

RISKthinking

Written By: **Ron Dembo**
Date: **First Presented at TEDuniversity Oxford, July, 2010**
Current Version, November, 2010

WHAT IS RISK THINKING?

→ The future is always uncertain - just how uncertain really matters. It matters because the way we frame a problem or understand a solution will differ depending on how uncertain the data is.

We live in a complex world where nobody can be expected to be an expert in all of the details of every decision we face. The mortgage market is complex, yet we have to buy mortgages. Computers are complex, yet we may have to decide which ones to buy for our business. We debate what to do about climate change, but we have to make choices about the future that will be impacted by it, even though the science is complex and the data hard to understand.

Most management textbooks do not help either. They tell us a lot about how to execute, control, measure, etc., but do not account for the nature of the environment in which a business operates – in particular, if it is certain or uncertain. As it turns out, there is a fundamental difference between the type of management and decision-making required in an uncertain world versus the optimal solutions for situations in which the inputs are close to being certain.

For example, if I set out to open a bookstore (in the days before the Internet), I would have many examples to follow; I know what books cost and I can return unsold ones to the publisher. Contrast that with starting a new company to produce power from waves: there are significant uncertainties in the efficacy of the technologies available, I don't know what price the market will bear, I am not sure whether subsidies for wave power will be forthcoming, or whether other renewables will get a more favorable treatment, I am uncertain about future power needs in my region, and so on.

These two situations are on opposite ends of the spectrum. Setting up the bookstore is a decision taken in a "deterministic" world – a world in which the decision parameters are known with certainty or are hardly uncertain – whereas the new wave power company is operating in a world where just about everything is uncertain or "stochastic."

In a deterministic situation, the essence of management will revolve around execution: hiring the right people, setting up the right reward structures to incentivize them, managing cash flow, and so on. We can learn this in a typical management textbook. In a stochastic situation, almost nothing about the

problem is certain. The optimal strategy in such cases is to hedge your response and adapt it to reflect changing perspectives on future scenarios.

By assessing whether the inputs to the problem are certain or mostly uncertain, one can get an idea of what the solution should “look like.” On the one hand, a well laid out plan, and on the other, a series of hedges.

REVERSE ENGINEER YOUR ASSUMPTIONS

→ Let’s look at an example. Imagine you have been given a job at the newly formed agency, Homeland Security, and you are overseeing a group that is proposing solutions for security at American airports. Your team presents two solutions to you. One involves large groups of people with minimal educational background applying a set of predetermined rules and procedures. The other is modeled on Israeli airline security that involves screening the passenger using a highly educated psychology professional. Which do you choose and on what basis?

Looking at these two possible solutions, you can reverse engineer the implicit assumptions used by the groups to analyze the problem. The rules-based solution implicitly assumes that you can catch the next terrorist with rules based on precedent. In other words, the next terrorist will look like one that has been seen in the past and will use terror methods that were used in the past. It is a deterministic mindset. The solution based on psychological profiling implicitly assumes that we cannot know in advance what a terrorist will look like, dress like, or carry onto a plane, nor can we know what terror methods they will use. This is a stochastic mindset.

Looking at the problem in this way makes it clear that the current American solution, based on an implicit assumption of a deterministic world, is simply not well suited to the problem it is trying to solve.

Hence the absurd situations we see at American airports where kids are asked to take their flip-flops off when they go through a scanner. What if the next terrorist hides the bomb cleverly in a scarf? Will we have to take off all scarves in the future? The appropriate solution is one that assumes a stochastic world – one where we don’t know who the next terrorist will be, what they will wear, where they will strike, or how they will do it.

Though stochastic and deterministic situation are two ends of a spectrum, real-world problems exist in shades of grey; they contain both elements, though they may be skewed more towards one end or the other. For example, if you are a bookseller today, there are good historical models for marketing and selling books but looming on the horizon is a complete disruption of the business model, just as has happened in the music industry, with the rising popularity of e-book readers. Your world is now moving from the cozy deterministic end of the spectrum to the scarier stochastic end. What is mostly deterministic today might become stochastic tomorrow and will require a complete rethinking of your business model, even perhaps of the types of employees you hire.

DESIGN WITH THE FUTURE IN MIND

→ Nowhere is this more apparent than in the software industry. Let's compare Microsoft and Google. We'll start by looking at how they operate and then reverse engineer how they see the world.

For a long time, Microsoft has made huge profits from its Office Suite. Every few years it makes a huge splash with a new release, which is guaranteed to solve all problems in the previous release and has loads more features (and consumes loads more memory). For a long while this strategy worked and it became a big cash cow for the firm. It clearly assumed a deterministic world where Microsoft could determine the rules and seemingly ignore the rapid pace with which the Internet was disrupting business-as-usual. Microsoft's world, however, was becoming more and more stochastic as the Internet matured.

Google, on the other hand, released software early, made it easy to work in the browser you were used to, and did not require you to buy a new machine each time you upgraded. The software was perpetually "beta" - a hedging strategy. In short cycles, it was upgraded based on information gathered from the market. It adapted well to the maturation of the Internet, the rise of bandwidth, and its disruptive power. Clearly, Google assumed a stochastic world and its strategy adapted well to fast-changing tastes and a very uncertain future market, one that had never been seen before.

It is not difficult in hindsight to see who had the better strategy. Just compare the rise of Google with the slowly dropping stock price of Microsoft.

WHO KILLED THE ELECTRIC CAR?

→ Let's look at another example. It is the early nineties and the largest carmaker in the world is holding a board meeting in Michigan. On the table is what to do with the EV1, an odd electric car that someone managed to build in the days when there was lots of cash to go around. An argument is made that SUVs and minivans are where profits lie, gas is a dollar a gallon, and that these markets will keep on growing. There is no room for this silly little electric car so "kill it" – clearly implying a deterministic viewpoint, even if there was recognition in the firm that there was a lot of uncertainty as to how the car market would evolve.

Almost simultaneously in Japan, at another board meeting, a strategy for hybrid cars was being proposed and a request was being made for a 1 billion dollar budget (small by the company's standards) to market and evolve the Prius, a funny little car with a funny little name based on a mixed model of electric and gas. This was clearly a hedging strategy and implied recognition of the uncertain future of the automobile market. It was a stochastic model of the world. In the worst case, the company would have wasted a billion dollars (small potatoes) and in the best case it would become the leading brand in hybrids with huge upside.

Well, we know what happened next. Toyota now has 70% of the world's hybrid car market and the Prius is the Kleenex of hybrids. One can only imagine how different the car world would look today had GM hedged and evolved the EV1. All it would have taken was for the management of the company to understand the nature of the market they were in and to explicitly question strategies that were deterministic in a stochastic situation. Armed with this insight, imagine how you as a board member could have reframed the discussion and what a big impact it could have had.

CLIMATE CHANGE NEEDS RISK THINKING

→ Risk thinking is particularly important when framing a discussion around climate change. By separating the deterministic from the stochastic, appropriate solutions can emerge.

It is scientifically verified with a very high degree of certainty that the levels of Carbon Dioxide in our atmosphere are higher than they have been for hundreds of thousands of years. This is deterministic and will almost surely lead to warmer temperatures for the earth on average.

On the other hand, the exact effect of such high levels is uncertain. Will England have a cold or hot climate? Will Canada be a grower of wheat in the future? Will malaria spread north? Will there be more hurricanes? This is stochastic, so the types of solutions we propose to combat climate change require a hedging strategy, which should evolve as the effects become more certain.

Take the debate on nuclear power: should we promote it or move away from it? The answer to this question would differ depending on whether problems of storing waste and managing safety could be solved in the near future. Imagine it is 30 years in the future, you are a country that banned nuclear at the turn of the century, and there is a fantastic new discovery that solves the core issues of storing waste and managing safety with little uncertainty. Nuclear power then becomes a major part of almost every electrical system because of the increasing imperative to avoid carbon emissions. Your country has missed out on a large lucrative market and suddenly all of the hard efforts made by France to evolve its industry are handsomely rewarded. They become the Prius of Nuclear power.

Let me give you one last example. Imagine you are a Presidential advisor and you are in the White House 4 days before hurricane Katrina will hit New Orleans. At this point in time, what is mostly certain is that the hurricane will hit the New Orleans area. What is mainly uncertain is the nature of the damage that it will do. Will it break the levees, unleashing a major disaster, or will it simply cause some flooding? Sending the National Guard will be costly and will cause some anxiety in the population. The downside is relatively small. If you don't send in the National Guard and you are wrong, the downside could be huge, the potential regret large. Not sending in the Guard is likely more risky than sending them in. It is clear what you should advise the President to do and why.

**A SIMPLE
STRATEGY FOR
A COMPLEX
WORLD**

→ In real situations, of course, there are more subtleties and complexities than the previous examples have captured. Nonetheless, risk thinking provides a simple strategy to follow. Learn to ask the correct questions. If inputs are very uncertain, the solution should be a hedge. If inputs are known with certainty, it is a matter of execution. Look at the risk-adjusted returns of each strategy and choose your strategy accordingly.

→ Download the original [TEDUniversity Oxford presentation](#).