The Number is Evil

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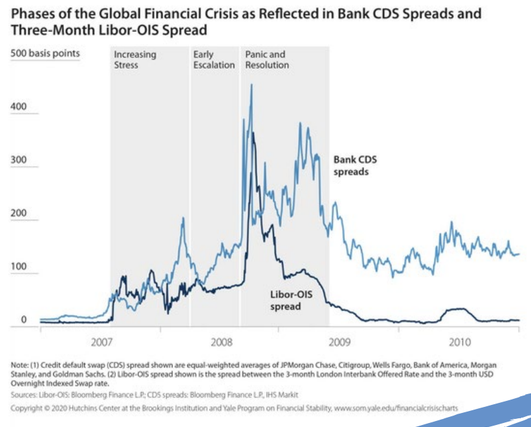
Ferryfield
The Risk People

How risk analysis can fail us

Space Shuttle Columbia 2003	Deepwater Horizon Oil Spill 2006	Lehman Brothers 2008	Financial Crisis 2010
			

So what do you do ?

»The stakes are high
»These were smart people

»Where do you start?
»What do you do?

You could go with your gut …

- Popular, long-standing practice
- Leverages experience of senior people
- Doesn’t waste time running silly numbers
- No confusion with charts, statistics, probabilities
- Adds real value

Dangers of going with your gut

- Often the only analysis performed
- Gut feel assumptions taken as certain
- Erroneous judgments are compounded in even the simplest situations
- Goals are missed, money is lost…
- Can’t figure out the problem, because individual factors “seem right” How did this happen?

You could try some point estimates …

- Like best, worst, most likely
- It’s structured, considers the downside
- Easily understood, and widely taught
- Requires you to think about likelihood

Dangers of going with your point estimates

- Who says you're guessing the right points?
- "Likely" is not quantitative
- Likelihoods have different meanings to different people
- What are you missing?
- Low and high estimates are, by definition, individually thought to be very unlikely
- The sum (or product) of the extreme cases is even more unlikely
- Can lead to spending resources chasing phantom risks and missing real ones

You could run some what ifs …

We know what's important, so let's check out those scenarios

- What if product development takes longer than expected?
- What if demand is lower than we think?

Try a few, holding others constant

Dangers of going with what ifs

- Like point estimates, what other scenarios are we missing?
- Arguments about which assumptions (gut feel again) are “correct”
- Like throwing darts to see what sticks
- Arbitrary results
- Correlations: Things could be dependent on each other
- Those relationships are lost holding assumptions constant
- Difficult to track - get lost in the numbers

They all lead to ...

‘ THE NUMBER ‘

"The Number "

- "The Number" is the one single value everyone is looking for
- 'The Number" is sooo tempting
- Because we secretly all crave certainty
- Human nature

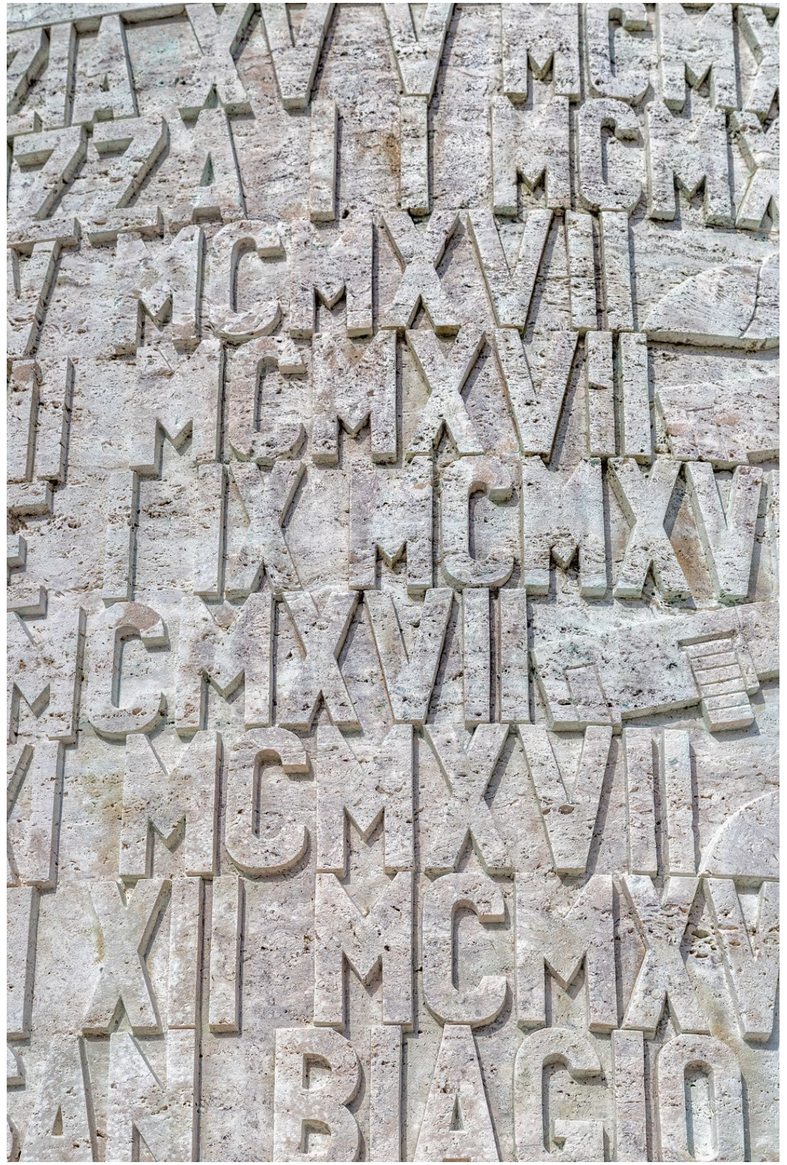
- The gut feel method guesses "The Number"
- The most likely case in point estimates becomes "The Number"
- Running lots of subjective what -ifs forces managers to pick, in the end, "The Number" to plan contingencies for

"The Number " is EVIL

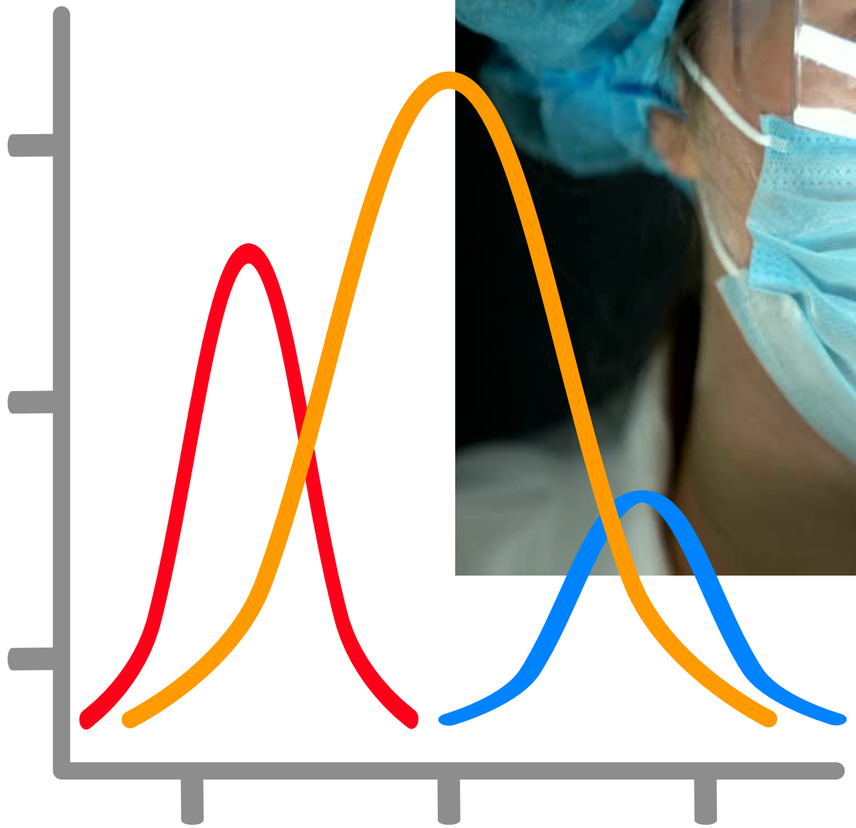
- But "The Number" is a snake!
- If anyone tells you they have "The Number," run away
- If any report bottom -lines "The Number," send it back

"The Number" as (dangerous) gospel

- "The Number," once written, becomes set in stone
- "The Number" is disseminated
- "The Number's" underlying assumptions – and errors - are forgotten
- "The Number" become the basis for big decisions



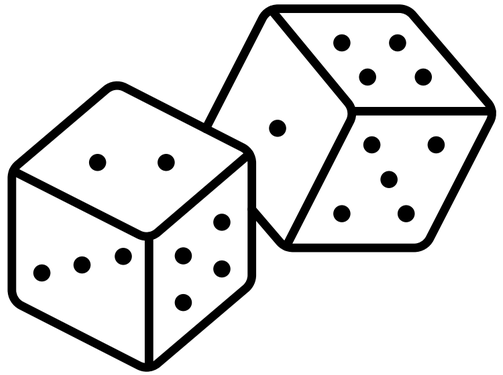
The antidote to "The Number" ...



Probabilistic Analysis

So what does probabilistic mean?

"Using a range of values and associated probabilities for each input parameter (usually given as a probability function), and generating a histogram of values for each output calculation (sometimes called an output probability distribution)."



Probabilistic means "in ranges"

AND

It means thinking in two dimensions:

- Not just "what if"
- But also "how likely"

Probabilistic VS.

GUT FEEL

It means not just “I think this is right”

It means not taking “gut feel” assumptions as certain

But instead you might question those assumptions try to identify boundaries

POINT ESTIMATES

It means not just: best case, worst case, most likely case

But instead you might see: 10% chance of achieving your best case, 5% chance of encountering the worst case, and a 30% chance of the most likely case

ARBITRARY WHAT IFS

It means not picking scenarios without data

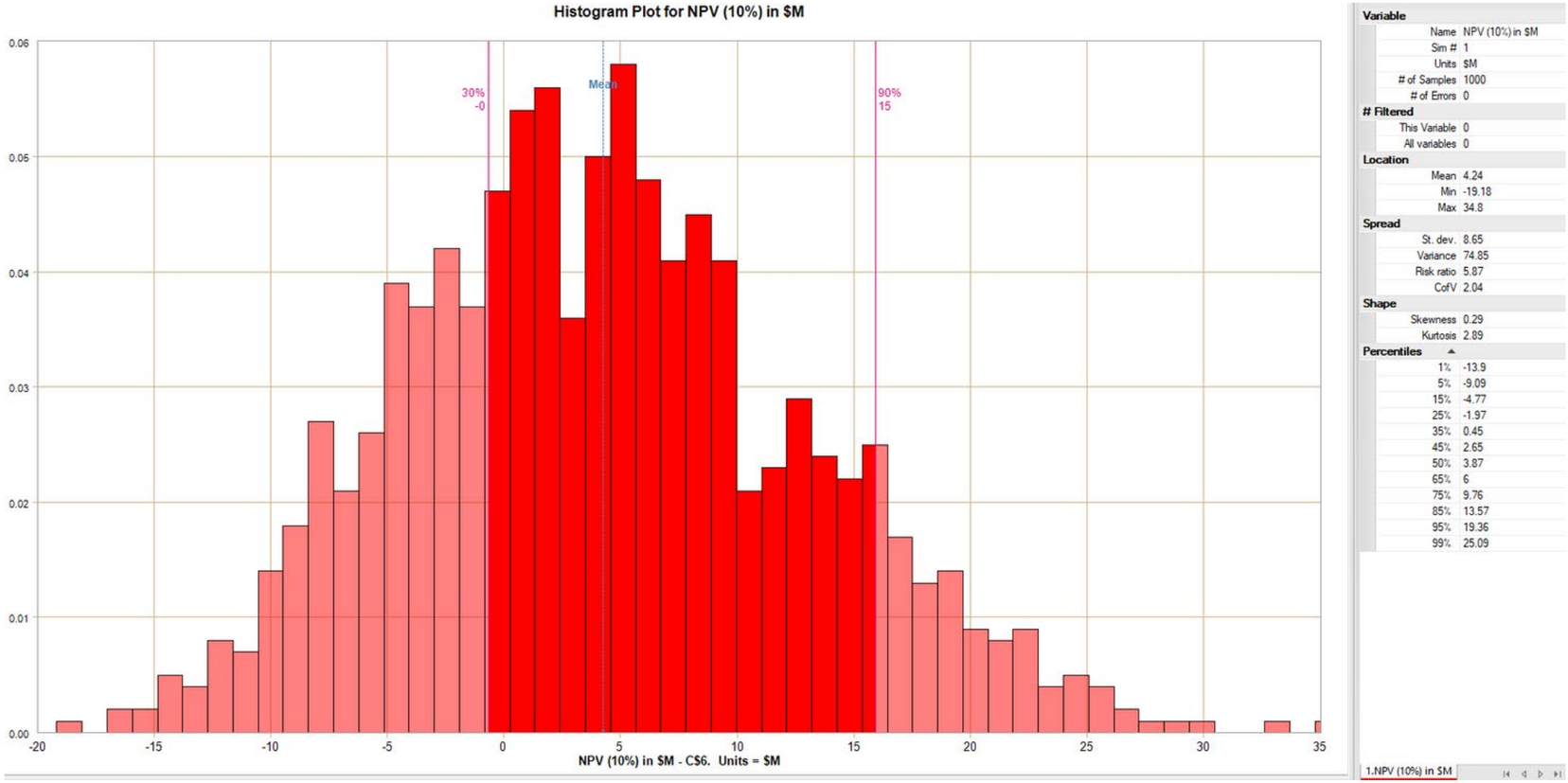
But instead systematically assessing risk based on probabilities of occurrence

Why is probabilistic analysis important ?

You get to see everything that might happen and the probabilities of different outcomes happening!

Because the world is uncertain

Uncertainty can be defined as “A parameter, the measurement of which we do not know, and cannot know until some time in the future.”*



But what does it mean ?

- Uncertainty means “unknown”
  - Whether or not it can be “figured out”
  - Whether or not it will be known in the future
- Uncertain means it could be this, or this, or this, or…
- But usually you have some idea of what it’s between

The world is in Ranges !!!

- That sounds like a range
- So, uncertain things can be best described in ranges
- We must ***think*** in ranges

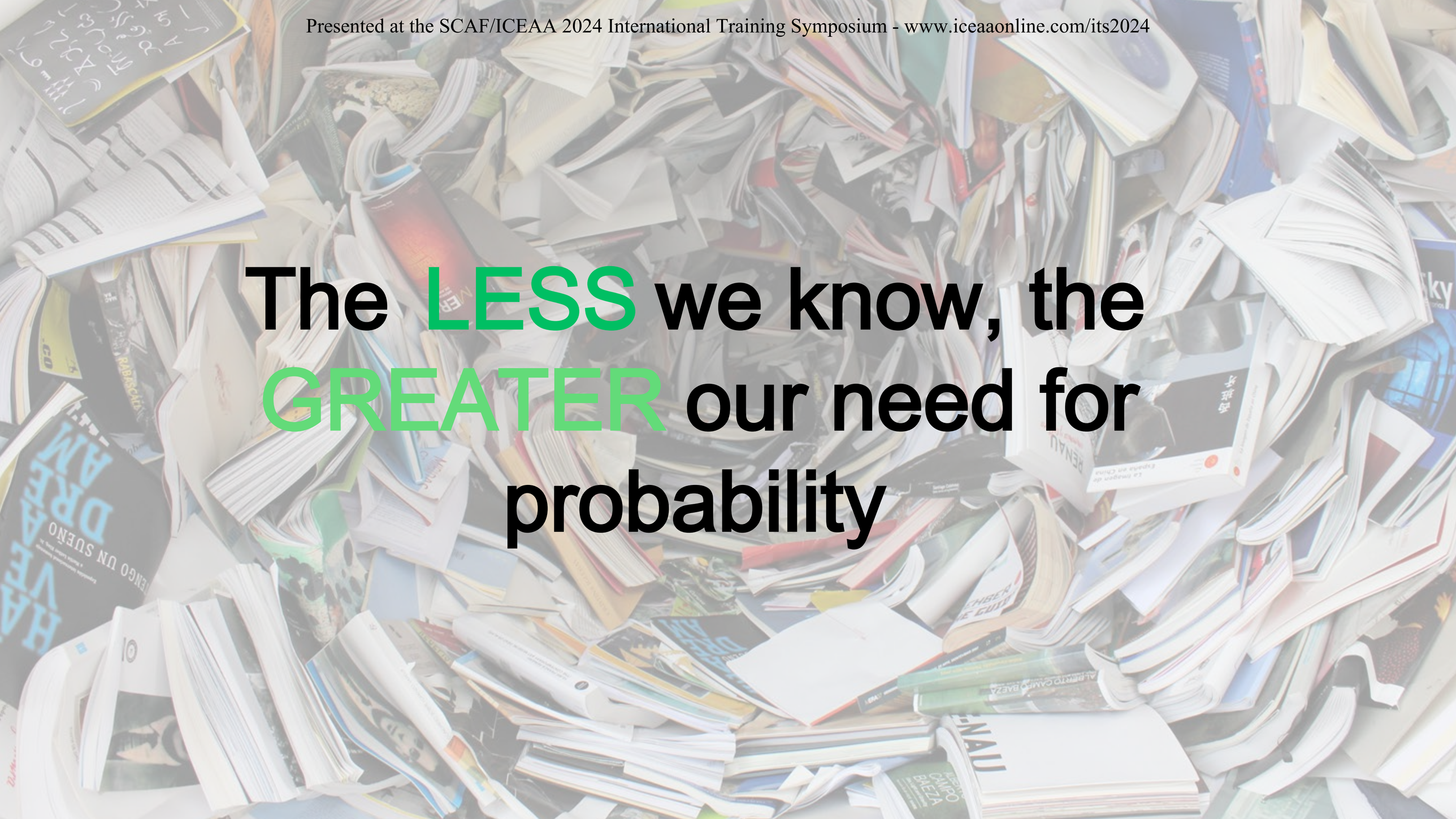
- Start thinking of what could happen (without getting paranoid!)
- Estimate actual probabilities
- Get used to: "I think there is a 70% chance of a cost overrun here."

Thinking in ranges

- Is more accurate than qualitative assessment (“very likely,” “unlikely,” etc.)
- No more illusion of communication
- Common language for everyone

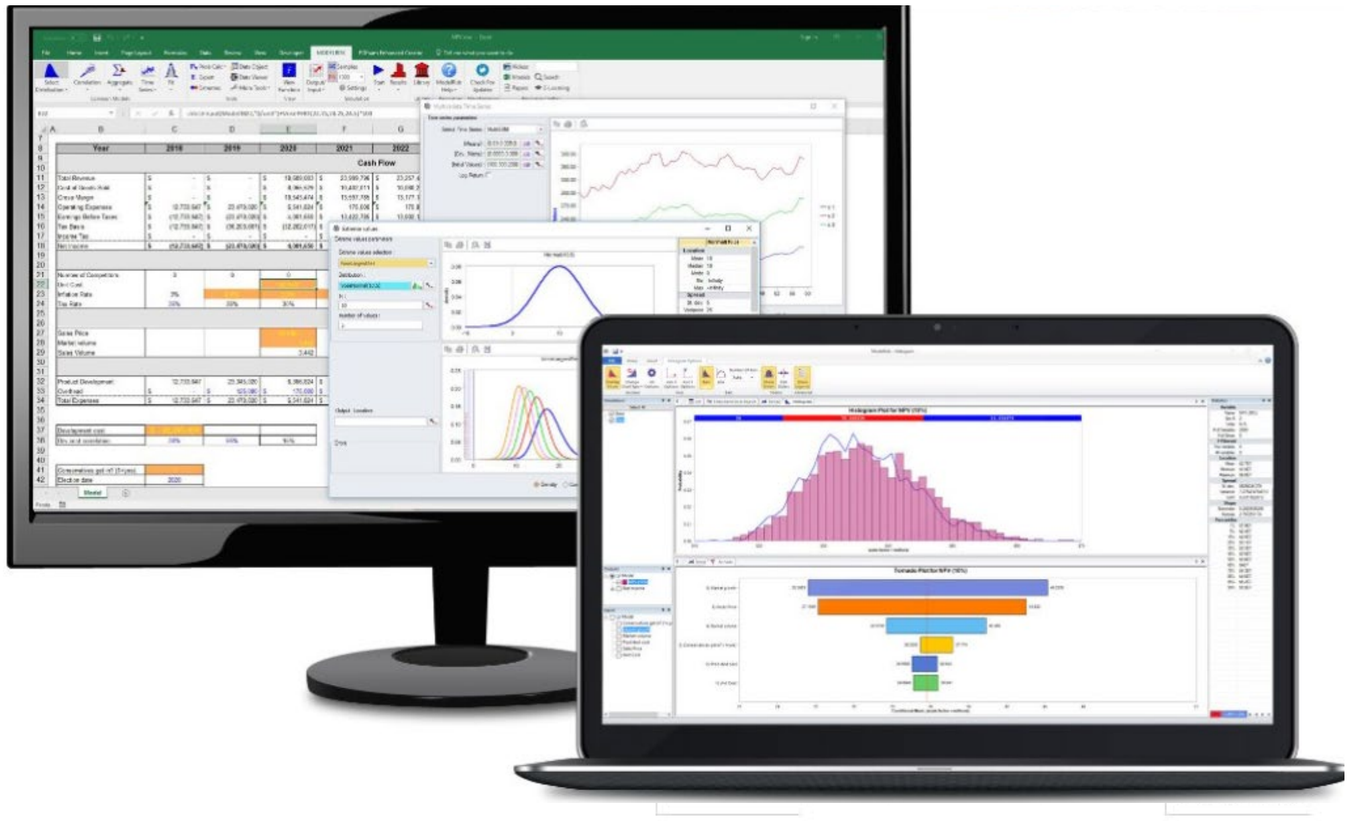
- What if you don’t know there’s a 70% chance of a cost overrun?
- Doesn’t that imply certainty we don’t have?
- Isn’t that just as bad?

- The 70% is an expression of uncertainty
- If we really knew the costs, we wouldn’t need probability
- If you have absolutely no idea, say 50%
  - You are still mathematically, and accurately, representing the degree of uncertainty



The LESS we know, the GREATER our need for probability

ModelRisk


Cash Flow


TXU energy


DOW


NORTHROP GRUMMAN


Spectra Energy


NEWMONT


De Beers
Group of Companies


gsk


Pfizer


BAE SYSTEMS


NASA


PENSKE


TEXACO


DUPONT


GRAYMONT


P&G


Johnson&Johnson


GE


ArcelorMittal


BOEING


Deloitte.


ALLEN & OVERY


UOB
大華銀行


access


SNCF


ORAU


USDA


Fidelity


GRINDROD


Del Monte
Quality


ecdc


NASDAQ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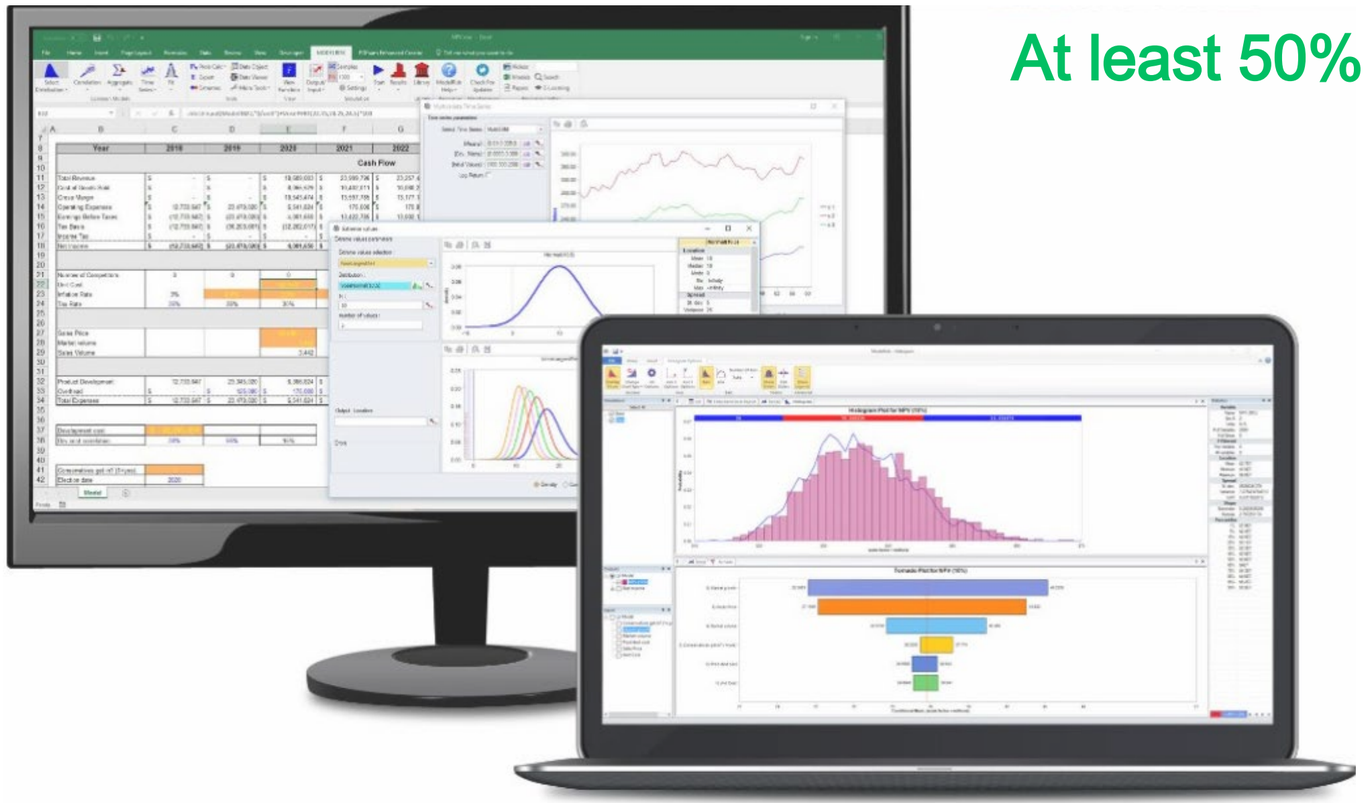
Roche

Why ModelRisk



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