

RECORD, Volume 30, No. 3*

Annual Meeting and Exhibit
New York, NY
October 24–27, 2004

Session 31L The Present of Futurism

Track: Futurism
Lecturer: Peter C. Bishop
Moderator: Curtis Huntington

Summary: Dr. Bishop, professor of future studies at the University of Houston, is a popular speaker at Society of Actuaries events and is well-known by many of our members. He provides an update of the topics and conclusions of the July meeting of the World Future Society and expands upon the issues most relevant to actuaries, including the status of current futurism research and the significance of emerging knowledge.

MR. CURTIS HUNTINGTON: I'm the co-chair of the Futurism Section, which is sponsoring today's event. We're pleased to have an old friend with us tonight, Peter Bishop. He's a professor of the Studies of the Future at the University of Houston in Clear Lake. Peter, it's all yours.

DR. PETER C. BISHOP: It's a pleasure to be here again. As Curtis said, I'm privileged to have been working with the SOA for some time now. Frankly, the SOA is the only professional society in the country that has a special-interest group on futurism, which it has had for more than 20 years. The University of Houston-Clear Lake is the only university in the country that offers a degree in future studies. That is a sad testament to your colleagues in education. I was doing futures for five years before I realized the word "future" had hardly ever been spoken in any class I had taken in all the decades I had been going to school. If you ask a teacher, "What are you doing?" the answer is, "We're preparing children for the future." The next question is, "Why don't you tell them something about it?" They don't know what to tell them about it, so they simply skip that lesson.

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This session is generally an interface between actuarial science and future studies. I was happy to publish an article in *Contingencies* magazine four or five years ago on this exact topic. You can check it out in a back copy or online. I'd like to describe the relationship that I see between actuarial science and future studies and also describe how we approach the future and insight into futurism as it's practiced today. I can report to you that, despite the fact that the educators are behind the curve, I also represent a new association called the Association of Professional Futurists. We are not as well-known or as well-credentialed as the actuarial profession, but we hope to get there. We do have certain criteria.

The World Future Society was created in 1967; it took us 35 years to get a professional association established, as well. I'm proud to say that many of the board members and the initial members are graduates of our program. They are the next generation. It's good to see people in their thirties and forties, people working in corporations, working in research organizations, building their own fields, coming together to build this profession. There's a future to future studies.

In fact, future studies are more common today, and the words "futurism" and "futurist" are more common today than they were. The first time I heard someone use the word outside the profession was about 15 years ago. I was on an airplane late one night. It was one of those times when you realize that it's 10:30 at night, it's 40 degrees below zero, you're seven miles above the surface of the earth, it's pitch dark out there, and you're traveling at 520 miles an hour. Two men were talking behind me. One was an executive with the Bechtel Corporation, a big San Francisco construction firm, and the other said, "What's George Schultz doing these days?" George Schultz, the previous president of Bechtel, was secretary of state under Ronald Reagan. The first man said, "He's helping us understand our future." I was shocked that someone actually used the word. Now it's becoming more common. The title of futurist is becoming a common title. I see the word "futurist" in common publications. I saw a headline in *Barron's* just the other day, "Futurist says...", so we've almost arrived.

What's the relationship between actuarial science and future studies? It has to do with models. Models are central to your field and, to some extent, to our field, as well. We talk about a mental model, a phrase made popular by Peter Senge in his book *The Fifth Discipline*, which applies to how we see the world. An even more famous futurist, Joel Barker, popularized that with the concept of a paradigm, how we think the world works. Sometimes that exists at the deepest levels, such that we don't even know we think it, until we're surprised when the world doesn't work that way, and we realize how wrong we were. I also teach a course called "Systems Thinking," which is based on the book *The Fifth Discipline* and some modeling. It is not as complex as the kind of modeling that you do, but in the process I get to reflect on the use of models and how we do models.

I teach my students four levels of modeling. The verbal model is basically about language. The good thing about language is that it is flexible and evocative. You

can say just about anything in language. The difficulty is that it is imprecise and difficult to say exactly what you mean. I teach my students that you first have to write it in language before you create it in some other kind of model.

Then we get to the more technical models. We do formal modeling, as I call it, which is causal modeling. Some of you may be familiar with that. It's very simple, just arrows and names, but it's amazing. It's a graphic picture. There are no computers; there's no simulation. It's just a picture of influences. But let me tell you, sometimes you get three people together, and each one does his causal model, and there are vast differences. All kinds of revelations come out once you start becoming precise. If you do that with a marketing department, a facilities group or a C-level group, you will find different people operating on different models of the world. They're trying to do something together, but one is pulling the tail of the elephant, the other one is pulling the trunk, and neither one is aware that of doing that. Formal models do have a role, even though they are completely nonmathematical.

When you get to the simulation models, the computer starts to come in. We have a couple of programs to do that. We use the tradition that came out of MIT, the stock flow diagrams from Jay Forrester, now called system dynamics. You can create what I call toy models. In these models, the numbers don't really mean anything; you are basically modeling shapes. You're modeling exponential growth and overshooting collapse. Some of you may be familiar with the limits to growth study in the early 1970s. The Club of Varrone sponsored a set of researchers. They forecast the future of the world and predicted that what's going on today can't possibly survive. They had a huge, complicated simulation model. The shape of the curve is trying to understand the structure of the world's model that produces overshooting collapse, exponential growth, cybernetic behavior and the like.

Then you get to the validated model. That's the kind of model that you do where the numbers really mean something. You have to validate the model with historical data and then crank it out into the future with future values—trend extrapolations and the kind of validated models that you are doing.

We have a common interest. Futurists tend to work at the upper end of this, in the more ideational, more qualitative use of models, to try and understand how society works. You work in the more mathematical, quantitative end of it, but we share a common interest. In that sense, futurism is similar to actuarial science.

Modeling is the representation of a real system in a valid and useful manner. The model has four different sets of assumptions that go into it. The form of the model is the structural relationships among the parts. The parameters are the initial values, The coefficients of the model. The initial conditions are the boundary conditions. When you are forecasting using a model, you have to assume that none of those three things will significantly change before the forecasted time horizon occurs. That's a standard modeling assumption. In other words, the structure is not

going to change, the parameters are not going to change outside some degree of uncertainty, and the initial conditions will not change outside some degree of uncertainty. That set of assumptions works well, but the longer time goes on, the less well it works.

We're the people who begin to take over once the modeling assumptions begin to get a little long in the tooth. They begin to become suspect in two years, five years, maybe 20 or 30 years. The problem that I think actuarial science has that most other people who do quantitative forecasting (such as economists and market research people) don't have is that the 30- to 40-year time horizon is a real time horizon for you. For asset management and liability, you're out there 40 to 50 years. You have to be able to say that nothing significant will happen that you have not taken into account in terms of your sensitivity analysis before that time occurs. The economists can say, "After two or three years, we're just not going to do a forecast." Their assumptions are probably pretty good, because they know enough to quit. But you have to go way out there and hang on. The other good thing about your field, like ours, is that the kinds of forecasts we do are so long-term that none of us will be around when they finally come true or not. What we're really doing is trying to make people feel comfortable today rather than waiting until it happens.

Futurism is long-term forecasting and planning when modeling assumptions are weak, such as when the system that you're modeling is so turbulent or the time horizon is so long-term that you can't make that assumption. In either case, that's where futurism picks up. We do have a complementary relationship. Your models are great for what we call the expected or the baseline future, and we're the people who deal with all the other futures that could happen instead. We're always coming along saying, "Yes, but what if, and what if, and what if?" We look like a bunch of people who are dragging in dead cats all the time. Don't I have enough to worry about? What is this "what if" stuff? But indeed, if you want to put a nice face on it, it's risk management of a long-term variety. It's long-term risk where the models may change.

There are three types of forecasts. The point forecast is what everybody wants. That's the customer's forecast. "Just tell me what your most likely estimate is and I will be done with it." Herman Kahn, the famous futurist, said that the most likely future is not going to happen. If you roll the dice, you've got 12 possibilities. Seven is the most likely possibility; the probability of not rolling a seven is five-sixths. Someone who bets on seven all the time probably doesn't do well. The most likely forecast in any large probability distribution has approximately a 2 percent, 3 percent or 4 percent chance of occurring. We're the people who deal with the rest of that.

We then back up and say that one of the sources of uncertainty is the fact that we don't know the parameters or the boundary conditions with a great deal of certainty. That's where stochastic models and Monte Carlo models come in, and you end up doing what we call sensitivity analysis. How sensitive is this model? You

make two changes in the parameters or the boundary conditions and run all the tests again.

But there is a third type of forecast beyond that. How do you do a test for the structure and the form of the model itself? That's where you bring in what the futurist does, which is the scenario. The scenario is not just a change of parameter or boundary condition. It is where the very structure of the system begins to change. New rules, new relationships and new structural conditions and relationships between the components occur after significant events of what we call discontinuities or disruptions.

We borrow our model of change from evolutionary biology. Stephen J. Gould and his colleague coined the term "punctuated equilibrium." I was teaching this concept and thought I had invented this great new thing until I saw it in my daughter's seventh grade science textbook. It is a type of model that futurists are comfortable with because it means that we have fairly long periods of equilibrium where standard models hold. Then we have disruptions where new things start, and those models have to be changed.

The Soviet Union is a good example of such a disruption. There's no way you can run a model of the Russian economy from 1980 to 2000 that makes any sense whatsoever. It's absolute folly to try to do that. Those kinds of sharp discontinuities are the issue if you are trying to forecast the Russian economy in 1985, and you're not taking the possible demise of the Soviet Union into account. Can you identify when the disruption will occur? Unfortunately not. Can you identify what the disruption will be? Again, unfortunately not. Most important, can you tell what the new model will be after the disruption? Again, unfortunately not. That's why there are 10,000 actuaries and 100 futurists, because we can't do much of that.

Nevertheless, knowing that the current era will come to an end makes the present a temporary condition. The present is not going to last forever. As much as it has lasted for a long time and the longer it lasts, the more comfortable we get with it and the more we equate the temporary condition with "reality." We are surprised when it finally does come to an end. We wake up one day, and the world has changed. I wish we could be more specific about when, how and what the result will be, but at least we're talking about it and realizing that what we are doing is a temporary thing for the time being. The time being may be another 20 years, or it may be another year. Somewhere in there, there will be those kinds of disruptions. That's what the scenario is for—alternative forms, different models, different structure relationships.

In sensitivity analysis, the assumption of change is that the major source of uncertainty has to do with the mathematical model, the parameters and the boundary conditions. Obviously, you can identify the drivers: interest rates, mortality, loss rates, appropriate use and the like. The sensitive driver must then have a big impact on the parameter. What you get out of that are error bars and

ranges of potential futures. The customers don't want that range, but you make them consider it anyway, if you possibly can, because that's the professional thing to do.

In scenario development there is the assumption of change. Punctuated equilibrium is the model that we're dealing with. We are in a period of an equilibrium era, and we will come out of that era sometime. Health-care liability after managed care is sometimes called managed cost, right? I did a study for the futurism section some years ago in which I tried to do a forecast of or scenarios about changes in U.S. mortality rates. It turns out that there have been two significant discontinuities in U.S. mortalities since World War II. One of them was due to the introduction of penicillin, right after the war. The other was the attention paid to cardiovascular disease and its understanding, treatment and prevention.

In both of those cases, there had been random up-and-down, year-after-year mortality changes that were trending upward, but not on any consistent basis. After each of those, there were 10 straight years of decreases in mortality and increases in life expectancy. A change like that would have been nice to know ahead of time when you are doing models where the mortality rate 10 years out was an important consideration. It is important to think about what could happen. Genetic breakthroughs and technology breakthroughs in terms of diseases are in press releases all the time. Eventually, one of those press releases is going to hit, and that is going to change and create that same kind of increase.

Discontinuities basically come from three sources. Some systems are in a critical state. That's not critical in the sense of acute disease. It's a term from chemistry. A critical solution is a solution in which, if you drop a little bit of a seed of something, all of this stuff comes rushing out of solution. The image that they use is the sand pile. You drop one grain of sand at a time, and pretty soon it builds up to an angle that is higher than it should be, given the viscosity of the sand, and one grain of sand then collapses it. That's a super-critical situation. It's also called far-from-equilibrium conditions.

If we are away from the natural variation of the system, we are in danger of reaching what Malcolm Gladwell called a tipping point, a point at which we go into a different type of system. The image that I use is a rolling surface with a marble in it. If we roll that surface around, the marble moves around in one of the basins. If we roll it around a lot, it goes up and over one of the hills and is now in a completely different basin. What are the critical systems that we are in? Is the trade deficit in that type of a critical system? With the lending of money to the United States from the other countries in the world, is the global atmosphere in that type of a critical system. Are we far from equilibrium? Are we far from the centerline, so that we might tip and rapidly enter into something new? It's something to think about. It's hard to identify what those are, because people say, "It's within the normal variation; don't worry about it." But it's a good question to ask, because we might not be.

Complex adaptive systems are another source of uncertainty. We're interested in the work that's coming out of the Santa Fe Institute. The models that we usually deal with are what we call cybernetic models, which happen to do with variables, parameters and equations. The type of models in complex adaptive systems are called agent-based models. It's a completely different perspective. Now we have enough computer power to run thousands and thousands of agents, each with certain goal-seeking behaviors and certain parameters that actually evolve, so you can tell what's going to happen. We've always treated the economy as a set of macroeconomic variables. The other perspective is the economy as a set of billions and billions of trading transactions going on all the time, out of which come a certain degree of those types. There has not been a lot of usable, useful modeling behavior come out of that perspective. But, of course, we know that there is the possibility in those models to be created. New things can happen, whereas in the cybernetic models, it's basically going to keep on cranking.

Then there's human choice. If we believe that human behavior, particularly the behavior of leaders, politicians and business leaders, is important, and these leaders haven't made up their minds yet how they're going to react, we've got another huge area for uncertainty. Those are three areas of uncertainty—the potential for a tipping point, the potential for new behavior coming out of a complex adaptive system and the potential for freedom and human choice. They lead us to realize that though the model we have today is as good as it gets, it's validated by the past, and we'd better watch out for those three and any other source of discontinuities coming along.

Futurists don't hide uncertainty. We don't assume uncertainty away. Rather, we manage the uncertainty. In fact, if anything, we lay the uncertainty right out on the table and ask, "What are you going to do about this?" Frankly, when you make assumptions, most times every assumption hides an uncertainty. But we say, "Let's not hide that uncertainty. What if this assumption is true, and what if the other assumption is true?" Then you've got alternative scenarios. It's the raising, the discovering and the management of uncertainties. In the process, we discover and analyze assumptions that people are making, both their mental models and the physical model that you are doing. The scenario approach therefore is the way to handle large amounts of forecasting uncertainty. That's really future studies compared to actuarial science.

Let me ask you to think about some of these things with respect to your own profession, the actuarial profession. I have an exercise that I'd like to do to gauge how much change you expect. We will use the change that has happened as our gauge. The first thing I want you to do is think about how much change the actuarial profession has been through in the past 10 years. Think about what the changes have been in the past 10 years, from 1994 to 2004, from the annual meetings of 1994 to 2004. That will be 100, our index number or baseline of 100. Now come up with a number that, on that basis of 100, indicates how much change you expect in the next 10 years, and why you think it would be that.

For numbers less than 100, it's not too hard to explain; it's basically inertia, things are the way they are. But for the numbers over 100, we would like to hear your scenarios—you see this is changing; we're close to a tipping point here; this is something that is going to change.

By a show of hands, whose numbers are less than 40? Forty percent of the change from the past 10 years for the next 10 years? Nobody. Fifty? Less than 50? Less than 60? Less than 70? Less than 80? Less than 90? Less than 100? Okay, everybody thinks it's more. Up to and including 110? Two people. Up to and including 120? Two people. Up to and including 130? Nine people. Up to and including 140? Three people. Up to and including 150? Eleven people. Up to and including 160? Up to and including 170? Larger than 170? Eight people.

Slide 10 shows a simple cumulative percent of the count. It's a graph that we use to see how much change you expect. Obviously, the median here was around 140 to 150, 30 to 40 percent more change in the next 10 years as has been in the previous 10 years. One of the principals of future studies that most people believe is the accelerating rate of change. Your numbers show that this profession is participating in that belief.

Let's hear some of the more interesting scenarios that you heard that might be a source of change within the profession. What are the sources of change or the drivers of change in the profession that you heard that you thought were interesting?

I'm repeating this for the sake of the transcription. The first is indemnity products to managed care products to consumer-driven health plans (CDHP). In other words, where you pay rather than they pay. It's shifting the burden of some payment onto the consumer on a pay-as-you-go basis, as opposed to an indemnity basis.

Another change. How's technology in the next 10 years going to change this profession? Are there any specific technological changes that you think could occur? If it's more rapid, how is that going to change the work of the actuary?

When I give my talk on the future of technology, trying to net out the results and stay away from all the technical stuff, the result is that everything in the future is instantaneous and simultaneous. Communication has gone from shorter time, shorter time, shorter time, smaller world, smaller world, smaller world, until we are now literally at the vanishing point of time. Instantaneous action. Instantaneous transaction. Things that take more than five minutes are at risk of being done away with or outsourced. By the same token, everything is simultaneously available to every single person in the world. Boundaries no longer make any sense. Even professional boundaries have a hard time making sense. What's your job going to be in a world of flash actuarial estimates? That is where we are going.

What about the image campaign? The American Institute of CPAs went through a

visioning exercise about a half a dozen years ago. It is trying to move out of the bookkeeping mode to the consulting mode, trying to move up the value chain in terms of higher-level, value-added services. What it has been traditionally is basically debits on the left and credits on the right. The actuarial profession is going to do the same thing. It could have a big impact on actuaries, opening up new opportunities. But that requires change; that requires training. In many ways it requires a different mindset to the business if you're going to do that.

We have time for one interesting change. In 10 years, there could be a tremendous breakthrough in any number of diseases. Again, the press releases are all over the place, announcing each one of those. Each one is probably an increment, but having that kind of breakthrough changes the whole mortality picture tremendously. If even just anti-aging itself, the research into attempting to slow down the aging process, should experience a breakthrough, that covers all of the chronic illnesses and all the deterioration illnesses of old age.

We've looked at product. We've looked at technology. We've looked at vision and action by the profession. We've looked at diseases and technology in the medical field. That's just scratching the surface. You can see that the future is a huge place. Is it possible to capture all of that in any one place? I wish it were. Unfortunately it's not. That doesn't mean we ought not to go there. People who want to experience different things go to large places. Some of them go to Africa. Do they see all of Africa? No. Do they bring back every experience of Africa? No, but they are better for having gone there. The future is a lot like that. Will you be able to capture it in a comprehensive understanding of the future? Absolutely not, but will your approach to the future be more flexible and more creative by having visited the future in this mode for a period of time? Absolutely yes. That's what this is for. It does, to some extent, go against the tremendous desire we have to capture all of these things, but it is a good idea to have gone there.

This brings me to the theory of forecasting that we talk about at future studies. A professional futurist will tell you, and should tell you, that he or she does not predict the future. Prediction requires, as it does in science or in any kind of nonhuman activity, strong physical evidence, strong assumptions and a unitary phenomenon, and therefore we can make strong inferences. Unfortunately, we get most of our street-level concepts of how to do forecasting not in social science, but out of physical science. In physical science, prediction is pretty good. If you're not within 0.99 percent, if your correlation is not 0.99 percent, you need to go back to the lab. The sociologist would die for 0.35 percent. Most of the variance is still completely unexplained, but we're scratching the surface.

That's where we learned about prediction. We apply that to human affairs, where we have evidence. Some of my pieces of evidence of the future are people's hopes, fears and expectations. It's not as good as a calibration on a weight balance, a volt meter, a light or a telescope. It is intangible evidence. We are often dealing with assumptions about the future, but you can't tell whether or not something

significant is going to happen. As a result, we have to produce multiple forecasts.

Most people believe that in human affairs, the more time you spend, the more research you do, and the more money you allocate, the better your forecasts are going to be. That is true up to a point. It is true in science, because you can get the most precise balance and get the error down to thousands of a percent. In human affairs, some of that is true, but sources of uncertainty never go away. The possibility of a human system to be in chaos, which is by definition a mathematical state that is unpredictable in the medium term because of the sensitivity to initial conditions; the possibility that an emergent agent-based system could create something brand new; and the possibility of human choice basically limit how good those predictions can be. We reach what I believe is the law of diminishing returns much sooner. You can double the amount of research dollars and get perhaps a 3 percent to 4 percent improvement in accuracy. In that sense, we may be wasting lots of money using the scientific model of forecasting, throwing lots of time and money at it, when we're already at the ceiling because of these uncertainties.

Someday will we understand human behavior to the point that they do in science fiction? Maybe, maybe not. But we certainly don't today. B.F. Skinner was good at predicting human behavior as long as he totally left out the human mind. He said he could condition anybody to do anything, and he did, and he got very good predictions. As soon as you include mind, you're in a different universe. Most of psychology, all of the social sciences—economics, political science, anthropology, sociology and, to some extent, actuarial science—are fields where it is difficult to make the kind of clear scientific predictions we did before.

Slide 13 shows the futurist's picture of the future. It's an expanding cone of plausible and alternative futures. The centerline of that cone is what we call the baseline or the expected future. That is the future that we are trending toward. Somebody said earlier that we cringe when we hear about trends. Not at all. Trends are the momentum of society. We are heading in that direction. There's no doubt about it. We just don't believe we're going to arrive at that precise point. Obviously, the longer things go on, the wider the cone becomes.

The futurist's job is to describe this region inside the cone. It's not everything that's possible; that's infinite. Even this is probably infinite to some extent. We basically divide it up into regions and tell a story about each of those regions. Those stories are the scenarios. We could be in this region or that region, but we just leave it at that. Realizing we could be in those, what are the implications? Thinking of the future as a cone allows for multiple futures, rather than one.

I invented a term called heuristic forecasting. Heuristics comes from the study of language, which is trial and error. In predictive forecasting, you take data and assumptions, crank them into a system and get a forecast. Futurists don't stop with the forecast. We go back and ask, "What are the assumptions of that forecast? Is that reasonable?" We always ask, "What could happen instead?" Remember, we're

in the business of revealing uncertainties, not hiding uncertainties. Not that anybody is doing anything illegal or immoral by hiding them, but that's our natural intellectual process. If someone wants to assume these uncertainties away and move ahead, we say, "Wait a minute! You can do that for one scenario, but don't do it for all the scenarios." We're in the business of making an iterative system of forecasting and assumption analysis.

The futurist is frankly more concerned about the assumption than we are about the forecast because the forecasts are multiple. Where do the errors of forecasting come from? They don't come from the data. They often don't even come from the model. They come from the assumptions or the constraints that you put on the model. You think either something is so unlikely or even impossible, and therefore it goes away. The best example that I know is from NASA. In 1989, the Goddard Institute announced to the Senate that chlorofluorocarbons (CFCs) were helping to destroy the ozone. That was front-page news, one of the success stories of the environmental movement. Three or four years later, the Montreal protocol would ban CFCs, and now the ozone is now stable. It's not coming back yet, but it is stable. We're not destroying it as we did before.

NASA had the data of the destruction of the ozone 10 years earlier. It was on a chart. Every year, its satellites were measuring less and less ozone. What was the explanation? It was the instrument. The organization said the satellite instrument was becoming out of calibration because it couldn't be the ozone. All of a sudden it had some calibrated and confirming data and was able to say it wasn't a problem with the instrument and that the instrument is working right. It is the ozone. But it took 10 years of seeing that data year after year. Assumptions, not data, are where the errors of interpretation and errors of forecasting come from.

That's where futurists live—in the world of assumptions. You talk about intangible. You talk about fuzzy-minded. People don't want to talk to us, because we're always telling them that they might be wrong. The good news about assumptions is they resolve uncertainty. The bad news is that sometimes resolving that uncertainty is not the right thing to do. Sometimes we need to keep it on the table and deal with it. Therefore, we have two types of forecasting. The forecasting that you do, to some extent, is not short-term, like economics, but includes single domains, few assumptions and a focus on continuity. The future includes many domains, many factors, many assumptions and many alternatives. We present not a single point or a range of forecasts, but a range of plausible forecasts.

How in the world do we do this? Scanning is what we call gathering the information. The first thing we do is forecast the baseline future. I don't think futurists spend enough time there. This is where we're headed, where the trends and conditions will take us, but we also believe that we won't get there exactly. We also deal with planning, which is where vision comes in along with organizational mission, goals and strategies. Finally there's action. Any ambitious plan requires not only new types of action but also a new mindset. It usually requires a whole reconfiguration

of the enterprise because if the vision and the plan could have been implemented before with the existing organization, it probably would have already been done. It not only requires doing things; it requires reorganizing and rethinking things.

I focus on the strategic plans. Strategic planning has gotten a bum rap these days, I think because people do it poorly. But it is the centerpiece of the whole thing; it's why we do forecasting. You do it for product rollouts and estimation; we do it for human action and enterprises. The scenarios, the expectations, the vision and the goals all lead into it. Of course, the plan results from those. Think of it as starting on the outside, doing research, projecting that research into the future, and not just the prediction but multiple scenarios. What is the preferable future we want to get out that, and then what actions do we want to take?

We scan broadly in future studies. We collect information from all kinds of different areas. I always think of this as a rendezvous with the future, a rendezvous with the forces of change. The stuff that we're dealing with today in 2004 did not start in 2004. It started in 2003, 2000, 1990 or back when Social Security was created. It has always been out there. But it's been out there as part of our peripheral vision, if in our vision at all. If you're flying an airplane, which is fast, or sailing a boat, which is slow, you're always scanning because a rendezvous with a solid object is not a happy experience. As a result, you watch things. You watch other boats. You watch oil platforms. Some of these things pay us off to the side. We're not in the business of being accurate. We're in the business of being prepared.

A person who is prepared often prepares for things that never happen. We all buy insurance. We all sell insurance. If people bought insurance only for those things that they knew were going to happen, there would not be an insurance industry. Most people buy insurance for things that never happen. Our house doesn't burn down often, yet we buy that insurance. The mortgage company makes us buy that insurance every year. We don't complain that there was another year when we didn't get to use that homeowner's insurance. That's not the concept.

People hold the futurist to the same standards and practice that we hold the scientists to. But that's wrong. If it didn't happen, it's like a walk in baseball. It's not an at-bat. If it does happen, we want to be sure it's within that cone of plausibility. If we do come to rendezvous with one of these things that's out there, that not too many people are paying attention to, we want to be sure that we said it first. There is change on the horizon. In that sense, the futurist is like the lookout on top of the ship, before radar, long-range navigation (LORAN) and global positioning systems (GPS). Was his eyesight better than the captain's? No. Was he smarter than anybody? No. His advantage was purely geometry. His horizon was 40 miles away, where the captain's horizon was 20 miles away, so he saw stuff first. That's what the futurist is. It's not that we're any better or any smarter or have any different information than anybody else. We're just looking at it differently. We're looking for these broad types of change.

You always have to have three characteristics. NASA was better, cheaper and faster. You can have two out of three of those, but you can't have all three. Wider, deeper and longer. The futurist scans a much wider set of images. We're living out there, in what we call the steep environment or the global environment, which includes everything beyond the customer, the regulator and the competitor. Is it huge? Yes. It's as big as Africa. Should we go there once in a while? We're there all the time. You should go there once in a while, a day, two days, three days a year maybe, seriously asking these kinds of questions. What is happening out there that could, in three, five or 10 years from now, come in here? What is happening in the transactional environment that we need to have an early warning of, because sooner or later that transactional environment will come in here. What we're dealing with today in our transactional environment, in our enterprises, didn't start yesterday. We don't want it to come over the horizon without our knowing it.

There's another more complicated way of looking at a social system. People in their natural habitats use technology within an economic context, which is itself within a government context, which is itself within a cultural context. This is perhaps overly sociological, but it does categorize the kind of influences. Everything in the long run affects everything else. The culture affects the technology. The technology affects the economy. The economy affects the government. The government affects the population. The population affects the environment. You've got many relationships. Is it possible to capture it all in one comprehensive look? No. Is it necessary to go in there and familiarize yourself with it? Yes.

Future studies had deep roots in the 1950s before it became a public thing. I mentioned Herman Kahn, who worked for the Rand Corporation. The Rand Corporation invented the scenario but called it a war game. The people involved invented it because the nature of warfare changed with nuclear-tipped intercontinental ballistic missiles. The difference was that conventional wars take a long time to get started. You've got to move people, and it takes months. During that time, while people are moving and getting in position to fight a war, other people are planning the war. They've got months to do that. They realized in 1947 or 1949, when the Soviets had the atomic bomb and an intercontinental ballistic missile, that the war would last about 30 minutes. As soon as you saw the missiles on the radar screen, planning time was over.

Did they say, "We're just going to wait for it to happen"? Of course not. They started the scenario. Could they comprehensively and conclusively predict exactly what that war would be like? Absolutely not. But they created a simulation: "What if they do this and we do this? They think this and we think this?" It's a technique that astronauts use all the time. They don't come back and complain that they trained for all these mistakes and all these accidents that never occurred. They don't get angry at the training people. If no accident occurs, they're perfectly happy. The football team does it all the time. They set up the red-shirt defense to play the defense that the next opponent is going to play. Are they predicting what is going to happen play by play? Of course not. They're giving the offense the

chance to play against an environment like that. This is all we're doing—looking at this larger environment and getting a feel of the play, seeing how things are going.

We're going to do another exercise. I've listed six categories: population, environment, technology, economy, government and culture or social. Over the next 10 years, what will be the most important trend in each of those six areas? What is its implication, and how will the profession be different? We're going to use the same kind of change metric as before. Let me ask you to pick one of those and describe it. Then pick a second one from all of the different steep environment categories. We've discussed product change, which is part of the transactional environment. We've talked about technology. We've had vision, which is part of the enterprise change. We've had medical technology. All we've talked about so far in the global environment are two technologies. What else could be out there? What are some nontechnological changes that could affect the profession demographically, environmentally, politically, socially or economically?

Let me ask you an historical question. Was the arrival of managed care in the late 1980s and early 1990s a surprise to the actuarial profession? To us, it happened to people outside the industry. It looked like it happened rapidly. Kaiser Permanente had been around, and we all knew about it. It started in the 1940s or 1950s, but it had not caught on. Then all of a sudden, there were risk pools and pushing the risk onto the providers and managed care.

There's always something going on in the transaction environment. But you are saying that managed care was not a discontinuity. Would you all agree with that? From the outside, that looked like a big watershed. When I started, it was just all major medical. But you're talking about consumer-driven plans. That's a euphemism for paying for a high deductible and paying for the ordinary stuff. For those of you in the health field, isn't it strange that health is one of the things that we believe that we should be insured from first dollar? That is what people expect. We don't expect to be insured to buy gas for the car, paint the house or take the pet to the vet. We pay out of our pockets for those things. What you're saying is we're going back to that. Depending on how long it takes, being out in front on that if in fact that's the movement is a good thing. If there should be a substantial change in regulation, that would be a substantial change in how health is covered.

This is a question for your industry. How has your industry worked out the implications of those in terms of forecasts, product and policy? Are there scenarios out there? Ideally, from a futures point of view, there would be industry-level scenarios just as you have industry-level practices and industry-level data. There should be industry-level scenarios that indicate, in the regulated national health insurance scenario, this is the way the model would run, and in the privatized environment, this is the way the model should run. I suspect some people are doing that. Are you doing it as a profession or as an industry? Do you know of anybody who does? If not, that's where I think futurism needs to be more prominent. If you do some of this, you can then bring that back to the models. You

go out into this future world, and you'll stay out there. I'm out there, and I'll be glad to see you, but you always come back home and ask how you can use this stuff. There is a practical consideration. What are the implications?

Let me give you a sense of how we go about forecasting. I see basically three mechanisms or drivers of change. Trends are part of it. That's the momentum. Discontinuities or disruptions occur. They basically stop one era and start another era and create, in some cases, a new set of trends and a new set of issues. Then there is choice. There's individual choice, but there are also industry and societal level issues, issues that, if they were decided one way or the other, would drive the future one way or another. All of these three are independently and jointly shaping the future. If people focus only on one or two of them, they're leaving out a strong driver for shaping the future. Keeping three things in mind at the same time is not easy.

Each of these then results in a different type of future. The probable future, the future that is the baseline or the expected future, is a function of constants and trends. It is definite, it's mathematical, it's scientific, it's quantitative, and it is extrapolative either through time series extrapolation or systems modeling. This is what most people think of when they think of forecast. What you get is a point forecast or a range at most. The discontinuities and the surprises produce what we call the plausible futures. The choices and images of the future present what we call the preferable future. The preferable future is a set of scenarios that we would like to see happen. Obviously, that's where we put our effort and our energy to try to bend the future toward that side of the cone. The vision and image campaign that we talked about is an example of that type of preferable future.

The problem with predictive forecasting is that it is socially acceptable. "Probable," "plausible" and "preferable" are strong declarative words: This will happen, this has to happen, this must, this should. But they are also fighting words because only one thing will happen. My will contends against your will, and so we're now into who's going to win and who's going to lose. When you adopt one future in that declarative sense, you have made one winner and most losers.

We, therefore, recommend the subjunctive mood. This might or might not happen, but in those kinds of discussions, everybody's perspective is respected and used to populate the cone of plausibility. In other words, we let people bring in all the different possibilities, all of their "what ifs." That is the concept of a learning organization. A learning organization is not one that just fights about what will happen. It's one that considers all kinds of different possibilities and then chooses to go ahead in the face of uncertainty, not knowing that those things are going to happen.

The scenario is how we construct the future. It's a set of scenarios. Good scenarios have to be interesting. This is much like journalism or literary fiction. It has to grab people's interest. I don't know how interesting your forecasts are. I'm sure they're

interesting to you, but how interesting are they to the customers? We have to make our stuff interesting, but at the same time, it has to be plausible. If it's not plausible, the customers can say that it's fantasy and will never happen. The scenarios have to have both interest and plausibility, which frankly is hard to do. As in science fiction, the most interesting stuff is not plausible, and the most plausible stuff is not interesting. Therefore, we're always trying to balance. There is also the relevance. It has to be their world. It has to be the future that they're going to do.

Slide 31 shows the cone again with a little more detail. Each of these baselines has implications. People often forget the implications. The technology is going to change the future, but the first question is how? The second question is, "So what? How is my life, my profession or my work going to be different?" The most famous scenario technique establishes the baseline. If you take the column and flatten it out here, you introduce dimensions of uncertainty. Here's one dimension of uncertainty: a little more A or little less A; here's another dimension of uncertainty, a little more B, a little less B. That defines four quadrants, which are four scenarios.

There are more than two dimensions of uncertainty in the future. In one large study I did for an oil company in Houston, we had 11 dimensions of uncertainty. This technique is limited, but it gets people to think about scenarios such as the collision of two uncertainties. A lot of us can think about one of them—high national health or high private health. If you cross that with something else, like a genetic technology breakthrough, all of a sudden you're forced to think of futures that you hadn't thought of before. This is what I call futures or intellectual calisthenics. They often say jogging is not transportation. You don't go anywhere. In fact, you end up exactly where you were, but you are in much better condition by doing it. This is the same. It is not to predict the future or even to say that one of those four things is going to happen. The result is an attitude of mind that says they could happen and that we need to be flexible. We need to not put all our chips in the center of the table and say that's what's going to happen. What if some of these other things do happen? It's an exercise in freeing up our mental model of the future that is the purpose here. A lot of my students ask, "What if one of these four things doesn't happen?" You wish that they would, but even if they don't, you've exercised your vision of the future toward something better.

Slide 32 is an interesting chart that shows what I call the trick of future studies. Most people get the relationship between probability and certainty incorrect. Most people think that highly probable things are certain and highly improbable things are uncertain. That's not the case. Highly probable things are also certain not to happen. Where is the uncertainty? The uncertainty is in the 50/50. This is the area that I believe, in our culture and in our education, we have been told to stay away from. Do you know what's going to happen? No. So we're told to be quiet. We live out here with what we know for sure, and to some extent we live here by denying these things as possibilities. They're possibilities, but they're not probabilities. The scenario says for the impact, let's leave out anything that's not going to change our future a lot.

Highly probable is the baseline. If it's medium probable, it's the scenario, and if it's low probable, it's the wild card. We can create scenarios about wild cards, but there are so many of them and they're such low probability that you do that only a little. This is where the scenario is focused. It is moderately probable, a 50/50 flip of the coin. If you can identify what those things are, you have protected yourself in terms of risk. It's a strange intellectual place to be, though, because our education has never asked us to talk about things for which we don't have a definitive answer. Remember, the model of prediction is scientific. It is not philosophical; it's not social science. It is scientific, and if scientists don't know 50/50 outside of a specific process, they'd better go back to work and not say anything until they do. We put ourselves in that same kind of category.

The purpose of the scenario development process is to come up with potential discontinuities. There are two criteria: What's an impact that would create a high degree of change, and what is the probability as close to 50/50 as possible? We're both sides. In another session on forecasting economic variables using the Delphi technique, we came up with two interesting scenarios about the consumer price index and the degree of inflation. There were some strong forces that could keep inflation low, and there were some strong forces that could raise it up. A lot of people estimated it could be a lot higher 10 years from now than it is today. That scenario could be close to a 50/50 and would be an excellent subject. Each discontinuity creates a new era.

Do we tell scenarios in the forms of stories? A lot of times, I find most scenarios boring. I am a futurist, and I'll tell you flat out that they're not very interesting, because they don't dramatize the future. The analysis of the future is one thing—the logic of it, the driving forces—but when you communicate it, you've got to put people in there. You've got to make it look like it is going to happen so that somebody thinks, "I might be the CEO in this future. I better be thinking about this more." There needs to be a balance of conflict in drama.

The future is open-ended. Most scenarios end up that we'll either live happily ever after or sadly ever after, and we're done. We've seen the best-case/worst-case scenarios. They're boring. Where's the drama? What are the forces involved that are contending, pushing and leaving it open-ended? The people of the future don't know their future any more than we do! It's not the end of the story; it's just another chapter.

I always require the students who are writing scenarios for me to balance the good and the bad. I think best-case/worst-case scenarios, though they have to be done, are not very plausible. Plausible is very different. They solved some of our problems, but they've created all kinds of problems of their own. So how can the future be a lot different? Humans of the future will feel very much like we do—stressed, uncertain and trying as best they can to figure things out.

If you're interested in scenario development, *The Art of the Long View: Planning for*

the Future in an Uncertain World should be your first book to read. It's an outstanding business-oriented book by one of the most famous practitioners of the scenario process, Peter Schwartz. He was the director of the Royal Dutch Shell Strategic Planning Unit in the 1980s. Royal Dutch Shell, by all reports, almost invented this process. These are some of the issues both that it was dealing with and that it forecast. It forecast the collapse of oil prices in 1981 two years before it happened and was able to even make money in 1981, while its reserves halved in value that year. It was talking about the collapse of the Soviet Union 10 years before it occurred because it had a lot of interest in Europe and had to understand what was going on. That's definitely a book that you'll want to look into.

Let me stop here and see whether you would like to talk about any of this or ask any questions to apply any this to your own practice.

FROM THE AUDIENCE: (inaudible question)

DR. BISHOP: Your premise is that we choose one of the assumptions over the other, and the trick is that you don't. The trick is that you run out the consequences of one assumption and its alternative simultaneously. What if this were to happen? What if the opposite were to happen? That's the A minus A and plus A. We don't, as most people do, say we're going to assume this inflation rate and this technological breakthrough. If you're doing predictive forecasting or sensitivity analysis and modeling, you have to do that. What we're proposing is not to assume either of those and then ask what difference it makes for our products, for our company, for our customers and for the industry. What are we going to do about it? Are we going to make a contingency plan? Are we going to wait for it to happen? There's a field called issues management. It's public relations, but it's future-oriented public relations involving thinking about managing the issue before it becomes a public issue and going into and developing contingency plans. We don't make the assumptions that you are saying we make. We try out each set of assumptions, and nine out of 10 of the scenarios do not turn out to be true. The mindset that it creates is that the present is a temporary condition; strange and unexpected things can happen in the future. Let's not lock ourselves in by too narrow a set of assumptions. That's the purpose.

FROM THE FLOOR: (inaudible)

DR. BISHOP: There are, as in any field, a number of different processes. The standard process, the default scenario process, is in the appendix of *The Art of the Long View*. Schwartz has been so good at commercializing his models that he's become a brand name. When you think of scenarios, you think of global business network, and so you can look in the appendix of his book. He has a clear set of steps. It's not complicated; it's common sense.

You basically collect what we call driving forces, exactly what can be done. What could change? Remember trends, discontinuities and choices. Then you rank them

on impact. Which ones are going to impact us the most, and which ones are the most uncertain? Which are the ones that we don't have a clue how they will turn out? I think the two that you identified—more government/less government and health insurance—are great examples of that. We take two or three of those and cross them in a matrix fashion, 2x2 or a 2x2x2 cube, and think about what life will be like in each of those. That's the elaboration process. We write a story or a skit demonstrating the interactions of two clients, customers or employers, in a vivid, engaging way that has some interesting differences from the present. Then we talk about implications and what difference would it make. That's a classic scenario.

I teach 12 different scenario processes, so the Global Business Network (GBN) is not the only one, but that's the one that most people use. It is driven by uncertainty. The problem is that it also is limited because there are more than two uncertainties. There are other techniques that allow you to be more free-ranging with all the different forces and factors, but they are bigger and more complicated. The Web site, www.GBN.org, has some nice instructional materials. It had the strategy of giving it away, and it became an industry standard.

FROM THE FLOOR: When you do a report for a customer, and you've done 10 different scenarios, do you handicap which ones might be most likely? The customer might want to know which ones are more or less probable.

DR. BISHOP: First of all, 10 is probably too many. You have to scope it down. If you make it too complicated, it becomes a blur. We try not to put probabilities on the scenarios because people will tend to pick the most probable and let the rest go. There is no mathematics when you're dealing with these kinds of qualitative assumptions to be able to say what the probability distribution is. Therefore, no, we don't do that. You can do that if you want to use a Delphi technique, getting a panel of experts to rank it. That's the way I would do it if I wanted to do probabilities.

Frankly, this is an exercise again. You have to calculate the probability of a customer's house burning down. But I, as the customer, don't have to calculate the probability of my house burning down for me to buy insurance. We are talking about risk and which is most probable and which is least probable. First of all, I don't think there's a basis for making that mathematical judgment with any degree of support. Second, it leads to ranking and controlling away what we think could be interesting and profitable discussions. We tend to put them all out there.

FROM THE FLOOR: (inaudible)

DR. BISHOP: When you say 2 percent, they say they have more important things to worry about.

FROM THE FLOOR: (inaudible).

DR. BISHOP: The worst-case scenario certainly scares people and gets their

attention, but it loses what I believe is the degree of plausibility because nobody really lives in the worst-case scenario. Nobody expects it to come about. In fact, in every bad scenario, there are business opportunities, as well. You want to mix it up with some good and bad stuff.