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**RICHARD DE NEUFVILLE:** This is the first of a couple of sessions revolving around decision analysis. And what I want to do here is to introduce a useful technique in this way of thinking about analyzing how we respond to uncertainties. And it's appropriate for simple uncertain situations. I emphasize that.

So the other aspect I want to emphasize is that this is a method that was largely popular starting around 40, 50 years ago. It was developed by a person called Howard Raiffa, who was a great exponent of it, and Ralph Keeney, who I taught with. At around that period in the '70s, we did some work together. And it was very popular and was a staple of most analytic business school courses, which it is now not.

That-- it took a while, but what has happened is that a number of companies didn't address it. And it is certainly an advantage over not addressing uncertainty. And for example, I know, since I've been working with Chevron a bit, that they have, and I have a copy of their, decision analysis manual.

And it goes on to articulate why it is said that this is to be a company-wide approach to dealing with questions of uncertainty. I would be interested at some point to discuss with the Chevron people to the extent to which they actually see it being applied because I have my doubts from the discussions so far.

But the point is, it is a thing that you ought to know about. And it has some advantages and provides you with some insights that would not otherwise be available. So I think that's useful to know about. But in terms of practical applications, it's inherently limited to some relatively simple cases. That doesn't mean it's not important, it's just that it is not a competitor, in my mind, with the kind of things that I've been trying to share with you.

So I think it's important to think about the kind of things which become fairly obvious when you use decision analysis. So I call them the three conclusions that any decision analysis will basically lead you to, or generally lead you to. And I think that they are also the ones that you see in flexibility analysis. And I've been talking about it, but it is not something that is so obvious when you do a simulation and so forth. You don't see the structure, but you do see it in a decision analysis.

So the first one is that it is good to have a strategy for altering your choices as a future is revealed. That is, that when we deal with uncertainty, instead of saying, I have a plan to do x-- build out my supply chain, for example, or build up the factory, or prepare for sea level rise-- to have a unique plan that says, phase one is this, phase 2 is that, phase 3 is this, and so forth, that is not the best solution, but you want a strategy, a strategy which says, not that I have a unique choice, but first I do this, and then I do the next move depending upon what I see happening in the world.

So it's an analogy, if you want, to a chess game. That is, you think ahead, you have a plan, but depending on what your opponent does or what happens in the real world, you decide to move this way or that way. So that you have a strategy, not a fixed plan.

The second aspect of it is that often your better choice is never your first choice. That is, that if you buy insurance against a downside, at the end of the year you've bought, say, car insurance and you never had an accident, you could say, well, that wasn't so good. Why wasn't it good? Well, I paid all this money for my car insurance, and I didn't have an accident so I didn't need it. But having the insurance is still a better choice because, what if you did need it?

But on the other hand, you could say, well, buying the insurance was not my best choice if I never had an accident. On the other hand, if you had an accident and you got really hurt, you said, well, my better choice might have been not to drive at all, not just drive with insurance and take some risk.

The point being that the better policy, for example, if you agree but as an example, that you have insurance against the downside situation, it is never the best choice in retrospect. It could have been, I did buy insurance and I didn't need it, or I shouldn't have been doing that full thing anyway and I shouldn't have had insurance, I should have just been doing that. So in that sense, your better choice may be this, your second best choice is what may be best given the range of things that are going to happen.

The third thing, which is one of the outcomes of doing a decision analysis is education of the client, that is, very often the person that you're trying to help-- it may be yourself, somebody you're consulting with, a boss you're trying to please, some person you're trying to work with-- may focus on an outcome and say, oh, if we do this, here's what we may get and not understand the process and the risks involved.

If you lead them through a decision analysis, as I will be suggesting to you in a moment, you make them think about whoa, wait a second, this could happen, that could happen, we should take those things into account. So very often the process of going through a distribution, or explaining your distribution-- explaining your setup, helps educate the client to understand what the uncertainties imply.

So it's in line with what I've been emphasizing in this course. It's step one is to recognize the uncertainties. And it's often the case that clients or people you're working with don't really think very clearly about it. So these are three general advantages of the decision analysis approach.

Now there's a motivation for this, which is that, by and large, people when they're acting intuitively deal poorly with complex uncertain situations. There is all kinds of data or experiments with groups and so forth about how people don't react well, in the sense that they don't understand probabilities, they don't update information, et cetera.

So we'll go into some examples of that, but they process it poorly. Very often they look at a complex situation, and they simplify it either by, for example, focusing on the extremes-- this could happen, that could happen, it's very bad or very good-- and they don't look on the entire process. That is, it's not just that you have a one-shot bet typically, but you're doing something over time-- say, building out your supply chain, your factory or whatever-- and that there are intermediate steps they're going through and those count for a lot.

So decision analysis provide a structured, efficient way to help people recognize this complexity, to recognize the probabilities, and to deal with it.