



Using Uncertainty and Risk with Parametric Tools



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Today's presentation

- Parametric tools –development and current state of play
- What's the problem
- Why Uncertainty
- Where's the risk
- Play the game - win a prize
- Conclusions
- Questions
- References

Parametric tools –development and current state of play

■ Why develop parametric tools

- Development stems from a need to produce reasonable cost forecasts quickly, reliably with as little data as possible (The origins of parametric cost estimating date back to World War II)
- Need to learn from historical knowledge to protect the organisation
- Cost of generating estimates to support bids and proposals is very high – look at the cost of losing!

■ Types

■ Commercial

■ Second generation models

- using flat files
- single estimation type per software package
- Macro costing for activities, low level of costing breakout

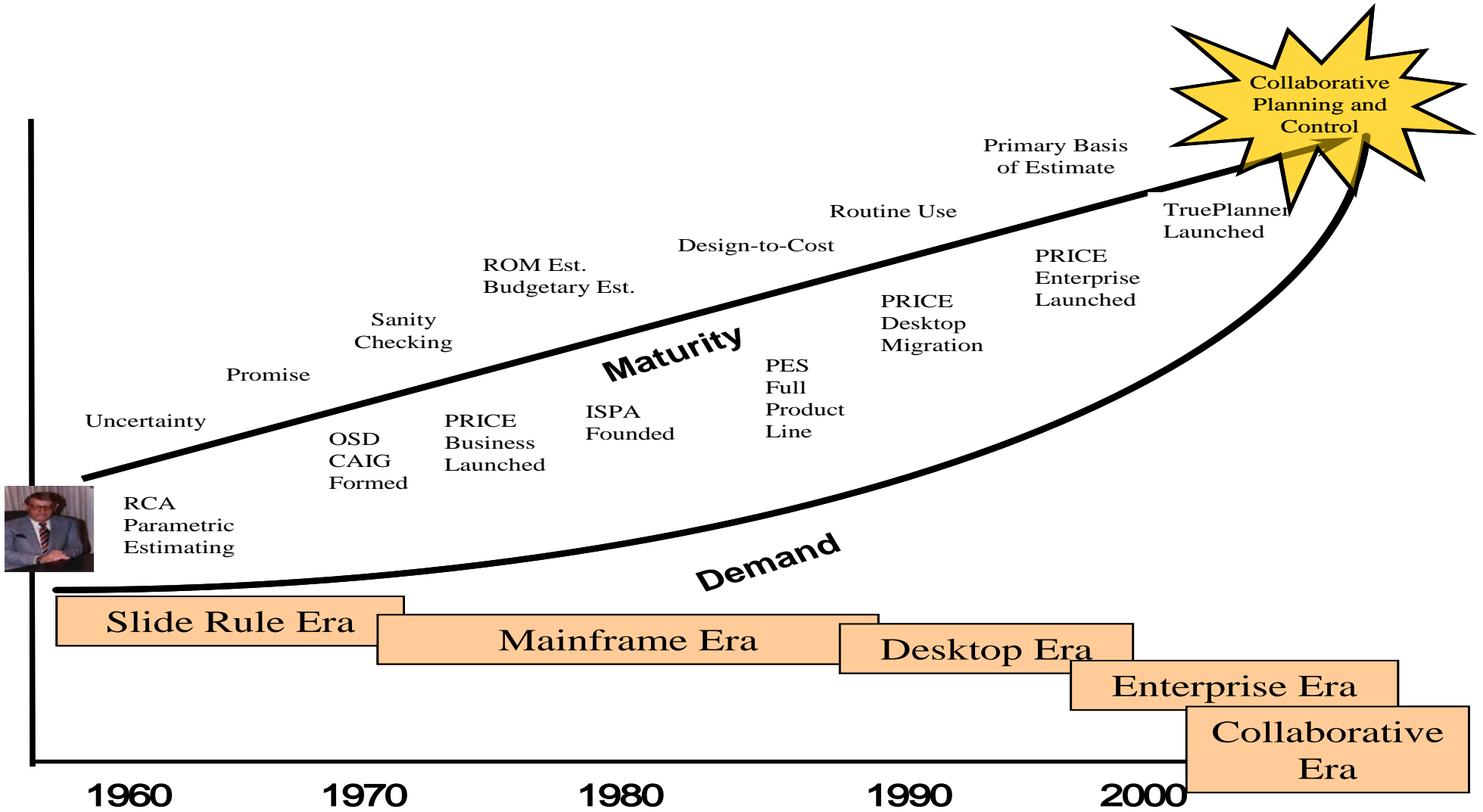
■ **Third generation** using framework approach to allow

- co-location of cost models generating “whole” projects in a single file
- Activity based costing
- “add your own” models

■ In-House

- Many companies have dedicated time and resources to building their own CER driven platforms

History of PRICE Systems

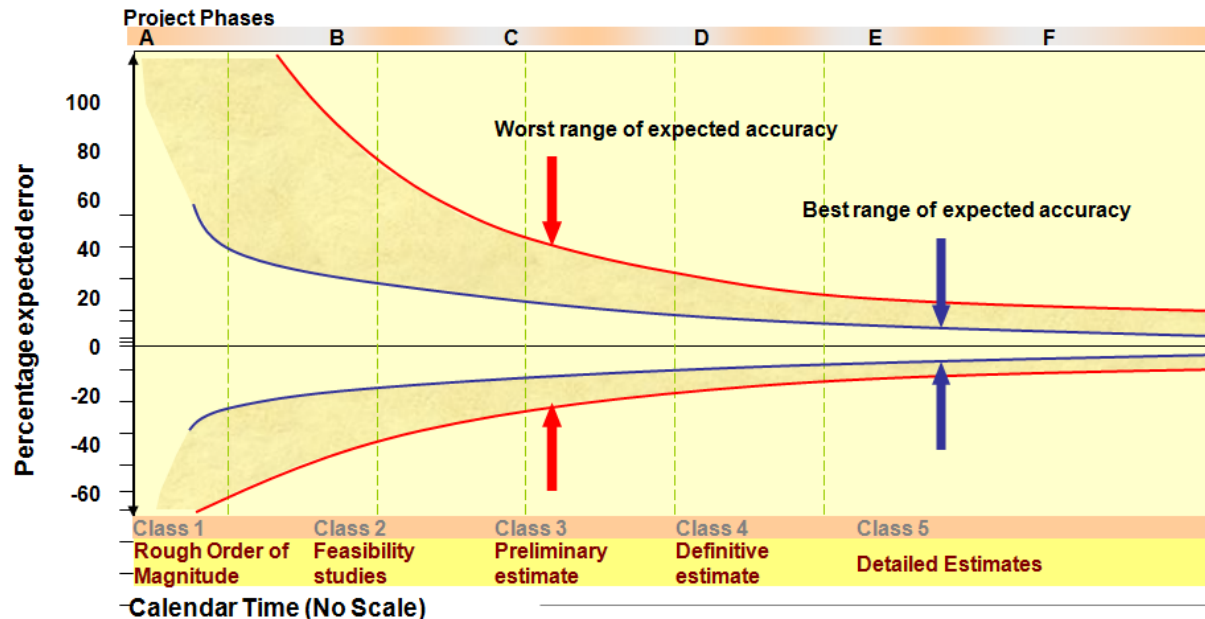


What's the problem

- We can all estimate – can't we?
 - The first number you give will be the one they hang you by
- Parametric tools offer the opportunity to capture uncertainty
 - Most management want “the” number we need to talk in ranges
- Few Parametric tools capture probabilistic risk
 - Differing approaches to risk in UK and USA can be difficult for the development teams to grapple with
- The tools offer “limited” functionality around the statistical manipulation of the inputs
 - Shape
 - correlation
- Many companies handle risk in other tools
 - @risk
 - Predict
 - Arrisca
 - Crystal Ball
 - ARM
 - etc

Why Uncertainty

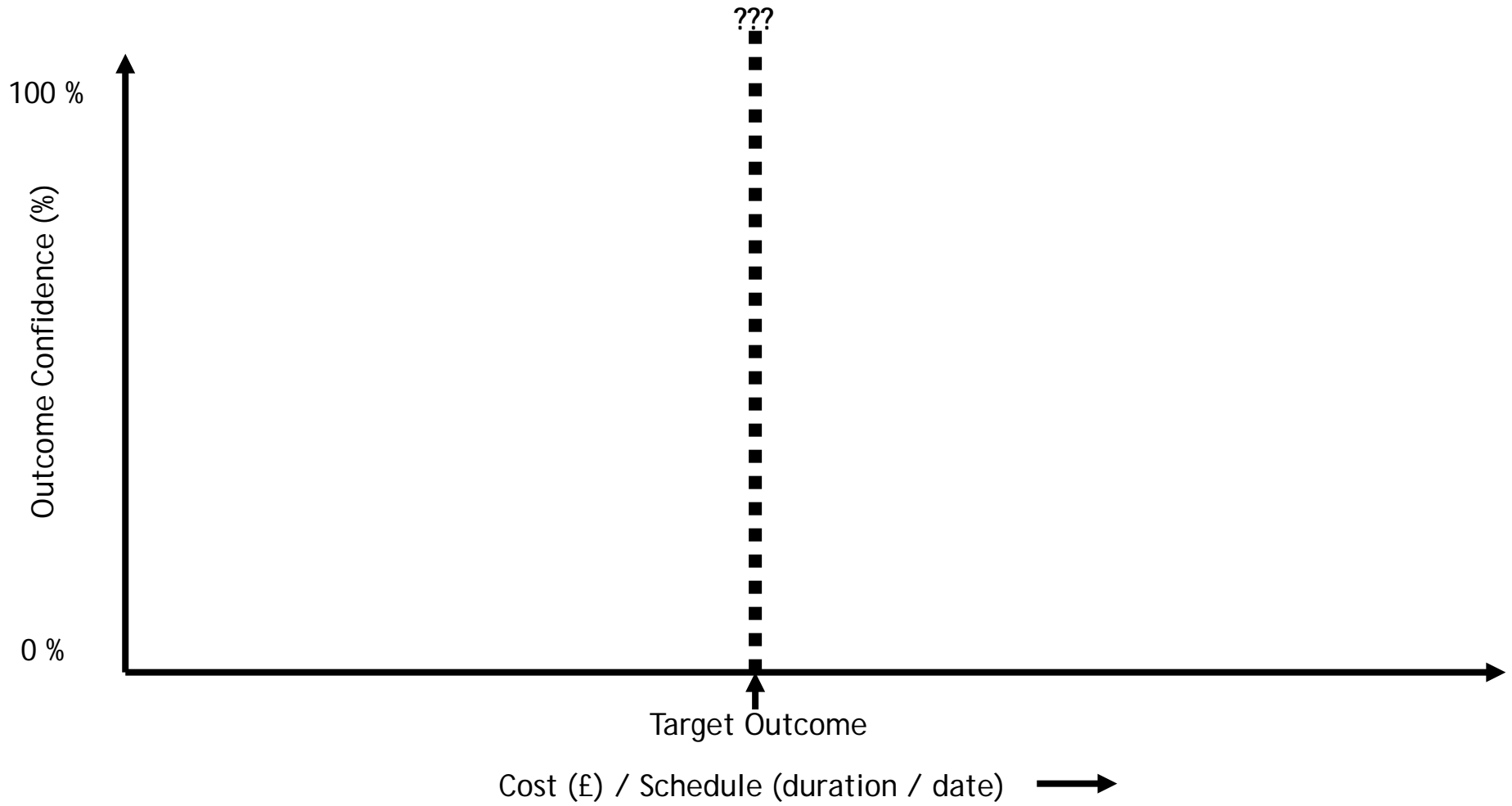
- To capture the variance in what we know
- To reflect the level of granularity in our numeric evaluation of the probable
- To allow for small (or not so small) refinements in the design
- To generate a level of confidence in the believability of the outcome

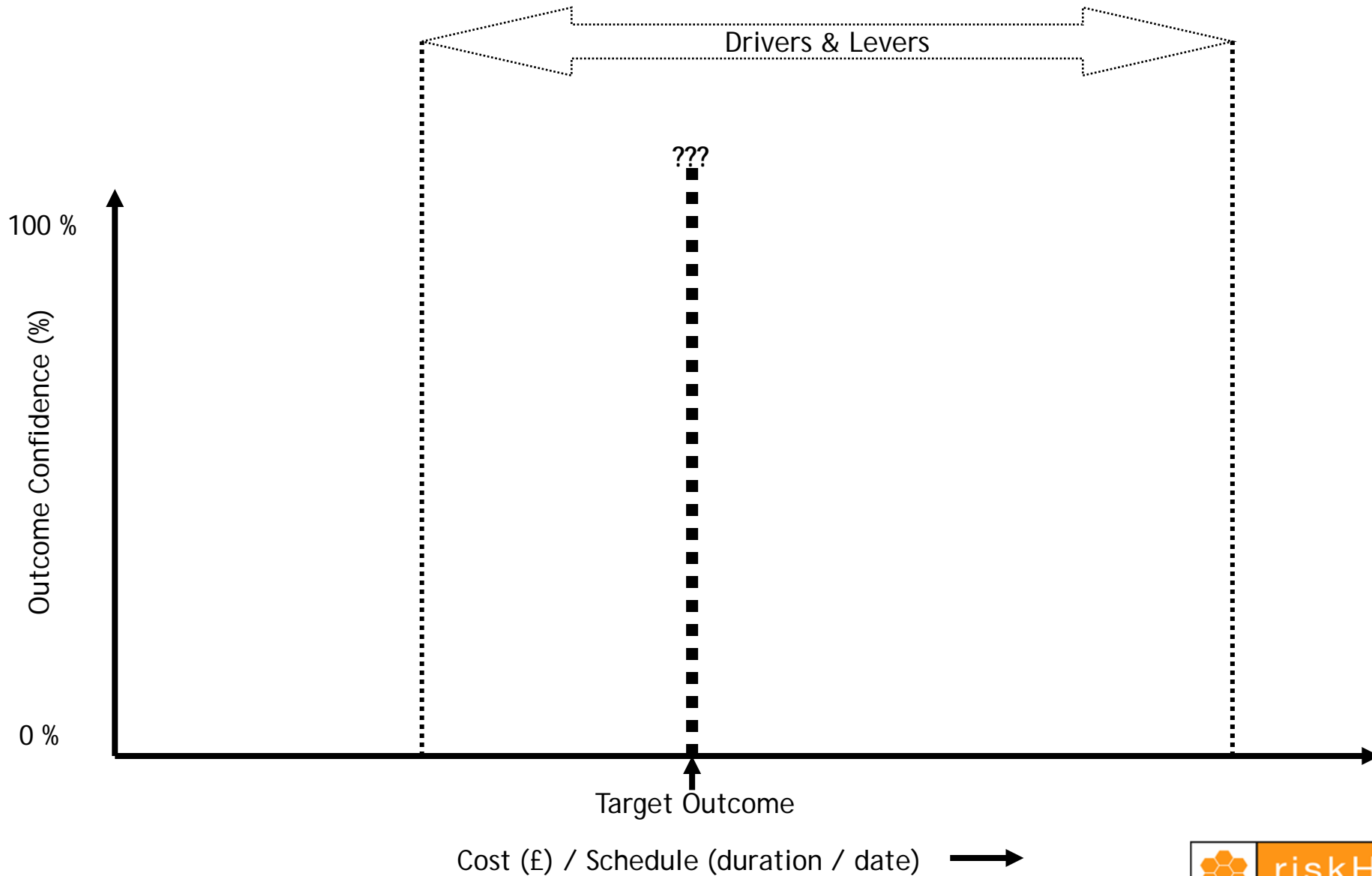


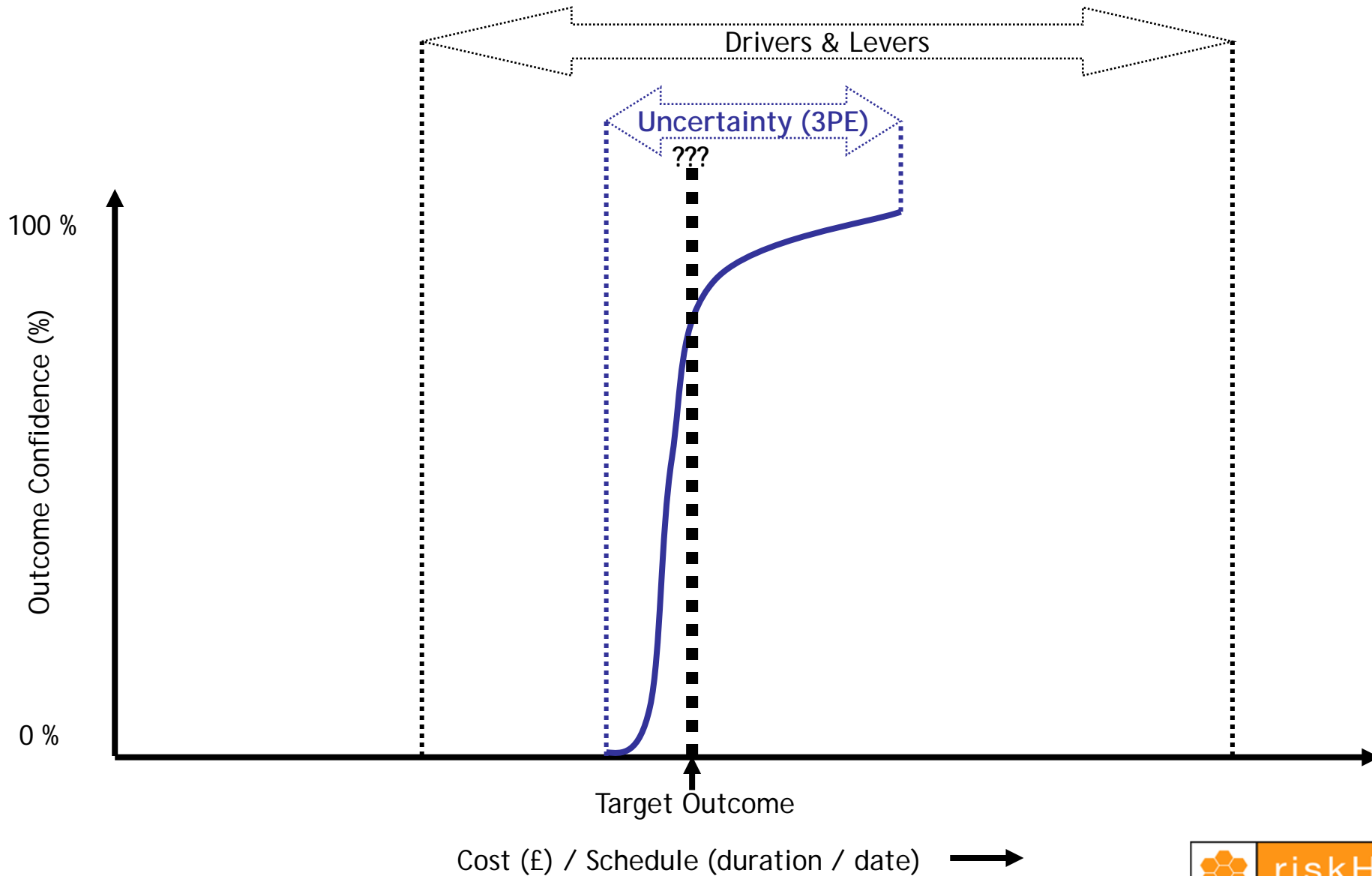
Source: WOODWARD, C. & CHEN, M. *Cost Estimating Basics. Skills and Knowledge of Cost Engineering*, 4th edition, 1999.

Uncertainty and Parametric tools

- Tends to be captured at parameter input level
 - within each object in the WBS each parameter may have a range of inputs
- Captured by three point inputs in most tools
 - Numeric (quantifiable)
 - Graduated (qualitative)
- Exploited using internal calculations
 - Monte Carlo
 - FRISK
- Tends to be limited to the basics
 - Should be sufficient for early day estimates
 - May not be flexible enough as the project matures
- Tends to be simple
 - Single shape (no user choice)
 - Correlated or uncorrelated for whole WBS (user cannot influence)

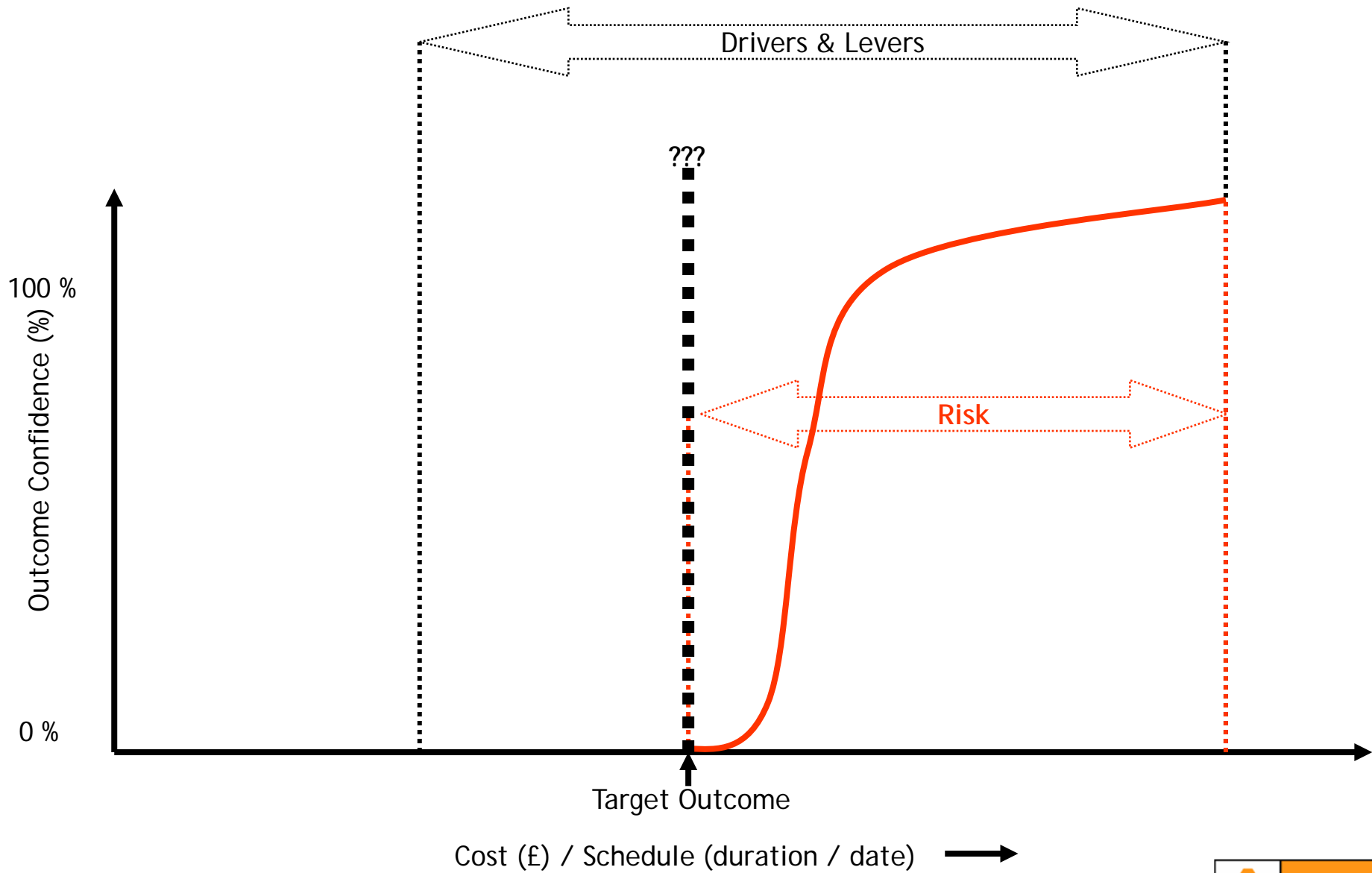


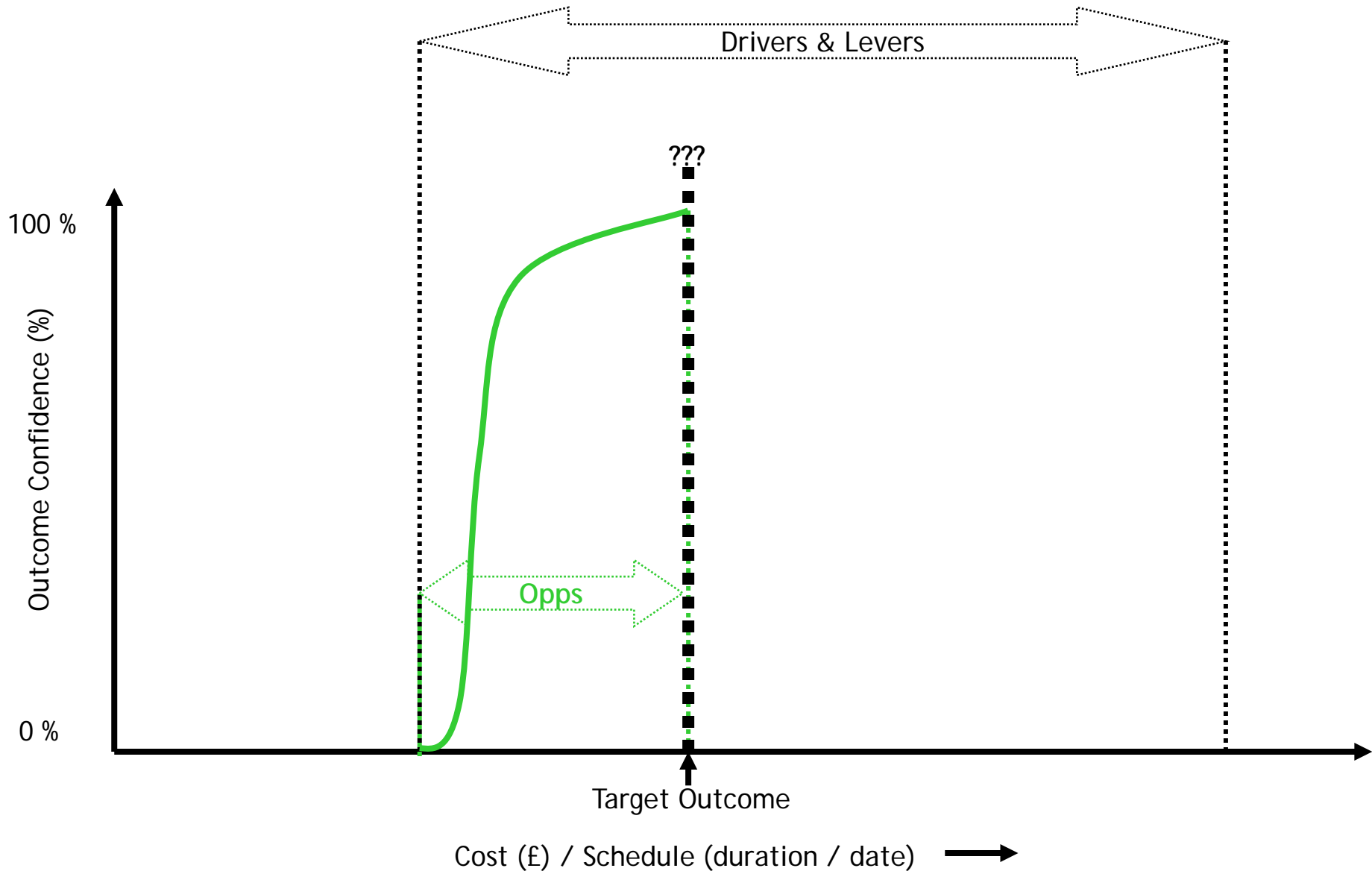


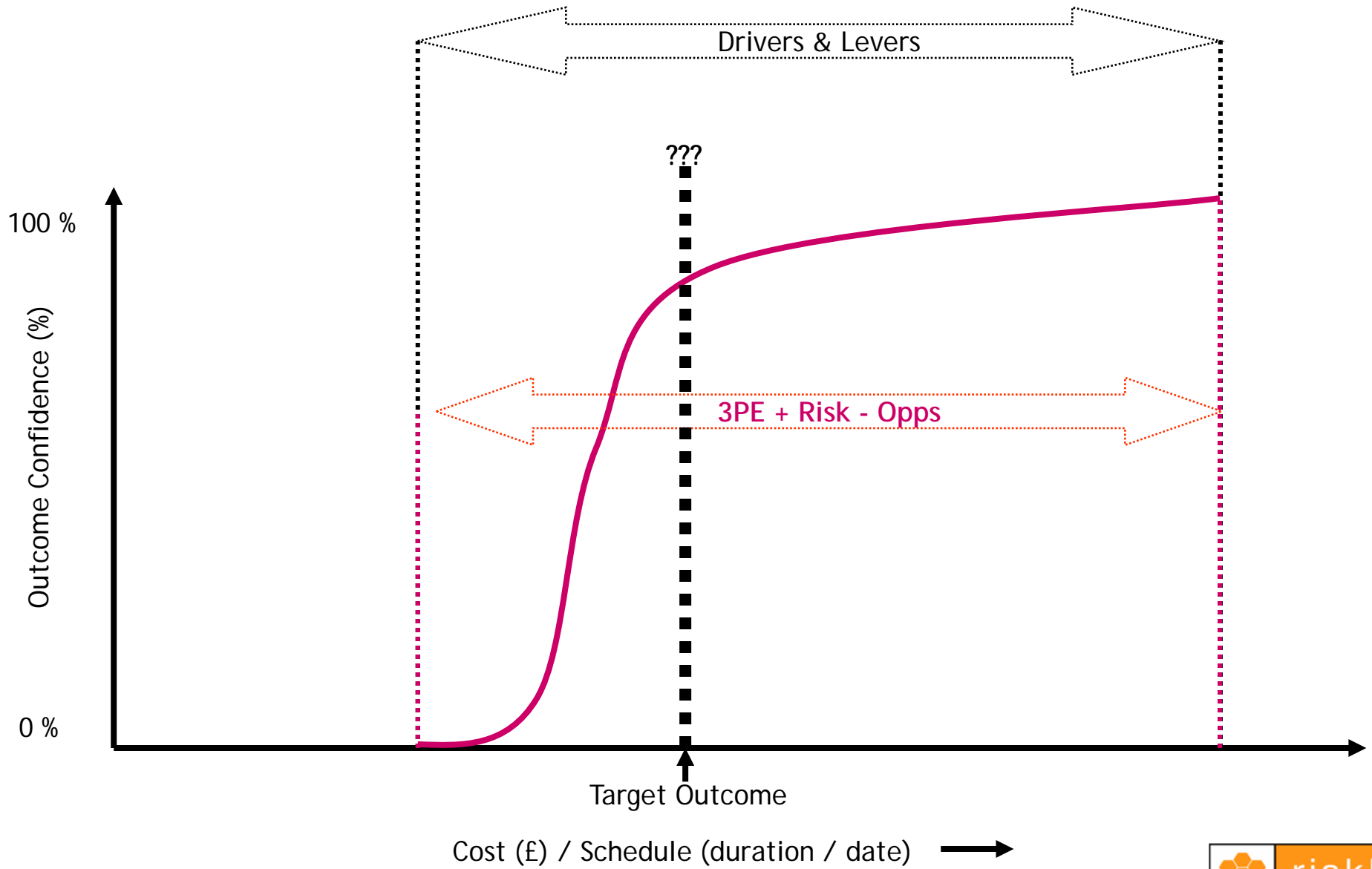


Risk and Parametric tools

- For early day models the “risk” needs to be captured at the level it alters a decision
 - Simulate what if scenarios
- Can be applied at
 - Parameter level
 - WBS element level
 - Sub-project level
- It can alter the approach to problem solution and this proposal definition
 - Offer realistic alternatives







$$V=U+(R-O)$$

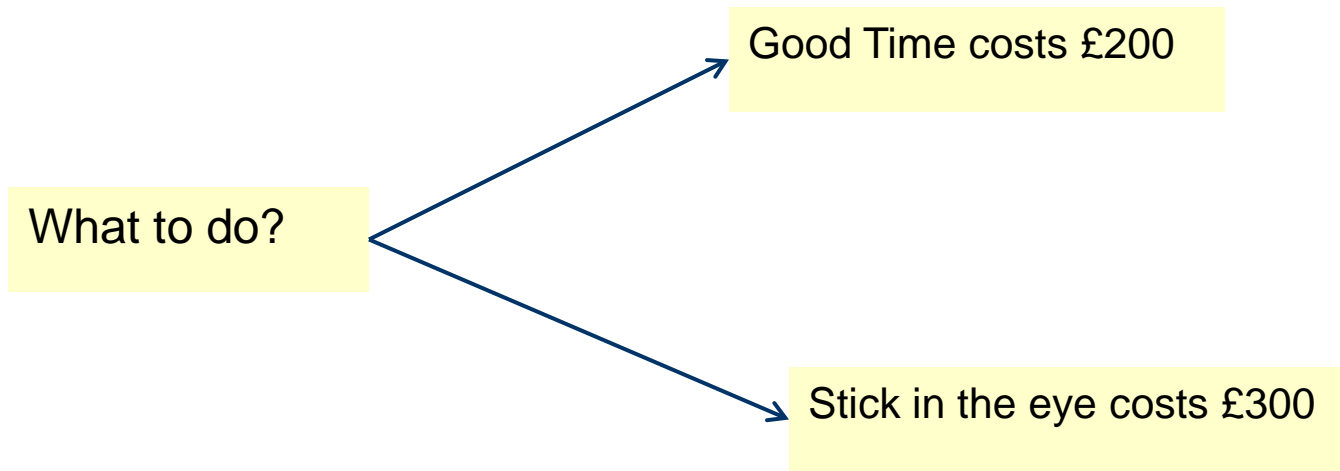
Variability = Uncertainty + (Risk - Opportunity)

Uncertainty = Lack of Estimation Knowledge

Risk & Opportunity = Probabilised Uncertainty

One (willing) volunteer please

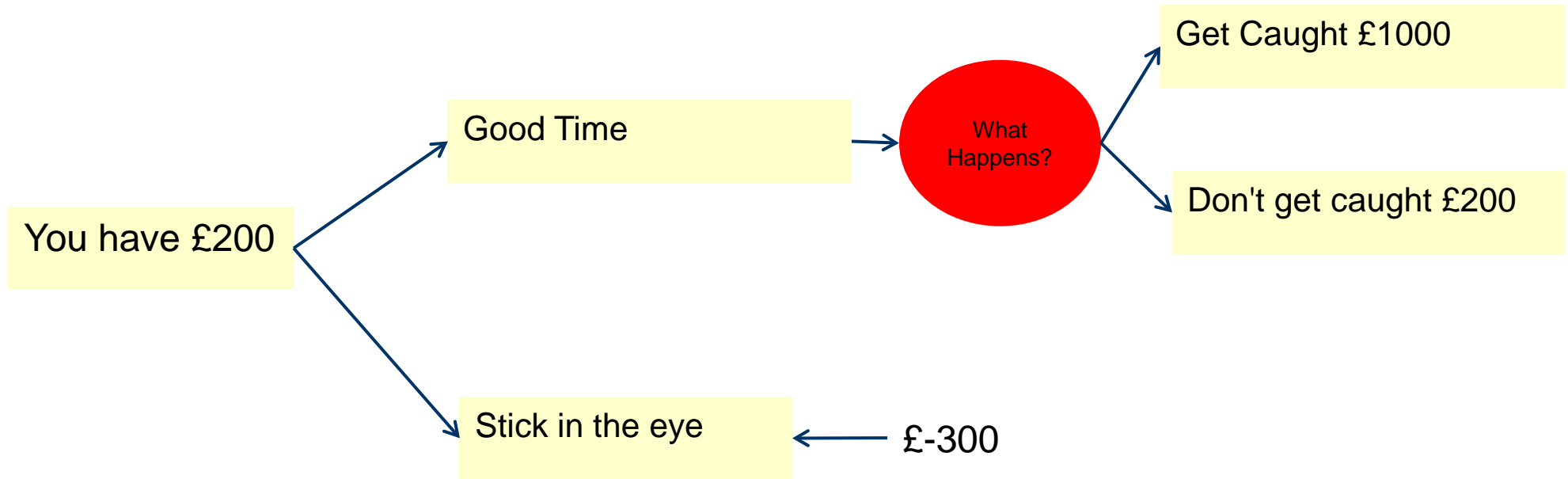
Simple selection



Assumptions

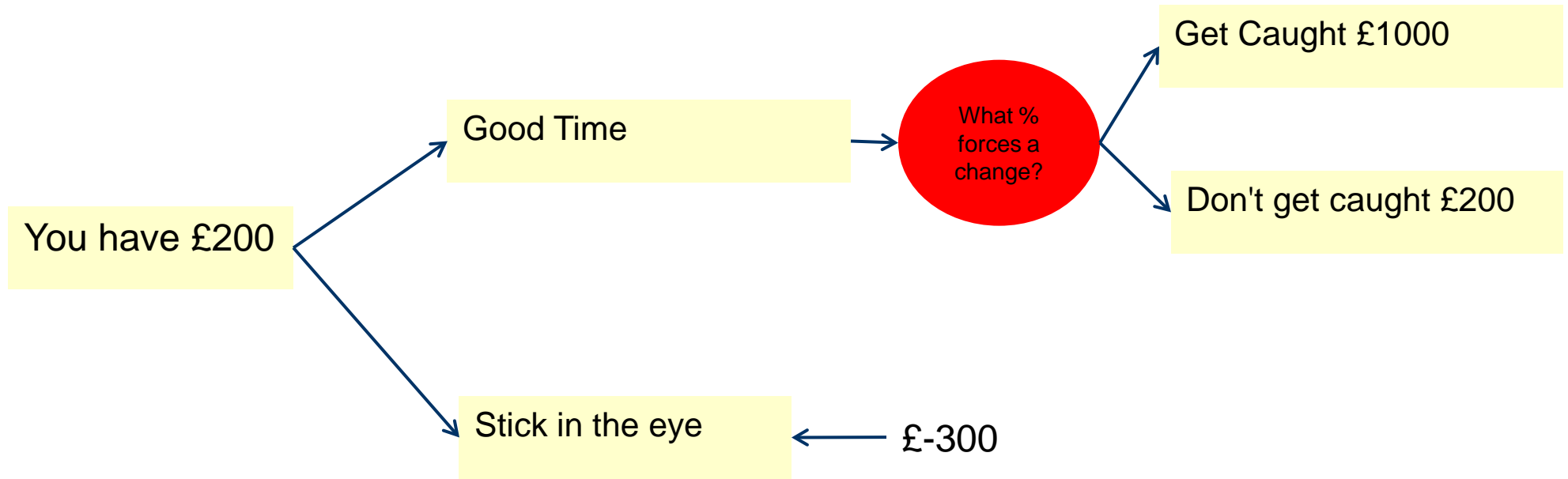
- You will enjoy the good time of your choice
- The stick will hurt but will not blind you

Add more information



Assumptions

- You will enjoy the good time of your choice
- If you get caught having a good time you will be fined
- The stick will hurt but will not blind you



Real example

- Electronics module is limited by
 - Space
 - Weight
 - Power
- It is believed that the embedded software will fit on a “small” series FPGA
 - If it does – all is good for us
 - Meet power targets
 - Meet weight targets
 - Meet functionality targets
 - Cost is acceptable
 - If it does not
 - Need to redesign battery pack or “snatch” power from other functions
 - Shave weight of body?
 - Redesign board layout
 - Heat problems
 - Go back for more money
- How can you cost this early days?

Current State of play

- Most major commercial tools capture uncertainty and support the basic calculation of outcome based on three point inputs
- Unaware of any major commercial tool that manages probabilistic risk as part of the WBS
- Many companies already have risk covered in other solutions
 - ARM
 - Predict controller
 - Excel
- Need to “risk adjust” WBS structures and outcomes
 - May not be sufficient to adjust parameters for risk
 - May need to “flex” the WBS structure and thus deliverables
- Most tools have an API to support the co-working of toolsets
 - Using excel as a transfer mechanism
- Happy to show working application at next SCAF “tools” event

Questions ?

references

- riskHive training material for Arrisca Desktop V3
- The flaw of averages – Sam Savage
- Uncertainty and Risk -Multidisciplinary Perspectives Gabriele Bammer and Michael Smithson
- Society of Decision Professionals
(<http://www.decisionprofessionals.com/index.html>)