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Hi, this is Richard de Neufville again. And now, we're switching gears to think not just about the evidence that we don't forecast correctly, but let's peer underneath the cover a bit, underneath the hood, if you want, of this engine that's driving the forecast to think about what the forecasting process is and why it has difficulties. So the natural thing when anybody is creating a forecast is to look to the past to see what has been happening.

This is, step one is, what's its field? So you look to the past, see what's been moving up or down, whatever the trend is going to be, and you project this ahead in some ways. Now, of course, you want to project it ahead to take into account some adjustments so that you are projecting ahead, but you see there are some changes that people are using more of it or less of it.

So you just don't project ahead in a straight line or an exponential line. You adjust in some way. That's the common activity.

But now, what then happens? Let's take a look at some example here. I'm choosing now some data from the forecast for international travel from Japan.

So this is the data. And the important thing is here are 10-year forecasts, which is the kind of thing you need if you're planning major investments in an airport. So what is the traffic going to be? And what you want to see is on the far right-hand side here that the percent error.

How big was the difference between what was forecast 10 years earlier at what came out? And the numbers here are 65, 53, 27, -13. That's what the brackets mean. So not too bad in the last year, really terrible in the first one that this is the kind of error that happens.

So they weren't accurate. Why weren't they accurate? Let's look at the evolution of traffic for this situation.

So the thick blue line with all the dots on it, that's what actually happened. And the little dots here underneath and above and at the end on the right-hand side on it are the projections. So what do we observe?

When the traffic was increasing slowly, naturally, you projected low amounts so that you got to under-project. OK, so then they said, OK, when the traffic is increasing quickly, we will project above. So you get over the forecast so that whenever there is something that is starting off slowly and then going faster, you tend to have these kinds of events happening-- you under-project, over-project.

So unless the thing is really steady, as, in the case of Japan, it was later on and it was fairly even, it's only in those circumstances that you tend to get answers that are right on. Otherwise, when you're dealing with new situations, introduction of new technologies, as was the case for international travel from Japan in the '70s and '80s and '90s, when you have an introduction of new technologies, you basically have this undershoot and then overshoot.

So what's the pattern? Forecasting projects for the past and the future is like steering a car by looking in the rearview mirror. That's what you're doing. You're looking to the past and imagining the future.

And what would happen to you if you drove a car like that? If it's low growth, you underestimate. If it's high growth, you overestimate, and in general, it's never right. And in general, if you actually drove by looking at the rearview mirror, what would you do? You'd run off the road.

So one of the issues is that just by the natural processes of what we do, we have to do in the forecasting, that is, look to the past to somehow project the future, there is that tendency to run off the road whether it is under-forecast in some situations, over-forecast in some other situations and, again, never quite get it right. This is the common experience.