



Magnox North

Calculating contingencies at project level

George Houghton – Senior Risk Manager

Trawsfynydd

Calculating Contingencies at Project Level

- Qualitative Vs Quantitative techniques
- Subjective methods
 - Low Medium High
 - RAG
- Statistical
 - Monte Carlo

Calculating Contingencies at Project Level

- Prerequisites for calculating contingencies
- Risk allocation
- Modelling techniques available
- Using risk outputs to change project approach.

Why quantify risk

- Quantify the effect of risks
- Predict likely project outcomes
- Identify options
 - how to respond
- Balance response against potential cost
- Focus management attention
 - priority areas

When in a project lifecycle?

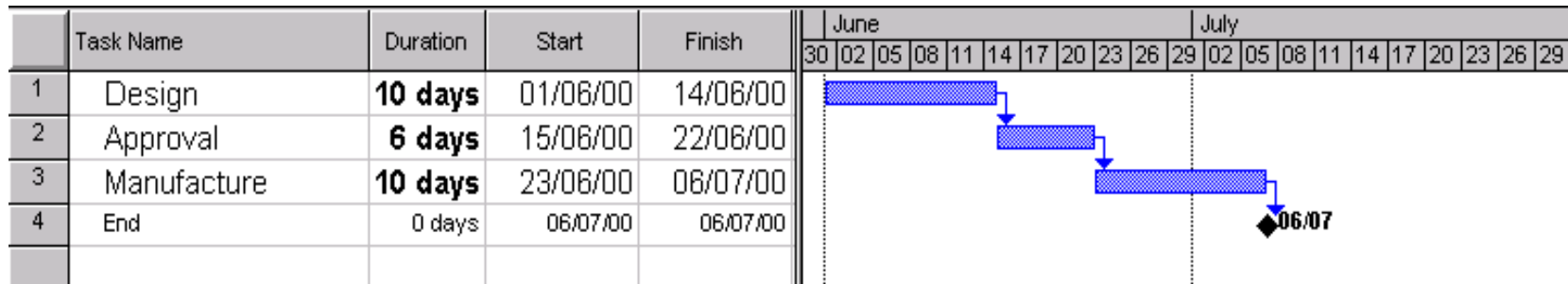
- Budget preparation
 - To support business or project decisions
 - Set contingency, determine price
 - “What-if” sensitivity analysis
- Project sanctions
- Project Execution
 - Appropriate Stage Gate
 - On major change, to provide confidence of delivery, etc.
- Early enough to respond

Prerequisites for calculating contingency

Determine the definition of contingency:

- Contingency is arrived from the combination of the following two forms: -
 - Estimating Uncertainty: uncertainty associated with possible performance for project or operational work scope in terms of cost and schedule duration.
 - Discrete risk: an event, circumstance or condition that may or may not occur, which could influence delivery of project or operational work scope

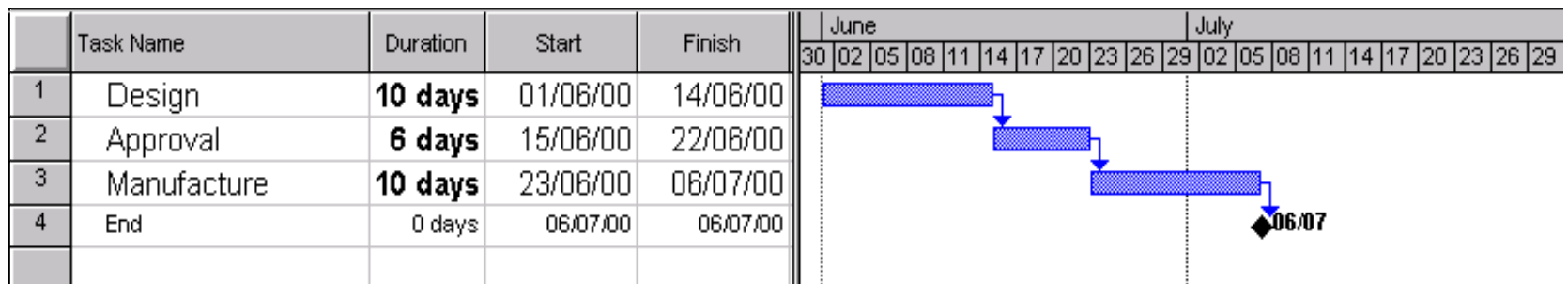
Draw Up Base Programme and Estimate



- Establish the base programme and estimate.
 - Part of a risk may already be covered within a base estimate or programme
 - Response strategies
- Remember to map discrete risks across correctly

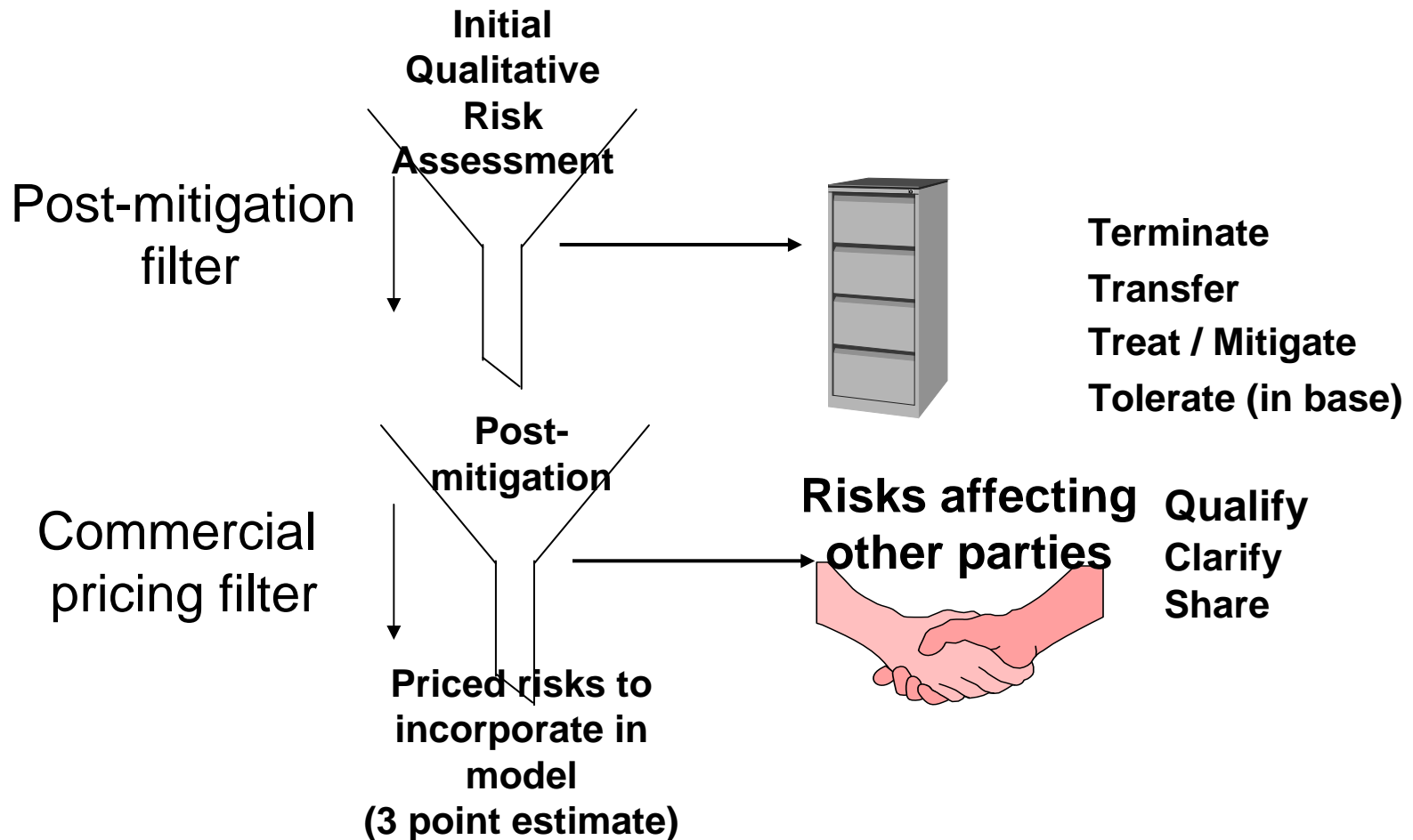
How does Monte-Carlo work?

- Simulates 1000's of potential project scenarios



- Therefore it builds a picture of all possible outcomes

Risk allocation



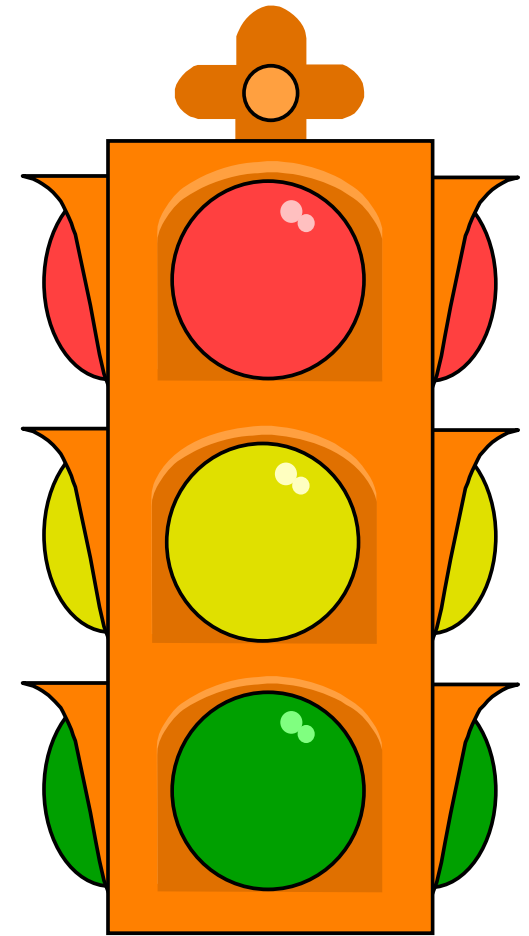
Trawsfynydd

Pricing risks

- Price relevant risks only
 - 3 point estimate (3PtE)
- Assess
 - Percentage likelihood of occurrence (not the risk rating)
 - Impacts (not the risk rating)
 - Either financial (£s) or programme (working days)
- Using the above details Monte Carlo simulation can now be used to establish a realistic estimate

Monte Carlo Practical Example

- 10 sets of traffic lights
 - 2 minutes per set
 - Total 20 minutes (risk free estimate)
- If on red (50% chance) add 1 min per light



Trawsfynydd

Mechanistic Results

Q: How long will the journey take

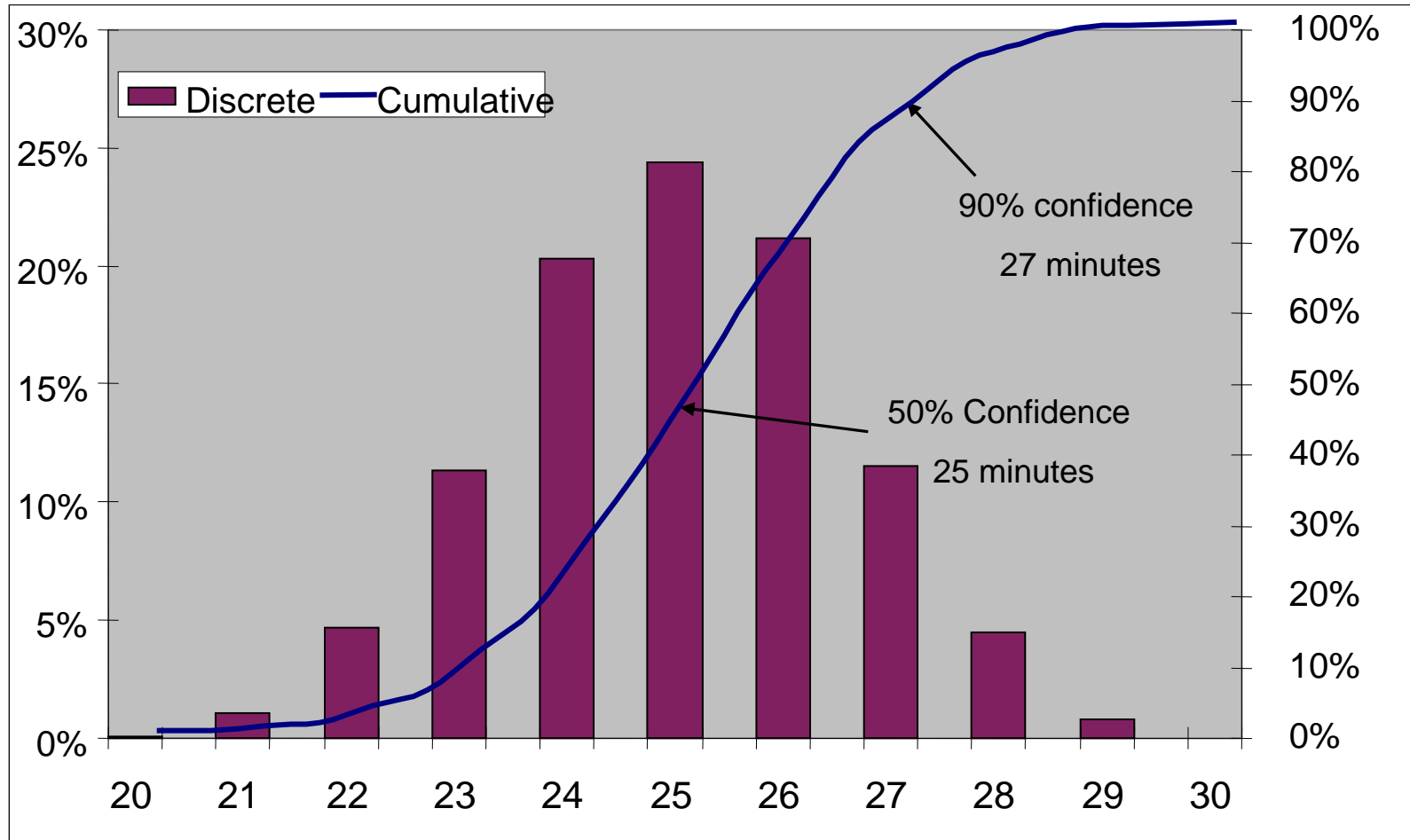
- How can you give a single answer ?
- So why quote a single value ?
- All we can say is:
 - Best = 20 minutes
 - Worst = 30 minutes
 - Average = 25 Minutes

Consider Monte Carlo

| Traffic Lights | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
|--------------------|---|---|---|---|---|---|---|---|---|----|------|
| • Run 1 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | = 21 |
| • Run 2 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | = 27 |
| • Run 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | = 23 |
| • Run 4 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | = 26 |
| • Run 5 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | = 23 |
| • Run _n | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | = 28 |

Trawsfynydd

Probabilistic Results - Graphical



Trawsfynydd

In Reality

- That was a very simple example
- Monte Carlo takes account of complexities, dependency and correlation of risks that can't be done with a calculator
- i.e simplistically models the “real world”

Modelling techniques available

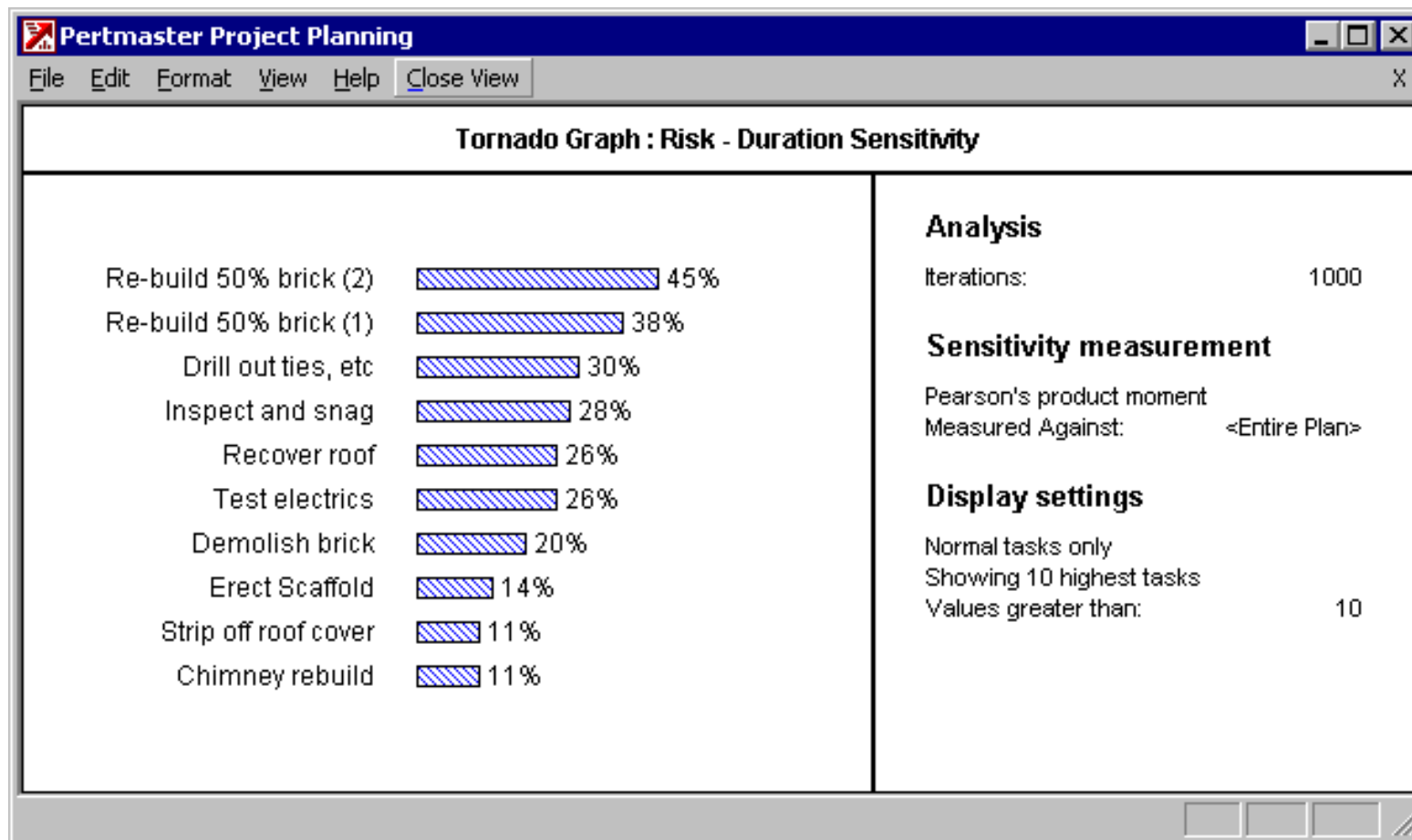
- Simulation based software that builds a simple model of all the possible outturns (cost and schedule) against confidence ratings
- Uses the sampling Monte Carlo technique
- Example Software: **@ Risk and Pertmaster**

- Specialist skill set

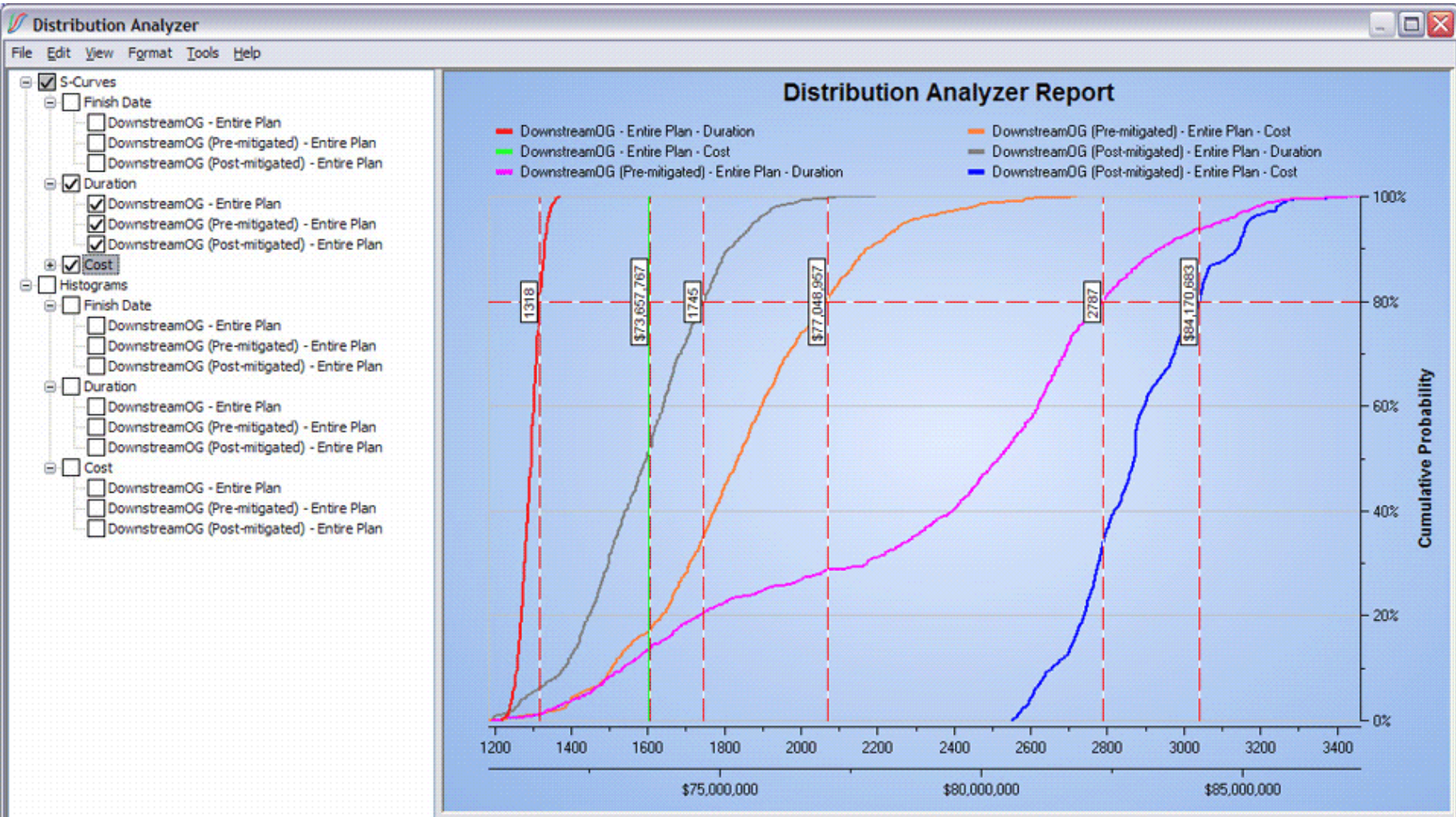
Using risk outputs to change approach

- Tornado chart
- S-curve
- Examples

Tornado Chart



Trawsfynydd



Trawsfynydd

Summary

- Useful tools
 - But only as good as the data supplied
- Most useful when most difficult
 - early forecast Vs lack of details
- Risk Management aims for behavioural/cultural change – i.e. **MANAGE RISKS**