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## Session 27PD

### Impact Of Terrorism on Future Mortality Assumptions

**Track:** Futurism

**Moderator:** MARK C. ROWLEY

**Panelist:** PETER C. BISHOP†

*Summary: Presenters discuss a method of mortality projection on various scenarios about terrorism that have been written by futurists given the events of Sept. 11. Attendees learn to use a futurism technique (scenarios) to address actuarial problems.*

**MR. MARK C. ROWLEY:** Let me begin by explaining our objectives today. We will:

1. Demonstrate the uncertainties and contingencies in a rapidly changing situation. Futurists really earn their money in those kind of situations.
2. Discuss how to practice contingency thinking in the face of uncertainty.
3. Explore alternative scenarios to the war on terrorism. We're going to be talking about using futurism techniques to deal with terrorism and what that means. What's going to happen with terrorism in the future is very uncertain.
4. Try to show the impact on future mortality and the strategic implications for insurance businesses of these uncertain futures.

**MR. PETER C. BISHOP:** I'm a professional futurist. The Studies of the Future program at the University of Houston-Clear Lake is the only master's degree program in the United States that specializes in the future and in professional and applied futures studies. We like to compare ourselves with the 3,768 colleges and universities that have a master's degree in studies of the past, better known as history.

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**Note:** The chart(s) referred to in the text can be found at the end of the manuscript.

I'd also like to point out that the SOA, as I came to find out about 10 years ago, is the only professional society in the country with a section devoted to futurism. So this session, in essence, is an opportunity to practice what the Futurism Section does, and that is to deal with those kinds of futures, which, frankly, fall outside the bounds of most of the techniques that you use. There are parts of the future that the actuarial methods don't cover. And those tend to be parts like Sept. 11 and similar events that have changed the world so radically; you have to adjust some parameters, at least, if not the structure or the models that you're using. So we're the people who bring in the ideas and the possibilities about where you may, in the future, have to adjust those parameters and models to make them appropriate and work best for your customers.

The agenda today begins with an introduction on how we think about the future. Then we're going to do some exercises that will help us mine and explore the future. I use the word explore not just in passing, because, indeed, we are going to use our knowledge and our imagination to investigate different futures to see what's out there and to what extent they may actually have an impact on the futures that you are working with all the time. At the end, we will give you the results of a number of studies that have been done since Sept. 11 on possible scenarios for the future. Then Mark will talk to you about the impact of that on mortality assumptions. So this session is one of those cases where the answers are in the back of the book. Don't look in the back yet, though, because we want you to have a lot of fun with the exercises as well.

As opposed to what you do, which is quite quantitative and mathematical, future studies tend to emphasize the discontinuities, the errors, the big changes in life — those tend to revolve around ideas a lot more than around numbers. In that sense, we deal with a combination of factors and drivers. There are basically three factors. One is trends, which, of course, you're dealing with. This includes demographic, economic and technological trends. That's where all the math, the models, the computers, the extrapolations and the forecasts live. However, every once in a while a discontinuity occurs.

We're now very aware that the world can change rather suddenly and have to take that into account. Of course, we all know about past discontinuities. We know about the fall of the Berlin Wall. We all know about Pearl Harbor. We all know about Sept. 11. We all know about the Enron bankruptcy. But guess what? There are others out there and new ones about to happen. And we in future studies, though we can't predict what those are, like to alert people to the fact that the present, which began with the last discontinuity, will end with the next discontinuity. We don't know where that is and we'll talk a little bit about how to manage that, but this particular era that we're in right now, the era of terrorism, if you will, or the era of homeland security, whatever you want to call it, is still temporary, as all the others eras were. It may come to an end next year, it may come to an end 10 or 20 years from now, but it is temporary. And we in future studies like to think about what happens after that.

Basically, the future, as it occurs to us, is the combination of trends that have momentum within eras — punctuations that begin and end — period. So the trends go on and then there's a punctuation. The trends go on and there's another punctuation. Frankly, your models assume that the trends are going to continue up to the time horizon and there will not be punctuations. And that's an OK assumption in most cases, but of course, it's not guaranteed and we're talking about what to do in that case.

The final driver, then, is choice — we're not completely victims here; we're not fatalists. We believe that to some extent each of us has a sphere of influence. We can by action, by knowledge, by forethought, actually make a difference in the future. So our recommendation is to use all three of these things.

What are the trends, what are the potential discontinuities, and what are the choices that people will make that will change the future? The problem, of course, is that we don't know what those particular discontinuities and choices are, and, therefore, we're dealing with uncertainty.

As opposed to most other professions like yours that do forecasting, we tend not to make assumptions. We tend to identify what assumptions need to be made, but we don't make them. Rather, we say, "Well, if you're going to make an assumption, maybe it could be A and maybe it could be B. Hey, let's look at both of those contingencies." That then results in the scenarios. To make a predictive forecast, you have to make an assumption and, basically, you are assuming that you know how the uncertainty is going to resolve itself. In many cases, you're right.

There are two kinds of uncertainty. Uncertainty above the line is uncertainty that you can resolve with more information and more study. That's what the techniques and the research are about. You can get your error down to a certain level of uncertainty and the more you spend, the less uncertainty there is. Unfortunately, there are uncertainties below the line that no amount of research is going to change.

You're all familiar, perhaps, with the development in mathematics in the last 20 or 30 years known as the "chaos theory." "Chaos" is a kind of a Madison Avenue word for something that is quite precise and mathematical. These are actually deterministic systems that proceed from one step to another through a mathematical formula, but are unpredictable in the medium term. Therefore, no matter how much research you have, like the weather, you can't predict more than three or four days out because it's a chaotic system. That doesn't mean the system is in chaos. It doesn't mean that people are running around like in a stock market crash. It just means that mathematically you can't extrapolate out beyond the first couple of points. No amount of research is going to change that.

There is an even more recent development in systems thinking, which is called "complex adaptive systems" and is sometimes called "self-organizing systems."

These are systems that are not built out of the kind of variables that we all deal with, like mortality rates, age and consumer preferences. These are systems that are built out of agents, like a stock market. There are millions of agents all making choices and out of that comes the emerging properties of price, market movement and things like that. Isn't an economy, basically, a set of agents? Isn't a market a set of agents?

We know that markets can do very unpredictable things. Everybody says that we should have known that the tech boom was a bubble. You couldn't pick up a paper in 1999 without somebody saying, "Hey, the tech boom is a bubble," but nobody knew when it was going to pop. And when it did, it was obviously quite unpredictable as a result of these "complex adaptive systems."

Then we have what we believe is free choice. Humans are basically free and they will make choices that are unpredictable. So we have chaos, complexity and choice here below the line, which means that no matter how much research you do, whatever services you subscribe to, whatever computers you have, whatever models you have, there is an inherent irreducible level of uncertainty in every prediction, and that's the kind of uncertainty that we're trying to deal with.

Here's another example of how issues get developed (see Chart 1). The issue is, basically, in two different domains divided by the line of what I would call "public awareness." Stuff below the line is out there, but it is not yet above the line and not yet in the media on the public agenda. People are not talking about it. Terrorism, I can tell you, was below the line as what we call an emerging issue for a long, long time.

I had the opportunity to do scenario preparation workshops with people in the intelligence community. On every single list of discontinuities, we had a major terrorist attack. So it wasn't that nobody was thinking of it, it's just that the wild card, of course, was the events of September 11 and that particular form of terrorism. Once something like September 11 happens, that issue then becomes framed. All of sudden, it's now on the public agenda. Congress gets involved, lawyers get involved and the iron law of issues management comes in, which is where you can actually affect the issue. Here it pretty well takes on a life of its own and you're done. You don't have much effect on it. We need to figure out what is down here that we need to be paying attention to that most other people are not and that we, if we think about it ahead of time, may want to spend some time on? The problem is there are thousands of issues down here. Which ones are we supposed to pick? Well, some of them at least. Picking some of them will alert us to the fact that something is going to happen and create a brand-new type of situation.

So how do we deal with uncertainty, then? The certainty is pictured in Chart 2, basically, as a cone. The present is a fairly narrow set of conditions and events extending into a set of alternative futures. The difference between futures and most

people who deal with forecasting or the future is that we do not make a prediction. We basically paint the different possible futures and then recommend that people make decisions on the basis of those alternatives.

A very simple form of alternatives, of course, is sensitivity analysis — changing a parameter and testing a range of parameters like interest rates or mortality rates. But the more interesting one is where the whole system really changes. So we think of the cone of plausibility, but there are limits on that cone. It's not just everything. It's not aliens landing on the White House lawn, it's not the creation of a perpetual motion machine and the wonder drug. It's those things that we think have some substantial probability. Obviously then, for us, the future is many things, not just one of them. And if you want a real good discussion, we could decide whether the past is many things as well, but that's the philosopher in me.

As a result, we have three types of futures that we deal with. The first type is the type that you deal with, the probable future. This is basically constants and trends — scientific, mathematical and extrapolative. That's the kind of future you're dealing with. We're dealing with a different kind, which is called the plausible future, which results from the discontinuities and surprises. We actually don't mind doing a little bit of speculation. We think speculation in the right form is actually healthy, because it prevents us from taking our models too seriously, realizing that, in fact, we are making those kinds of assumptions. And the scenario and the simulation is the product of that particular type.

We're not going to cover it in detail here, but just to be complete, we have preferable futures. Those are the futures that people want to have. These are visions and choices that people make, empowered when we do change management and leadership. Those are the forecasts that we get to. That's basically how a futurist approaches the future, including the methods that you use in a larger context, which include discontinuity, surprises and a fair degree of uncertainty.

Now, let's look a little bit more specifically at the issue of the uncertainties involved. At the Annual Meeting in Chicago a couple of years ago, somebody said he had never thought about it this way, that the relationship between probability and predictability is not a straight relationship. Most people think that highly probable things are very predictable. The sun will rise. Very predictable, right? Then they think that very improbable things are not very predictable. But they are very predictable. Improbable things such as having a volcano eruption here in the next year is very predictable, meaning it will not happen. The least predictable things are in the 50/50 range. Those things are, literally, a flip of the coin.

One of the problems of thinking like a futurist is that we have always been told not to go there. We've always been told not to get involved in things in which we really don't know the outcome. You're only supposed to say things that you know and you don't know the outcome of 50/50. As a result, we tend to talk about those things

that are probably going to happen and those things that are probably not going to happen, but we tend to avoid areas in which there are high degrees of uncertainty and unpredictability, but that's where the best scenarios are.

That's where the best alternative futures live, in this kind of a sense, because if we graph low, moderate, and high probability with impact, we basically create a space in which we know where the scenarios are (see Chart 3). First of all, in the bottom of this graph, we're not going to deal with the low-impact stuff. So we tend to ignore stuff that's not going to affect us, and we probably should.

We have a baseline future. This is the future that you all deal with. This is the expected or the official future. This is the future where we headed. It's kind of like the heading on a boat. If you draw a line through the centerline of a boat and you get to the shore, if the boat continued on that direction, that's where it would end up, but it probably won't and that's where the scenarios would come in. Scenarios are moderately probable, but high impact. Notice that they're not probable. They're not likely.

In fact, Herbert Kahn had a favorite phrase. He said the probable future isn't. The most probable future isn't probable. You can illustrate that very simply with a dice example. The most probable outcome when you roll two dice is a number seven and it only comes up one out of every six times. The most probable is not probable. The most likely is not likely. So you're betting all the time on the most probable. Everybody says, well, give me your best estimate, your best guess. That may only be 10 percent a probability, in which case 90 percent of the time it will be wrong, so we're sensitive to that kind of thing. Then, finally, there are wild cards. They are very low probability, but high-impact events. September 11 and Enron are two examples of that in the last year. We can't predict those, but we are prepared to realize that they will come about when it comes time.

So how do we handle the scenarios? The reality of alternative futures is the fact that we actually might live in a future that's different than the one we expect. Frankly, that is not a trivial concept. That is really hard to get our mind around, because we are so conditioned to the present and the official future, images and different ways of looking at scenarios. Scenarios are often stories. They can be portrayed as videos. They can be portrayed as movies or books. You could do a scenario of an actuarial forecast made in the year 2003 for the year 2010, assuming an alternative future had already happened by 2003. That would be a scenario. So anything that would happen in the future is that type of a thing.

Let me then more directly talk about this cone in Chart 2. The cone consists of the baseline future, and this is the official future. This is more or less where the trends are headed and the implications of those trends, what might happen after that, or what the implications are, and then two kinds of alternatives. There is the rather smooth alternative in which you have a different model. You end up here. This is

the real future here. I don't know if your future is like that; one that continually gets bent and knocked one way or the other. If you take the alternative future, then, and project it on the two-dimensional space, the baseline is in the center of that and we have what we call dimensions of uncertainty.

"A" here is a value, but we might have less of A or more of A. And here is "B". You might have more of B or less of B. And if you take two of those dimensions you've, obviously, therefore, charted out four different kinds of scenarios, four different worlds, if you will, one, two, three and four with different combinations of A and B. It's an interesting exercise. We're not going to have time to do that, but it's an interesting exercise, because if we're thinking of contingencies at all, we rarely think of two contingencies simultaneously. We rarely combine them and say, "well, what if interest rates were this way and the population choice was this?" What kind of a world would that be? It gets us thinking about alternative futures that we haven't ordinarily lived with. We live with the great future, the utopian future, the one we wish would happen, and we live with the catastrophic future all the time, but these are more interesting and have more of a development like that.

**FROM THE FLOOR:** You're not just dealing with wild cards until they occur.

**MR. BISHOP:** We talk about wild cards, but you don't generally create scenarios out of wild cards with a lot of energy because there are so many of them and they are so improbable. It's just a matter of resources. Sure, if we had all the time in the world, we would investigate every one. So a wild card is that low-probability event. We like to stick in the middle there with the 50/50 kind of stuff that could happen — might happen, might not — and then those explore those two alternatives. I'm glad you picked up on that. It's not that we ought not to, but the time is generally not available.

There is a futurist whose specialty is wild cards and, if you're interested, his name is John Peterson. He has a brief in Arlington, Va., called the Arlington Institute. He publishes a newsletter via e-mail called "Future Edition." He's a very challenging thinker.

**FROM THE FLOOR:** Do you assign probabilities to the various scenarios?

**MR. BISHOP:** We tend to resist the assignment of probability. I tend to talk about three types: likely — more than 50 percent; plausible — less than 50 percent, but not close to zero; and unlikely — possible, but quite close to zero. The problem is that, to assign a probability in any kind of a systematic way, you have to have a distribution. And we don't know the distribution of discontinuities and events, so we're using a rather intuitive qualitative assessment.

We often do this in groups, which can act as a check. If I think it's plausible and everybody else says it's not, then, obviously my judgment is in error with the group's judgment. That doesn't mean I'm wrong and they're right. The stuff that's

most interesting to us is the plausible. The likely is already part of most people's concept of the future, so there's not a whole lot of value added by continuing in that direction. The unlikely or just possible is so unlikely that it probably won't happen, so I'm interested in the plausible, which is somewhere between 10 and 50 percent probability. But that's such an important region, because as soon as you bring up something — let's say it's 20 percent — somebody says I don't think that's going to happen, and they're right. There's an 80 percent chance it's not going to happen. But if you ignore all of those and deal only with those things that are more than 50 percent probable, you've left out a lot of potential contingencies in the future.

Wouldn't it wonderful to be able to assign probabilities to these things with the complexity and the number of them? You could do it by some kind of Delphi or judgmental process where you survey a group, but it would be hard to do. Thanks for the question, because probability is at the core of this, but numerically it's a very difficult thing to deal with.

As I said, we're going to take these ideas and have a couple of exercises in exploring our future, particularly as it relates to this terrorist threat, the events of September 11, the war that's going on, international relations, our homeland security and those kinds of things. Our objective is to find out what are the most plausible, interesting, different alternative futures that could result — not the ones that we kind of expect, nor the ones that are such wild cards that there's a million of them that could happen, but probably won't.

We're going to explore this three different ways. The first is just a standard brainstorming process. We're going to divide into two teams and I'm going to ask you to give me some ideas and I'm going to write them on this flip chart. Then we're going to do some we've made up. We have some scenarios and we're going to give them to you to look at. Then we're going to give you the results of four or five different studies that we found on the scenarios that occurred since September 11 and talk about those as well.

What could be different between today, in 2002, and 10 years from now, 2012, in this domain of terrorism, international relations and security? What's a piece of a scenario that comes to your mind?

**FROM THE FLOOR:** Terrorism is gone.

**MR. ROWLEY:** All right, so terrorism is gone. Interesting. All right. And the green team, a potential difference between today and 10 years from now?

**FROM THE FLOOR:** There are terrorist activities every day.

**MR. BISHOP:** Interesting, OK. This is brainstorming, so we're going to have a chance to comment on Al's scenario there in a second.

**FROM THE FLOOR:** India and Pakistan are in the midst of a nuclear war.

**MR. BISHOP:** OK, so we have a nuclear scenario from India arising in South Asia.

**FROM THE FLOOR:** There'll be a war in the Middle East.

**MR. BISHOP:** OK, right. So we've got a full war in the Middle East.

**FROM THE FLOOR:** The U.S. invades and colonizes Canada.

**FROM THE FLOOR:** Osama bin Laden is caught and there is a new leader.

**MR. BISHOP:** OK. Catch bin Laden and there's a new Al Qaeda leader. That's good, because that's actually two different scenarios.

**FROM THE FLOOR:** A doomsday scenario — we've experienced a significant nuclear event on U.S. or Canadian soil.

**MR. BISHOP:** OK, some kind of a suitcase bomb or something goes off in a populated area.

**FROM THE FLOOR:** I suppose another scenario would be where there's a dramatic single event such as simultaneous chemical plant terrorism in several locations at once, that sort of thing.

**FROM THE FLOOR:** Terrorist activity in the Mideast and they take control over oil production.

**MR. BISHOP:** Terrorists take control of oil. Interesting.

**FROM THE FLOOR:** How about peace between Israel and Palestine?

**FROM THE FLOOR:** Fewer civil liberties. Cameras everywhere, except restrooms.

**FROM THE FLOOR:** An economic boom through recovering from all the destruction from terrorist activities a couple years earlier.

**MR. BISHOP:** OK. Because they destroyed all of those outmoded commercial office spaces?

**FROM THE FLOOR:** Now we're rebuilding.

**FROM THE FLOOR:** It's going to sound similar to some of the ones that we've said already because it's more of a series of several attacks that just really disrupts our economy and our way of life as we know it now.

**MR. BISHOP:** OK. And that's a nice place to go. Now, give me an image. A scenario has to be kind of a story. What would it look like when I got there?

**FROM THE FLOOR:** We might not have power or telephone communications.

**MR. BISHOP:** Oh, you're really back to the Stone Ages.

**FROM THE FLOOR:** How about SOA merges with Casualty Actuarial Society (CAS)?

**MR. BISHOP:** Do we have another one?

**FROM THE FLOOR:** U.S. becomes totally isolated.

**MR. BISHOP:** All right, U.S. isolation. Excellent. OK, good, let's hold it there. That's the brainstorming, that's the use of imagination. Now, are we saying any of these things are going to happen? Of course not. This is an exploration of alternative, plausible futures. Remember the difference: probable, plausible and then wild card just possible.

Let me ask you, first of all, if any of these are in the era of what you consider to be the area of the probable, things that are probably more than 50 percent likely that are quite likely in the near-term. That doesn't mean it can't be a scenario, but then it becomes part of the baseline scenario. Anything here that is quite likely? I'm going to read these: Terrorism gone; everyday strikes; nuclear India/Pakistan conflict; full war in the Middle East; U.S. colonizes Canada; catch bin Laden; a new Al Qaeda leader; U.S. nuclear event; simultaneous chemical plant explosions; terrorists take control of oil resources; peace between Israel/Palestine; fewer civil liberties and more cameras; economic boom and rebuilding; back to the Stone Age; SOA and CAS; isolated U.S. Which of these would you say are likely?

**FROM THE FLOOR:** Catch bin Laden.

**MR. BISHOP:** Catching bin Laden is likely. So that's part of the baseline. It doesn't leave it out of the future, but it puts it at the center of the cone.

**FROM THE FLOOR:** Less civil liberties, more bin Laden, and also lots of terrorism.

**MR. BISHOP:** OK. Do you think every day is likely?

**FROM THE FLOOR:** Pretty close to it. Certainly every week.

**MR. BISHOP:** OK. All right, so less civil liberties and bin Laden and you want to say every day. Is every day plausible? A terrorist event every day?

**FROM THE FLOOR:** No, it depends on what your environment is. If you're talking about Palestine, I think, it's possible.

**MR. BISHOP:** OK. Well, let's define the territory then as the U.S. Let's say in the U.S. is an everyday terrorist event a plausible outcome? It's OK to say no, because that's what I would say. I don't think it's plausible.

**FROM THE FLOOR:** Well, it depends on how long a time you're talking about. Every day for a week, every day for the rest of our lives?

**MR. BISHOP:** Every day is a relatively permanent condition. Now, is every week plausible?

**FROM THE FLOOR:** Close to it.

**MR. BISHOP:** OK, all right. So something maybe a week. Let's say that once a month is quite plausible. Are any of these scenarios totally implausible in your mind?

**FROM THE FLOOR:** Terrorism gone.

**MR. BISHOP:** Terrorism gone you think is completely implausible at this point. Interesting. Can anybody tell a story about how that might actually occur? Telling the story really becomes the support for this. If you could tell the story, then it's plausible. That one would be a very difficult, if not impossible, future to imagine where from we are today.

**FROM THE FLOOR:** Well, it could be possible. During World War II we must have been very successful at deterring that sort of thing, even though they may have landed on our coast. So, if the FBI is pretty successful in regearing and working cooperatively with all the other home security agencies...

**MR. BISHOP:** Right. That's an interesting one. Imagine 20 years ago if someone said that communism would be gone. Sometimes the implausibility is not in the world; it's kind of a function of our imagination. Now, is it possible that a person, one person completely unrelated could do something? Maybe the anthrax was just one person, one crazy person. Is it going to be possible to eradicate that? Probably not. But as an organized worldwide threat, where you're having it as a continual concern, it wasn't that way one day and it may not be that way again. We may be in a kind of an era, but nevertheless, let's leave it at that. Any others that you think are implausible?

**FROM THE FLOOR:** The United States colonizing Canada.

**MR. BISHOP:** Well, yes, that one may not be in the right territory. What's the relationship between Canada and terrorism?

**FROM THE FLOOR:** Very simply, it's the U.S. wanting to control that space. There's a plan right now in which the United States wants to control defenses across the continent.

**FROM THE FLOOR:** And there are two blocs, a U.N. and a non-U.N., so you have a whole bunch of people against terrorism and then you have some countries supporting it.

**MR. BISHOP:** Some are with us and some are against us, but the colonization — it's hard to imagine that as a result of terrorism. Not hard for you?

**FROM THE FLOOR:** Not for many.

**MR. BISHOP:** OK, tell us. Now, I'm not just saying the colonization. You may be afraid of that, but how does that come about as a result of terrorism?

**FROM THE FLOOR:** The United States wants control of the continent and Canadian Customs.

**MR. BISHOP:** Oh, OK, immigration. So the colonization is the control for security purposes?

**FROM THE FLOOR:** Right.

**MR. BISHOP:** OK. I can see that. We're going to do one more thing and then we're going onto our second exercise. The next thing is what we call the "dimension of uncertainty." You remember we had the As and the Bs. These are individual events. What we're looking for, and the more important thing, is how they're different and how they vary along certain continua. What are the big dimensions here, basically, from plus A to minus A, from plus B to minus B? OK, yes, a "dimension of uncertainty," please?

**FROM THE FLOOR:** I saw two of them here. One dimension is from peace and war.

**MR. BISHOP:** OK, so there's a peaceful future and a warlike future. OK, that's a dimension. What's another one?

**FROM THE FLOOR:** Known versus unknown.

**MR. BISHOP:** OK, known versus unknown. Yes, that has more to do with scenarios.

**FROM THE FLOOR:** That's more like the bin Laden thing and the news.

**MR. BISHOP:** Yes, that's a specific piece that we don't know, but how would things vary if we were to rank them on different things?

**FROM THE FLOOR:** There are different ranks up there.

**MR. BISHOP:** The first two.

**FROM THE FLOOR:** I think we just have disruption.

**FROM THE FLOOR:** One.

**MR. BISHOP:** OK, so more terrorism or less? OK, less.

**FROM THE FLOOR:** You know, dealing with the economic situation, I'm wondering if the spectrum would be economic prosperity.

**MR. BISHOP:** OK, right.

**FROM THE FLOOR:** And the other end would be a form of economic depression.

**MR. BISHOP:** Excellent. Are there other dimensions that you see if you were to have to rank these and sort them?

**FROM THE FLOOR:** Well, there could be more terror in rural areas. It's not all going to be in the Middle East.

**MR. BISHOP:** That's a good point. Any other dimensions that you see here? We have explored and brainstormed alternatives, but I find these dimensions to be a bit more helpful as opposed to looking at this spot, and that spot, because out of these you can actually create scenarios and, perhaps, even create alternatives.

What would a world of peace but economic depression look like? Those two things don't go together. Is there a way that I can think of that happening? Yes, peace made at the cost of intense control. A world of peace, but a more or less imposed peace with tremendous controls on people and, therefore, lack of free trade, lack of innovation. You can have that. When you start crossing these, you begin to see whole worlds. Not just specific events, but whole worlds.

**FROM THE FLOOR:** I would say, again, it leads to a depressed society as the failure of the financial institutions, like insurance companies.

**MR. BISHOP:** That would be part of it. Well, let's not get too close here. I mean, to what extent are people in a hugely depressive economy going to have resources to be able to support financial institutions, even banks, loans and whatever else?

And you have another dimension: really high defense costs. And high defense might be up to 50 percent of the federal budget, up to 20 percent of Gross Domestic Product (GDP) spent on just defense and security issues, that certainly

would lead to depression. You might have peace, but it would be a very different kind of a peace than what we've thought of.

**FROM THE FLOOR:** Another dimension might be the use of nuclear weapons.

**MR. BISHOP:** That's a good one — nuclear versus not. And you could do the same for the others — the biological, chemical, those things.

**FROM THE FLOOR:** I think another dimension that is a high dimension is the loss of civil liberties on one part of society.

**MR. BISHOP:** So free versus controlled?

**FROM THE FLOOR:** One of the three aspects that I was looking at is to see SOA emerging. And also to have a complete disbanding of all actuarial societies.

**MR. BISHOP:** What's the relationship of this to terrorism? Is there one?

**FROM THE FLOOR:** Oh, if they merge, maybe they can solve terrorism.

**MR. BISHOP:** Yes, but it points out that it's not always just two scenarios. There could be three. There could be something in between alternatives there, so we'll take that one as interesting. Now, notice that we have one, two, three, four, five, six, seven dimensions that you could then think about what would happen. What are the probabilities? What's plausible?

If you are at all familiar with the scenario technique, you have heard about Peter Schwartz who is the current proponent of that technique. He wrote a book called "The Art of the Long View." It's a tremendous introduction to futures thinking and scenario thinking and, basically, he comes up with how to do that. The problem is that almost any complex situation has more than two degrees of uncertainty. We've just listed seven, so it's kind of hard to do in two, but you could do them two at a time or, perhaps, three, so you see the technique. What are some of the alternatives futures? How do they differ? Then you can begin to play with them as real driving forces of change and how the future might be different.

All right, are we ready for exercise No. 2? Now, you're going to see Mark's good work. Basically, we've collected dozens of scenarios that have been produced since September 11 and put them on cards. Some will be the same as the ones we've been over, we hope, and I suspect some will be different.

Let's begin. Does the card in your hand say something so completely implausible that you want to turn that one in and try to get something else? You don't even have to tell us what it is. Just turn it in and get something else. We're trying to find something plausible.

If you each have a plausible scenario in your hand, I'd like you to get with one other person and briefly share what you have. What are the dimensions on which they are different? And we're going to believe that, out of this exercise, we'll come up with a richer and more interesting set of dimensions of uncertainty.

Our purpose is to enlarge and deepen our understanding of the dimensions of uncertainties, the assumptions that people make or don't make about the future. Did anybody find a scenario that was quite a bit different than the ones that we had listed before? Any that were really kind of interesting that you'd just like to share the content with the rest of us?

**FROM THE FLOOR:** I have one where it suggests that the United Nations becomes the peacekeeper of dispute.

**MR. BISHOP:** Interesting. So the response to terrorism is the strengthening of world organizations like the United Nations and places like that? OK.

**FROM THE FLOOR:** If the United Nations takes over, yes.

**MR. BISHOP:** Are there any others that were different enough from the ones before?

**FROM THE FLOOR:** I guess this one relates to the causes. And if I understand it right, it's about raising the standards of living, particularly in the Middle East.

**MR. BISHOP:** So the causes of terrorism are poverty, depression and lack of hope, and improving these among some folks might do something to ameliorate it. All right, any others over here that were that different?

All right, let's talk about now. Look at the dimensions of uncertainty: peace versus war, war versus less terror, war versus better or worse economics, not much effect on the U.S. versus a lot, high defense versus same defense, nuclear versus not, and freer versus control. Were there any other dimensions that you came across that you think we would need to add to that list? Any differences between the scenarios that you have and how they are different?

**FROM THE FLOOR:** International cooperation versus none.

**MR. BISHOP:** OK, so international cooperation and support versus not; how much the world really works on this together versus how it splits apart.

**FROM THE FLOOR:** Increase or decrease in the prosperity and power of Islamic countries.

**MR. BISHOP:** Any others that you saw that were different? We had seven. We've added two more. All right, so we have had seven through basic brainstorming. And

using this exercise we've gotten two more. Some of these are correlated. Most of them are somewhat independent and you could talk about alternative worlds and crossing them and selecting.

One exercise that we don't have time for is to pick two or three of these at random and then assign them to somebody and say, "OK, let's just assume that this is what happens. Now, tell the story about how that might be." And the story is not so much a detailed thing, it's really getting your mind into the fact that there is a different future out there and you might actually be living in it and whether it's possible or plausible we could have that.

All right, for step No. 3, these are the lists that we came up with for where the cards came from. As I said, there have been four or five major studies of collections of scenarios since then.

The Millennium Project is a very interesting global scanning project that's run out of the U.N. University by some futurists, and they came up with 11 different scenarios and then others.

"Future Survey" is an excellent publication that is an annotated list of all the books coming out every month related to all aspects of the future: health, military and globalization, the economy. If you're interested in keeping up with futures, it's a publication about future societies. Michael Marien is the editor of that publication, and he came up with some of his own assumptions and questions.

I came up with five or six dimensions of uncertainty and divided them into four major categories: the U.S. response, the international response, the terrorist response, and then the final state and the final outcomes. Basically, I thought these were all of the different ways in which the United States could respond. These are not mutually exclusive, but the kind of strategies that I thought were open to it.

If there is to be a war, is it going to be a hot war or a cold war, and is it going to be short, long or forever? One of the scenarios is that terrorism becomes something like automobile accidents and train wrecks and things like that; it's just there and it happens and we do the best we can. It doesn't really change our life a whole lot, but it is a concern for us. It's just a permanent condition.

Whether bin Laden is captured or not, whether the U.S. attacks Iraq or not, these are more specific. And the domestic support for this type of quasi-war status we're in is continuing or the U.S. domestic support begins to wane. Are any of these implausible? They are all plausible in terms of U.S. response. It's hard to think of what's not on the list, but is there any alternative scenario about the U.S. response, a dimension of uncertainty that you came across or that we had on the list that's not up there?

Let's turn then to the second sector, and that's the response of the world. Is it supportive or not? We talked about that. Is it multilateral or not? Is this going to be from governments or is it going to be from non-governmental organizations like the United Nations and others? Is this going to be a military strategy? Are the Islamic countries themselves going to support the war against terrorism, in general, or are they going to stop doing that?

The terrorists are also actors in this thing. Do they get stronger, as most people fear, or do they basically stay the same, committing one big event every three or four years? Is there a possibility that they might become weaker if not completely nonexistent? Are they going to attack political targets or economic targets? I found these four or five specific targets and/or modalities included in the scenarios.

The longest list of all is what you would call the final determination. Do we have more security or not? Do we have more civil liberties or not? Are we more involved in the world or less? Has it become an isolated world, a fortress world, or does the world pull together as a result of fighting this common enemy? Does the long-term U.S. strategy include trying to do away with bad stuff, like helicopters and gun ships, or trying to support good stuff? Do we have more or less globalization? Is the world as a whole better off, worse off, or about the same in 10 years as a result of this?

I think many of you are thinking this is a terrible event, but terrible events often have a way of producing an outcome that is better. World War II was a huge global tragedy and yet it set the stage for the prosperity and the democracy and all of that since then, so the short-term effects of something can be different than the long-term effects.

While there is a world out there and it's probably uncertain, there may be more terrorists or not and we may be able to control them or not, and people generally stop there. We believe that if you're studying the future, we need to have a tool or at least an approach that gives us a little bit more opportunity for seeing some of the finer grain detailed in being able to deal with some of the other things.

Somebody asked me once why do we do all this. Is it pointless to predict the future? Absolutely not. The purpose, overall, is to prevent us from being surprised, and that is a very difficult outcome to measure. Let's imagine the "what if" historical scenario that the FBI got Moussaoui out of Minneapolis and really grilled him and found out about this thing, and the World Trade Center still exists and the Pentagon doesn't get attacked by an airplane. You know, it certainly doesn't make the evening news. All of the crimes and all of the terrorist attacks that are prevented are not as dramatic as those that are not. So, frankly, if you're in the business of trying to prevent surprise, you're in the business of doing a job for which there is, unfortunately, tragically, so very little credit. And that's, basically, what we're in. But our view is that you get your surprise one way or the other.

September 11 was a gigantic surprise all at once. We in futures recommend that we take our surprises a little bit at a time, so we look to be surprised. We go out and try to be surprised so that we're not surprised all at once. It's a habit of mind. A lot of times at work we're not supposed to be surprised because we're supposed to know everything. On the other side, if you allow yourself to be surprised a little bit at a time, then at least when stuff happens you're more prepared than the people who have kept the tunnel vision going. So that's the purpose of this, and I hope maybe you were just a little bit surprised today.

**MR. ROWLEY:** Let's talk a bit about the impact on U.S. mortality. I think just about everyone in the room is aware that September 11 really had very little impact on insured mortality. In terms of the insurance industry, this was a property and casualty event, not a life and health event. One of the issues is just how violent the world will be, and I think that's been touched on several times today. Is it going to be everyday terrorism, or is terrorism gone?

Maybe we're going to be OK in terms of life insurance deaths, because the risk here is for a life insurance product. I guess this is great for annuity products — annuity products with life contingencies — but the risk here is life insurance. And perhaps a little faith, because terrorists are more interested in terror than in creating a lot of deaths. That's one plausible scenario. Part of what we're thinking about here and what you guys think about in your jobs all the time is, will there be blips upward in mortality? Of course, we've always had blips in mortality, even for large insurance companies. You can have blips just from statistical fluctuations, and most of us have seen that.

Well, one question to ask here is, are the blips going to be bigger if terrorism takes some of these plausible scenarios that you guys have been talking about? Let me take a little poll by a show of hands. How many of you think it's plausible that mortality is going to be higher in the next 10 years because of terrorism than what we would have expected otherwise?

I think most of you raised your hands. Tell me if I'm putting words in your mouth here, but I think what we're saying is that this could have a material impact on financial results for U.S. life insurance companies. Now, maybe I shouldn't assume that. Let's ask that question, too. How many of you think that deaths from terrorism could have a material impact on financial results of life insurance companies just because death claims are higher? So we're past that. When I first prepared the presentation, I talked to some other actuaries who think that's not going to happen.

**FROM THE FLOOR:** You're saying a big impact like this on financial balance sheets and that sort of effect? Wouldn't you also see an impact on expenses?

**MR. ROWLEY:** Yes, I agree with you. Is the impact on expenses and investment income?

**FROM THE FLOOR:** Right, is it more expenses that they may think impact earlier by your mortality?

**MR. ROWLEY:** I think that, yes. I'm going to try to do this differently, because I don't think I have to talk you into that.

**FROM THE FLOOR:** I think of expenses from several points of view. First of all, I think that you're going to see underwriting change. In other words, you're going to be much tighter with underwriting people from certain types of backgrounds. And I think your underwriting expenses are going to rise in that sense. I think, also, that there's going to be a siege-type mentality within the company. In other words, there's going to be an awful lot of emphasis sooner or later on internal security. Right now I could probably walk into most insurance companies off the street if I was dressed as I am right now and have little trouble getting into virtually any part of their company, except the computer area. I could do it in most cases quite easily. I think that's going to change. Security is going to be tighter and people are going to be more carefully screened. And it's going to be not just screening initially, but screening repeatedly to find people who are susceptible, for example, to blackmail and that sort of thing. I think this increased ratcheting of security internally is going to be quite costly and could have an effect of five or 10 percent of your expenses in the long run. It's going to take somebody getting into one of the big companies and creating an explosion, just like the incident that occurred in Montreal years ago. It brought about very tight security in companies' computer installation areas, and I think you could see other situations like that.

**MR. ROWLEY:** Thank you. The stage is already set for a potentially more violent world. There are things like stockpiles of smallpox in Russia that we're not really sure are controlled. That would give me pause. Could nuclear power plants in the U.S. be attacked, and what would the effect of that be? Could terrorists contaminate the food supply? Chemical warfare? What else?

Someone I work with, Dr. Ray Webster, who's also Colonel Ray Webster, advises the National Guard. I think he has a little more trouble seeing than all of you do how this could have a big impact on mortality. I think he's thinking about what has happened and that how it could change in the future. He was telling me a while back that he recently had to dust off his books from medical school on anthrax to advise the military on what could happen with that.

If a much improved bioterrorism agent was developed, these are the some of the things you would need to have to be true. So you talk about smallpox, anthrax, and I could go through the whole list of the different agents out there that terrorists have or could use, but there's research going on. There are technological advancements. And I just hope we can keep up with it, and that they come up with a much better one, we hope, that our infrastructure here in the U.S. could handle in our homeland security.

So what does this mean for strategies for insurance companies and financial services companies? Of course, we don't have war exclusions in policies very much at all, so if we had a big blip up in mortality because of terrorist activity I don't think we have contractual language that's going to help us a lot. The government after the September 11 event has shown that, so far, we're not real eager to be a payor of last resort. And one thing probably a lot of you have noticed with the group life reinsurance is that it's expensive at best, unavailable at worst, and this happened after September 11. So, the direct writers and the reinsurers are definitely at risk here.

What should that mean for us? Is this stuff useful in managing our companies? I think from this discussion today, the obvious question is, do we all have the ideal risk exposure in our companies? Is it where we want it to be?

Let's briefly talk about other actuarial assumptions. I ask myself the question, which of the actuarial assumptions are uncertain? Sometimes I would say all of them are, but some are going to be more likely to be dealt with or more important to deal with than others.

Here are some examples. Peter and I have both done this with every mortality question and what might happen to mortality. This is the flip side of mortality. With the human genome project, with aging research, how could that happen? Because of policyholder behaviors, setting lapse assumptions relating to all these things is often difficult. We will have to get inside the heads of the policyholders, and in doing that it would be helpful to use these kinds of techniques. Another one that just occurred to me last week has to do with the pricing of long-term-care insurance. What if a cure for Alzheimer's is found? This would have a profound impact on long-term-care morbidity.

Chart 1

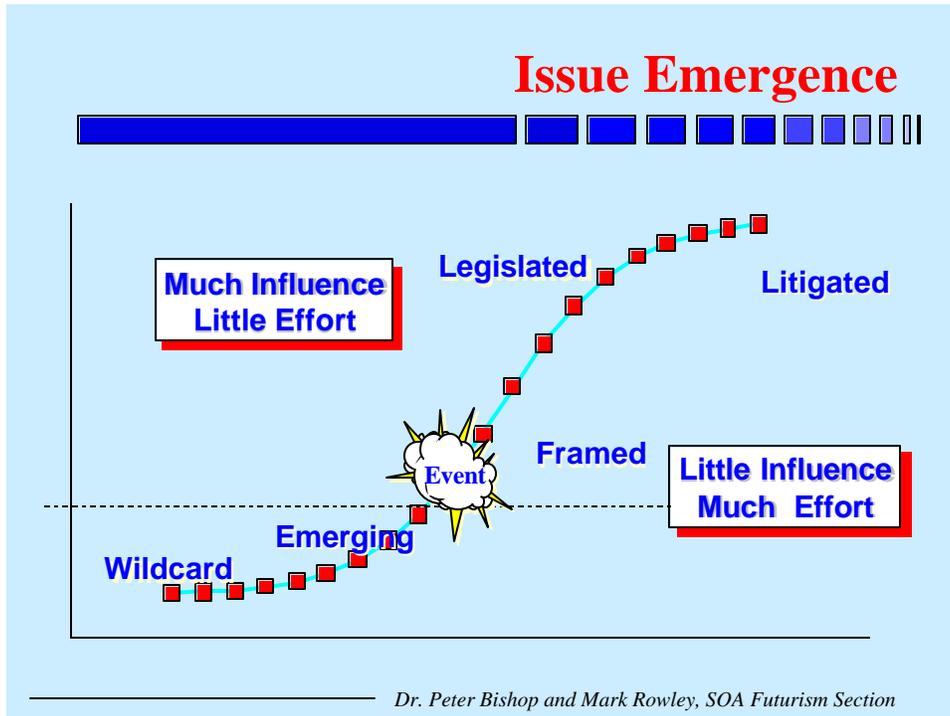


Chart 2

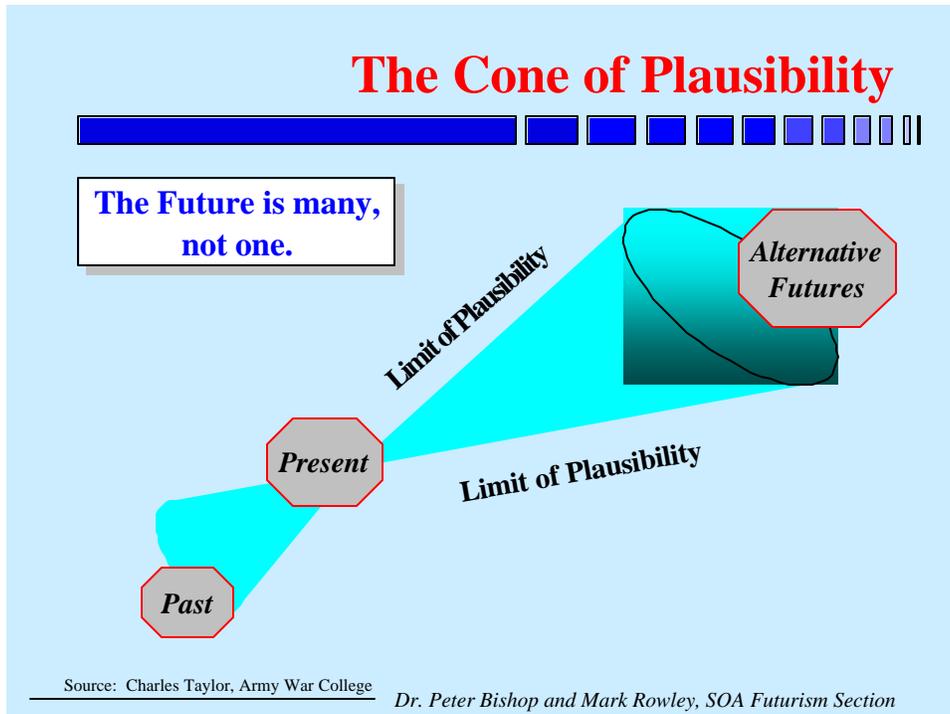


Chart 3

