1919, that pandemic killed we do not know, the estimates range from 20 million to 100 million people, and it killed this number of people, by the way, in just a matter of months, which really puts

a catastrophe like HIV/AIDS into context. At that time with a much smaller global population, 20 million to 100 million people died in a matter of months.

What is the difference between SARS and pandemic influenza? One important epidemiological difference is that SARS did not spread until symptoms showed, so someone was sick when they became able to spread. Who was picking up SARS? Mainly, not exclusively, it was people who were caring for the ill, family members, nurses, doctors. The person who spread SARS outside of China was a doctor who had been caring for SARS patients. Pandemic influenza was very different. The disease was spread by people who were healthy. They had the disease within them, they had the virus within them, but they did not know they were ill, no one else who was interacting with these people knew that they were ill, and the disease had spread around before people really realized what the challenge was there. So in that case we really were blindsided, and when we think about the policies we need to address these kinds of challenges, we need to be thinking of those kinds of diseases like HIV/AIDS that smolders and lies hidden, and diseases like pandemic influenza that can spread even among people who appear to be healthy. Thank you.

MR. LUFT: Thank you. Let me begin by saying that I am not very good at predicting the energy market and if I were, I would not be in the not-for-profit sector, but I will try to sort of give you a sense of what

we are seeing as the likely scenarios and maybe focus more on what I call the "eh" scenarios, those scenarios that you raise and people say, "Eh, can't happen," because one thing that happened in recent years is that we became much more concerned in a way about the possibility of supply disruptions. But before I go into this, let me just start with a distinction of Energy 101 because when we talk about energy security, there are two forms of energy that we need to focus on.

One is the energy that we have in this room which is electricity and electricity is made from a variety of sources, nuclear power, coal, natural gas, solar, wind, geothermal, and we all use it and we rely on the grid. And then there is transportation energy. When it comes to transportation energy, that is the energy that brought all of us here, every food item that you consume travels on average 1,500 miles from farm to plate and it is all petroleum dependent. Our transportation energy is almost entirely dependent on petroleum and in this sector there is little flexibility, so if something goes wrong with petroleum, we are in trouble because our economy is completely dependent on transportation, movement of goods, services, and people. These are two different universes and the problems that affect one do not necessarily affect the other and the solutions to one are not necessarily solutions to the other.

If we look at the electricity sector, we had in 2003 and 2004 a glimpse of what could go wrong when the grid goes down. We had in the summer of 2004 a sort of butterfly effect, an uncontrolled chain

reaction, on the East Coast and in Canada when the blackout took place. We had I think it was $6 billion in damages, 15 million people were without power, and about 100 power plants were shut down. The interesting thing about this is that it took a very, very long time to figure out what really happened there. Of course, our knee-jerk reaction was to blame the Canadians, and then we blamed the terrorists, and only after very long days of investigations, it happened to be an overgrown tree in Ohio that was not trimmed, and it is amazing how this whole started from an overgrown tree. So if you think about what an overgrown tree can do to our economy and think about what a coordinated attack by evildoers can do if they really put their minds to it and attack the grid in a systematic 9/11-style operation in which the recovery could be much longer, it shows that in the electricity sector some very bad things can happen. And by the way, not only when it comes to the grid, also power generation sources particularly nuclear power plants that are as we saw recently in Japan could be quite vulnerable. Actually, the case of Japan is very interesting. We are talking about the largest nuclear power plant in the world that was built actually to sustain an earthquake, but it was not built to sustain a 6.8 earthquake on the Richter scale. Again, it took a very long time to assess the damages. The utility company that was responsible for the reactor first of all reported there was no leak. Then they said that there was a small leak of radioactive water. Then the size of the leak turned out to be bigger and bigger. Then it turned out that there was 50-percent more

radioactive material in the leak than they had initially reported. Then it turned out that hundreds of barrels full of nuclear material fell down and the lids came off. Anyway, it was amazing to see with the meticulous and thorough Japanese, things like this cannot happen in Japan, they can only happen here, but even in Japan these things can happen. And it turned out that that was the sixth serious incident related to nuclear power in Japan since 1999. So we are quite lucky in this respect and I think when it comes to power there are some very, very serious issues that need to be addressed.

But I want to move from power transportation because as I said I think that is where the big vulnerability is since 95 percent of our transportation energy is based on something that we do not have a lot of and the people who have the petroleum in the world do not like us and they will never like us in my view, so the one thing we need to remember when we talk about petroleum is that the future of petroleum, or as long as our transportation system or energy system is dependent on petroleum, our economic future will be dependent on the future of Islam because 75 percent of the world's oil reserves are in Muslim countries. The 25 percent of oil that is not in Muslim countries is running out twice as fast, rate of depletion that is, than the rate of depletion in the Muslim world. And if something goes wrong in the Muslim world like Sunnis and Shiites decide that they do not like each other and want to kill each other, that affects our energy future. It happens to be that the Shiites, for example, are only 10

percent of the Muslim world, but when you look at the distribution, they sit on top of 45 percent of the percent of the world's oil reserves, and they are 75 percent of the population in the Persian Gulf where most of the world's oil happens to be. So when they decide to kill each other, that affects our energy future.

One of the things that I think all of us learned to appreciate recently is that there are some people who have identified oil as the Achilles heel of our economy and they see oil as something that is a target in what they call economic jihad and they train suicide bombers to go after oil facilities because they realize when they blow up an oil facility in the Persian Gulf and oil prices go up, our economy bleeds more billions of dollars, and as it is, we send every day $1 billion in exchange for oil overseas, but if oil goes to $200 a barrel then more money goes their way and more money percolates into the system that sustains radical Islam. I think that when you read the communications, when you read jihad websites, the thinking is very clear that this is a major part of our economic warfare strategy against the West, if you listen to bin Laden he says very clearly we defeated the Soviets economically, of course it is nonsense but this is what they broadcast, we can defeat the Americans economically by going after oil. Which is why, by the way, Iraq, the country that could have produced 4 million or 5 million barrels of oil every day is hardly doing two because there are a sustained attacks and sabotage against pipelines, refineries, and pumping stations, et cetera.

Just on the way here I received an email that in Saudi Arabia today that the Saudi government arrested 208 terrorists who were actually planning on blowing up a major oil facility in the kingdom, and that is not the first time. In April of this year they arrested about 187 terrorists. Some of them went through flying school. They took flying lessons to hijack planes and crash them into facilities. Before that, in February 2006, we had suicide drivers and suicide trucks driving into Abqaiq which is the largest processing facility in the world, so this shows us that there are people with suicide mentalities. It is quite a significant thing when a person is willing to sacrifice his life in order to deny us oil, that tells you a lot about where they are. So that is a threat that has been understood by us, and when you look at our government policy, we are responding to this. Almost every day there is an article in the newspaper about the threat of a supply disruption or terror attack against oil, so in this respect, in the past 5 years we have been able to ring the alarm bells and direct public attention to this problem.

Where we did not succeed so far, and that is when I go to the "eh" scenario, there are two things. One is I think that the public is, not only the general public but the Washington intellectual community, very dismissive of two threats. One is the notion of an oil embargo or use of the oil weapon. Can't happen. They did it in the 1970s and it did not work, it backfired on them, they suffered more than we suffered, not going to happen again. That is one thing, that is, that people tend to dismiss.

The other threat that people tend to dismiss is the threat of resource wars. Countries do not go to war over resources anymore, that is 19th century stuff, that does not happen anymore. Now we live in a world in which everybody collaborates and we are interdependent. I want to talk about those two scenarios because these are sort of low-probability scenarios.

One of them is, again, there is not going to be the use of the oil weapon. Just in the past couple of years there have been at least five cases that I have counted of countries that either used the energy weapon or threatened to do it. That starts with Hugo Chavez and Ahmadinejad, and of course Russia and what they have been doing. I think that we are still at a point in time in which in those countries there is more saber rattling than actually doing it and the reason is because they are still not in full control over our energy system. But if we maintain the current system, then as I said, the resources that are outside of the OPEC rim of influence are depleting very fast, their control over the remaining share of the pie will be increasing and with it comes an ability to manipulate prices and to use oil as a political leverage. From my point of view, if it happened before, it could happen again and it is just a matter of the right timing and the right circumstances, and as the Prime Minister of Malaysia once said, Mahathir Mohammad, when people are angry, they do not act rationally.

The second thing is a resource war, again, something that people tend to think cannot happen. Last summer we commemorated the seventieth anniversary of the Marco Polo Bridge Incident which was one

of those landmark incidents in which started this 8-year cycle of Japanese aggression in the Pacific and ended 8 years later with two mushroom clouds, but if you really look at the genesis of all this, a lot of it had to do with access to resources. One of the reasons that Japan really embarked on its expansionist policy is because they needed resources, and today we are dealing with new emerging Asian powers like China and India who really need a lot of resources. We are talking about 2.3 billion people, that is a third of humanity who are dropping the bicycles and they want to drive cars and have microwaves and everything that we take for granted. I think it is unwise to assume that we can always manage resources and know how to deal with because, again, when countries are pressed against the wall and they need access to resources, sometimes they tend to miscalculate. So I would not dismiss this possibility and I hope it does not happen.

So there are a few things that we can do to address this issue. One thing we need to do of course is to make sure that if a supply disruption occurs that the damage is merely bad and not catastrophic because there is no doubt that it can happen, but there is no doubt also that we have remedies. For example, one thing that would be very useful would be if we had more strategic reserves. The United States is in pretty good shape, but the rest of the world is not and, frankly, if the rest of the world suffers, we will suffer as well. The reality is that most countries do

not have sufficient reserves and most countries are at the very beginning phases of their preparation of reserves.

Why is this important? Because unlike the 1970s and the 1980s and even the 1990s in which the oil-producing countries, but primarily Saudi Arabia, had a lot of spare capacity and we had liquidity in the market, today we do not have the liquidity in the market. So if something bad happens in Saudi Arabia, there is nobody out there who could come up with the oil and inject this oil into the market. If there is no liquidity in the hands of the producers, we might as well create liquidity for ourselves with strategic reserves. It is not only taking the oil and putting it in the ground and keeping it there, the whole mechanism is like a blood bank that we need to implement and to decide when do we use the reserve. At what point do we decide to use the reserve?

A few years ago when oil was $50 a barrel, if I had told you that something can happen that will drive oil to $100 a barrel, I think that everybody would agree that if I raised such a scenario, people will say, no, we will use the strategic reserve. Oil went to $100 nearly and we did not use it. So at what point do you decide that we are in a crisis? And at what point do you sort of take the politics out of, because then if it happens before the elections, people say they are using it to survive the elections. So we really need to take the politics out of it and make sure that we had a Fed-like system in which we can implement those mechanisms.

But even more important, while all of this is really a stopgap solution, the real thing that we need to do is to turn the transportation sector to be more like the utility sector. We need to create diversity in the transportation sector because, as I said, if we only remain with petroleum, we are in trouble. We are in trouble. The cars that we have today, when you put a car on the road, it will be on the road for 16.8 years and I do think any of the oil experts can tell you with a straight face that we are going to have transportation fuel for the next 16.8 years. So if we are not sure that we are going to have 16.8 years of transportation fuel based on petroleum, it is really silly to continue to produce cars that can only run on petroleum. You may want to build a car that run on petroleum but also something else.

So me the strategy should be to do to oil what electricity did to salt. Salt until the 20th century was a strategic commodity. Countries used to go to war over sale. Colonies were built around it. It was the only way that you could preserve food. Then came refrigeration and salt is just another commodity. We need to turn oil into just another commodity, something that can compete with other sources of energy and that is why we need to have multifuel platforms, flex fuel cars, electric cars, plug-in hybrid cars, platforms that can tap into other sources of electricity so if something bad happens to oil, if tomorrow Saudi Arabia decides that it does not want to produce more oil or whatever you want it to be, or Ahmadinejad decides to close the Strait of Hormuz, we say we have

flexible-fuel cars that only cost about a hundred dollars a car to make them, there is no reason why that should not be a mandate. I think it should be a standard feature in every new car sold in America just like a rear-view mirror or an air bag or a seat belt or an FM radio. If it costs so little and even the auto manufacturers are quite fine making those cars, they themselves said that they are willing to make 50 percent of the new cars flex fuel by 2012, so why not? It is a low-hanging fruit. Of course, once you have the cars, then you have the chicken, the chicken can lay the egg and that brings us to the infrastructure. The infrastructure to serve alternative fuels is not that expensive. For $8 billion or $9 billion you can retrofit most of the pumps in this country. Just to give you a sense, we just appropriated almost $9 billion for a strategic ballistic defense system, not that I underestimate the importance, but that is not a huge amount of money when you look at the threat and the vulnerabilities to our energy supply.

Lastly, we need to electrify our transportation system. It is very important that we shift from liquid fuel to the use of electricity because electricity is not only cleaner and cheaper, it is also domestically produced. As I said, we do not import electricity to this country. People are talking about independence, when it comes to electricity we are energy independent. Almost all, except for a little bit of electricity from Canada, we have the capacity to produce everything here, we do not

import any of our electricity sources, and if we shift from oil to electricity, we essentially shift from an imported resource to a domestic resource.

These things do not involve sort of way over the horizon technologies. Flex-fuel cars have been around for over a hundred years now. The Model T was a flex-fuel car, so this is a very low-tech technology. Again, if we deploy those things and make sure that every new car sold in America can run on gasoline and something else, then we have a system that is very well diversified, we can shift quickly from one source of energy to another in the transportation sector, and that is how you get energy security and at the same time you break the vertical monopoly of OPEC that will just increase and trouble us in the years to come. Thank you.

MR. GARFINKLE: Now we approach our question-and-answer period. We have about 20 minutes to do that. While the panelists are being hooked up to their technology, let me just observe that what you just heard is just a sampling of what is in the "Blindside" book. As I think you have been gather, in a way there is both a vertical and a horizontal balance of what the books represents. On the one hand, in Judge Posner's and Frank Fukuyama's pieces in the book, we start at a fairly theoretical level, but as we get into cases, we get down to quite specific policy issues with very specific policy propositions and fixes. So it goes all the way from the theoretical to the rubber meets the road.

As you can see, there are many different kinds of subjects involved here. There is energy, there is health, a whole range of subjects. So in a way what we have done using the concept of "Blindside" is we have regrouped a lot of conventional policy issues into a new framework that allowed the reader to stand back and see things that seem different within a common framework. So those are the two kinds of balances the book creates, and as far as I know, it is the only book in existence that tries to do this. Of course, since it is the first effort it is not perfect, but it certainly I think represents a remarkably innovative start to thinking about the whole phenomenon of "Blindside."

Having said that, we will now open the floor. Would you please just identify who you are and ask your question, and we are set to go? Sir, way in the back.

MR. DILLON: Ken Dillon, CNC Press. I am wondering if you took a look at the methodologies you were using for each of your applied areas and tried to see if you would apply them in other areas and whether you would get a good effect. In other words, is it scientific methodology or some other methodology that may be useful in foreign affairs? Have you done this kind of cross-fertilization effort?

MR. AHMED: Frank?

MR. FUKUYAMA: The book grew out of a single conference where people presented the papers simultaneously and that was the source of the chapters. I think that is an exercise that would be very

useful that really needs to be done. For example, I made a generic statement that you cannot hedge against everything because hedging is costly, but then several people got up and said actually there are some low-cost hedges that we could apply in this particular area, and so that is obviously not a universally true principle.

But I think that when I think about this problem, it is a generic set of problems. My view is that the primary obstacle in a way is a psychological one that transcends all of the particular domains in which you can think about low-probability events and that the psychological is the inability to get real decision makers to focus on these low-probability events just given the kinds of incentives that face most politicians, bureaucrats, and people in positions of responsibility. So in a sense the more theoretical chapter is trying to lay a basis for creating a common framework for thinking through, but I think this is just the beginning of a deeper analysis where you really should try to see whether some of the lessons are transportable.

MR. GARFINKLE: Let me just add that when Frank designed the project, I think the tendency was to focus on cases, to sort of hook people, engage people with things that are of immediate concern. Obviously there has been a lot work done in cognitive psychology. When we are surprised, and this is not because the world does anything, we do it to ourselves, it is a psychological -- there has also been a lot of work done on mathematics on probability and statistics. We decided quite

deliberately not to go into these very highly theoretical dimensions, we wanted to create a book that was more sort of policy oriented. Anybody else, please? Yes, sir.

MR. GADBAR: My name is Michael Gadbar and I am with General Electric. Another way to state the dilemma that is posed in your book is the fact that we do not know what we do not know, and while it is hard to talk about that because obviously by definition we do not know what that is, you could think about policies that make us more blind or less blind. I am wondering whether in your work when you think about politics and global politics you looked at the dilemma posed by the tension between engagement and isolation and whether or not the policies that have been promoting isolation, whether it is on Iraq during Saddam Hussein or Iran currently, actually have the side effect of self-blinding, of making us more blind because we know less about the people who we are isolating and whether that has any implications for the kind of foreign policies that we might adopt?

MR. GARFINKLE: Does anybody want to take a whack at that?

MR. FUKUYAMA: I think that obviously more information is better than less information. One of the problems that you had in Iraq was that no one, not even an academic anthropologist, had gotten into the country in the last 25 years. That was not entirely the result of the policy of sanctions, it was also the Iraqi government was not letting people in as

well. So it is the case that to do the kind of monitoring that Scott Barrett is talking about really does require this institutional framework that tries to deal with these tough cases. Sometimes it is that countries are isolated, Scott was talking about cases where they are so chaotic that you do not have the basic institutional framework to do a sort of monitoring, but I think in all cases one of the beginning points at which you start this problem is by having access to better information and then systems for filtering the right signals out of all the noise that you are going to get from that process.

MR. GARFINKLE: There is also of course self-isolation, and I know from reading Scott's work that one of the reasons that avian flu has tended in some cases not to be reported properly is because there are economic consequences to poultry industries of reporting. Would you like to elaborate on what self-isolation can produce?

MR. BARRETT: Reporting is a constant problem. With BSC, for example, the farmers reported that their cattle were possible infected and we see such a small of money in compensation that there is an incentive for them not to report. This is a routine problem.

There is a current problem that emerged and you may have read about, that Indonesia has samples of H5N1 that they normally would hand over to the World Health Organization for analysis because they are constantly wanting to track the evolution of the virus and you are trying to spot when it might jump so that it becomes transmissible from human to

human. They held onto their samples. They said why should we share our samples because you are only going to develop vaccines that we will never have access to that we cannot afford. So they are using this as a bargaining chip and in my opinion that is actually a reasonable thing to do. I think that they are right that they would not have access to that material.

I would say that there are aspects here of psychology, even our analytical ability to deal with problems involving profound uncertainty, there is some research in economics on that, but I think underpinning a lot of this are fundamental incentive problems. It is not that things are impossible to be done, there are reasons why they are not being done, and that is an example of something that would be worked out through negotiations but the problem there is really one of incentive.

MR. GARFINKLE: Yes, sir, in the front?

MR. TRAINER: Robert Trainer with *International Investor*. As one who survived one of the blackouts in New York in 1977, I remember very well how it was almost comical and fun for about 12 hours, and then as people's food began to spoil, suddenly people's patience ran out very quickly.

My question is twofold. One, redundancy. One of the lessons from that time was ConEd was forced to build more redundancy into their systems. I do not see that here. And even in regard to the strategic petroleum reserve, one of the questions we have often asked is shouldn't there be a strategic refined reserve? You said we are better off

than most nations, but am I not right that we measure the amount of petroleum we have in that reserve in terms of weeks, really, and I think it is about 44 days' worth the last I heard to handle the country's needs. So we are not talking about a great amount of time should something dramatic happen in the world markets.

I guess I would like you to elaborate, too, and imagine a scenario where we started to approach 30 days or so and we are really looking at those reserves, how quickly could we refine them, who would make the decision as to where it is distributed, how, which states, whether it goes to jet fuel, whether it goes to automobile gasoline, whether it goes to diesel for trains? And national security quickly gets involved, national intelligence, and I wonder if your book has gone into what might be some of the repercussions in terms of those decisions getting compounded by all those concerns.

MR. LUFT: As to our strategic reserve, it is true that if you look at it you see 60 days of imports, but that is only if you assume that all of the imports disappear all together which is not a very likely scenario. What is more likely is that, one, two, or three countries will go offline, so if we talk about let's say a loss of 1 million barrels a day, then you are talking about 2 years of theoretically that the (inaudible) reserve is over 770 million barrels, and the president announced last year that he wants to double it to 1-1/2 billion barrels. But you make a very, very good point here that the fact that we have the oil in the reserve does not mean that

we are going to have the gas stations or that refined petroleum products available to us because one of the mythologies when people talk about oil is that oil is oil is oil. Well, oil is not oil is not oil. There is sweet oil and sour oil, different types of crude, then there are refining issues and certain refineries can only process certain types of crude, and these things cannot be changed at the flick of a switch. So no doubt, if there is a supply disruption, we are going to suffer to a certain extent. The last time that we had a major supply disruption during Hurricanes Katrina and Rita when 14 refineries went offline, in the State of Georgia a policy was implemented of every child is left behind when the school buses did not operate. So these are real concerns and we have to begin to think who decides on how much goes out and the distribution, and considering the fact that the U.S. military is the largest consumer of fuel by far that they will have something to say as well.

On redundancy, all I can do is quote what Bill Richardson said after the blackout in 2003. He was Secretary of Energy so he should know. He said we are a superpower with an electricity grid of a Third World country. Our grid is so underdeveloped and so underinvested and so problematic which is why, by the way, I am such a big fan of electricity as a fuel because what electrification of transportation will do is create the utilities and new markets with their products with a new revenue stream. Now they are at the point that they are losing customers because our industry is leaving the country and going overseas. If you are creating a

new market particularly during off-peak hour electricity when I believe most people would recharge their cars at night, then you create a new source of revenue that will enable them to do what I am hoping that they will do is to really move into a much smarter grid which is way, way, long, long overdue.

MR. GARFINKLE: While we are talking about energy, let me just note that as a complement to Gal Luft's piece in the book, we have a piece by William von Villian and it is a piece at a slightly different level. It looks at the model of DARPA which is a successful innovation organization when it comes to weapons and asks whether the traits that have made DARPA successful can be applied to the energy sector. It is quite an interesting piece, so there is more about energy in this book than only one essay. Yes, sir, back by the tripod.

MR. LAPORT: Todd Laport from George Mason University. If we are successful in doing things that can help us anticipate extreme events, we still will not know until we have an extreme event whether we got it right. Aaron Wildavsky wrote in a book called "Searching for Safety" some years ago about the tradeoff or the different strategies and anticipation is one against a known threat, but resilience is one that is useful in situations in which the threats are unknown or unpredictable.

What do you think, what does the panel, or what do your authors think if you can project what they might say if they are not here what the political requirements are to produce the situation in which the

United States and other developed nations in particular could be more resilient and what that might look like if we were able to do that?

MR. LUFT: One word, pain. People only respond to pain. If I told you prior to 9/11 our country is vulnerable, we have to improve our airport security, 9/11 came, money was no issue, we could do anything, of course our response would be we overreacted, but we did respond. So pain is a very good start. We need to suffer some pain in order to make the right movements.

MR. GARFINKLE: As I recall, in the book Judge Posner does talk about resiliency. He does not talk about the difference between structural uncertainly and stochastic uncertainly, in other words, the difference between knowing there is a number but you do not know what it is, and not even knowing what the variable is. It is when you get to the situation where you have structural uncertainly and do not even know what the variable is that you need to build resiliency into a system and I think Judge Posner talks about that in the book. Yes, sir, in the front here?

MR. PEARLMAN: I am Lew Pearlman. I am currently a consultant with the public entity Risk Institute. Let me mention that in 1979 I was a consultant with Professor Charles Perrow and some others to the Three Mile Island Commission. Perrow came up with a paper which he later expanded to a book which is probably well known to people here called "Normal Accidents." He told the commission to their own

consternation that whereas the public perception of Three Mile Island was this was a bolt out of the blue, this never could have been anticipated, how could such a thing happen, he said, no, no, this is totally normal. This stuff happens all the time. One of the features that he pointed out as a normal accident is what historians would call the fallacy of hindsight. After a major disaster of course there is always some sort of board of inquiry or commission or congressional investigation or criminal investigation to find out how did this happen, whose fault is it. The dilemma of low-probability events is that after they happen, the probability is 100 percent. When you do this kind of investigation as we all know, the trail always leads to the fact that somebody predicted it, that warnings were issued, that some engineer out in the field was sending memos to headquarters, my God, this is terrible, do something, and that it was ignored. Or an FBI agent in Minnesota was saying we want to look at Moussaoui's hard drive. It always happens that way. And then the public perception shifts from these things are inevitable, how are we going to learn to become resilient and adaptive? Who do we blame? Who do we sue? How do we get retribution? I do not have an answer to that, but I think that is a central part of this problem.

MR. GARFINKLE: Gal, do you want to comment?

MR. LUFT: Just an example from this morning, I gave a speech before the Biomass Coordinating Council. These are the people who are responsible for making fuel from biomass. I told them we are

embarking today on one of the most aggressive genetically modified biocatalyst developments. We are investing billions of dollars in producing bugs that can eat wood and secret poison. This is what we are essentially doing. There is absolutely no regulatory regime or safeguards to make sure that some of these bugs can go from the lab to the atmosphere and begin to eat your home and your furniture. Somebody needs to think about this. You should have seen the response. It was heresy. People just do not want to listen to this. I was not suggesting we should. All I am saying is we have to be cognizant and we have to make sure that we apply the right safeguards and we are careful because we do not want the biofuel industry to suffer a Three Mile Island which would be a huge setback. But the interesting thing was the response. I did not see the openness or the ability to deal with these questions or doubts and I think that is where the danger is, that people sort of blind themselves to those questions and they cannot fire me, but I believe there are a lot of people within the industry who are friable for things they are saying but they just would not say that and that is where the danger is.

MR. FUKUYAMA: Actually, if I could comment on this, first of all, you are absolutely right that the retrospective of trying to assign blame for not having anticipated things that were essentially nonanticipatable is an absurd exercise. I thought the whole 9/11 Commission was a total waste of time and actually made us reorganize our intelligence community in a counterproductive way. I do not know how

you can stop doing stupid things like that, but if we could, we would be ahead.

Gal in response to the previous question said you have to suffer pain. One version is that is the catastrophe has to happen and then retrospectively you are wise and you close the barn door after the horses have gotten out. But it does seem to me that what you really want to do is not that, the ideal scenario is that you get these kind of early signals that are painful but not catastrophic that you can respond to. What I was trying to say, again to make a plug for the Schwartz method is that politicians if they can visualize a very bad situation without actually having to experience it can sometimes be persuaded to make the necessary investments now in resilient infrastructure that will anticipate and allow you to flexibly adjust and so forth. I wish I had a lot of examples of where that was the case, but hopefully if this is done right, you can at least open their minds to the possibility that they ought to be thinking about at least some of the fairly clear short-term investments. That is a pretty tough thing to do, but that is why I do think that some of these scenario exercises are quite helpful to people because it does that kind of prior visualization.

MR. : The problem, Frank, would be for politicians especially obviously their attention spans are short, but if you do go out on the limb to endorse some dramatic action to prevent some blindside event that we can be sure is going to happen and then that event never happens and you never get credit for it, imaging George W. Bush got his famous

briefing on al Qaeda on August 6, 2001 and imagine if that afternoon he had said I am ordering the invasion of Afghanistan to prevent attack on the United States, 9/11 never would have happened, and George Bush would have been the most ridiculed president in American history. He ordered an attack on this little backwater country because of what? Nothing ever happened. I think every politician who thinks about the possibility of some calamity is aware that if he takes successful steps to prevent it he never gets credit.

MR. GARFINKLE: We have time for one more question, there is an event right after this one. I see a hand, blue shirt, nice tie.

MR. SHUCKNER: My name is Greg Shuckner and I am from the University of Central Florida. Sort of building on that last point, you talked about the fact that we may or may not be in a position to respond appropriately depending on circumstances that we may or may not be able to anticipate, hence being blindsided. The question is about structural changes that may be need to be made in the government and there was a question earlier about whose call it would be to decide which allocation you would use for petroleum. Do we need to make structural changes in the government itself in order to be able to respond, anticipate, and predict blindside events?

MR. BARRETT: I am not sure if I am going to give a clear answer. First I want to tell you by the way I found that third disease. It is plague. So now you do not have to go home and check Google.

I wanted to make a comment about what was said before and it may be connected to the question that was just asked. One important case of the U.S. government acting on very good information of an impending catastrophic risk was during the Ford administration when there was a soldier in I think Fort Dix who fell ill from a swine flu illness and died. Scientists at that point projected that this would emerge as a pandemic flu and they brought back stories from 1918 and 1919, and a scientific panel was convened and urged the president to order the production of vaccine and for every American to be vaccinated for the swine flu, and President Ford gave the order and it was done.

What actually happened at that point was that the flu did not materialize and people were facing a different risk and that different risk was about the vaccine itself. People were falling ill from something called Guillain-Barre syndrome, and then there was a claim made that vaccine was actually causing the illness. So people at that point shifted to consideration of a new kind of risk and the uptake of the program fell apart. In retrospect, President Ford was criticized for doing this, but actually if you remember what I said before, pandemic flu was spread before symptoms showed, so actually this is a real hard one. It is totally different from smallpox which was spread only after symptoms showed.

So it is the case that if you do not act when in retrospect you should, you are blamed, but it is also true that if you do act and ex ante that was the sensible thing to do, you may also be blindsided.

MR. FUKUYAMA: Actually, the reason I thought Scott should answer that question was that I am not sure about reorganization of institutions in the U.S. government to deal with this. There are certain things we should be investing in like better public health infrastructure and so forth, but the clear institutional gap I think is the international one. It is quite interesting that Judge Posner, the real libertarian guy, University of Law and Economics person that does not want any more government than is absolutely necessary, but when he looked at the nature of shared risk across borders and the need therefore for collective action to deal with them, and then you look at the actual set of institutions that we have to mitigate some of those risks, that is where I think the absolutely really big need is.

MR. BARRETT: And let me just add one thing quickly to that, and thank you for reminding me of what I should have said. It really was stunning for Judge Posner of all people to say you basically need a world government to address the problem of climate change. That is pretty astonishing.

You need two things to work. You need domestic institutions, and you need international. As bad as we may think our own institutions are, the bigger problem is going to be with the poorer countries. If you think about an issue like climate change, for example, the question of institutional resilience was mentioned before, the thing you want most of all to promote adaptation which is a form of resilience is to

have stronger institutions in the poorer countries. And as bad as ours may be, and Katrina is fresh in our minds and other situations, too, it is much, much worse in the poorer countries, so you need those institutions to work. But internationally of course there are major gaps and as I said in my remarks earlier, there is a tendency for the most-able countries to want to make the investments domestically. Typically, not on all issues but a lot of issues, we take a more defensive posture. What that does is that leaves the rest of the world more exposed every time we do that so that there is an asymmetry introduced in terms of our institutional responses. The forces of gravity are always moving in that direction. That is what sovereignty basically does, it pushes in that direction, and in some cases that is collectively harmful and actually you do want to focus on institutions that address these problems in the most fundamental way and that is what I was trying to point to earlier in my remarks, if there is a new outbreak you want to get it right at its source, like after you had the terrorist attacks you want to go right into Afghanistan, a much more effective way to address that threat than just throwing up the walls at the border. So I think that is right. That is a particular area where because of the institutional sovereignty which we are not going to let go of we are particularly vulnerable institutionally to further global problems.

MR. GARFINKLE: I would like to thank Scott, Gal, Gregg, and Frank, and I would like to thank Bob and the Brookings Institution and

the Brookings Institution Press, and all of you for coming. Thank you very much for coming.

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