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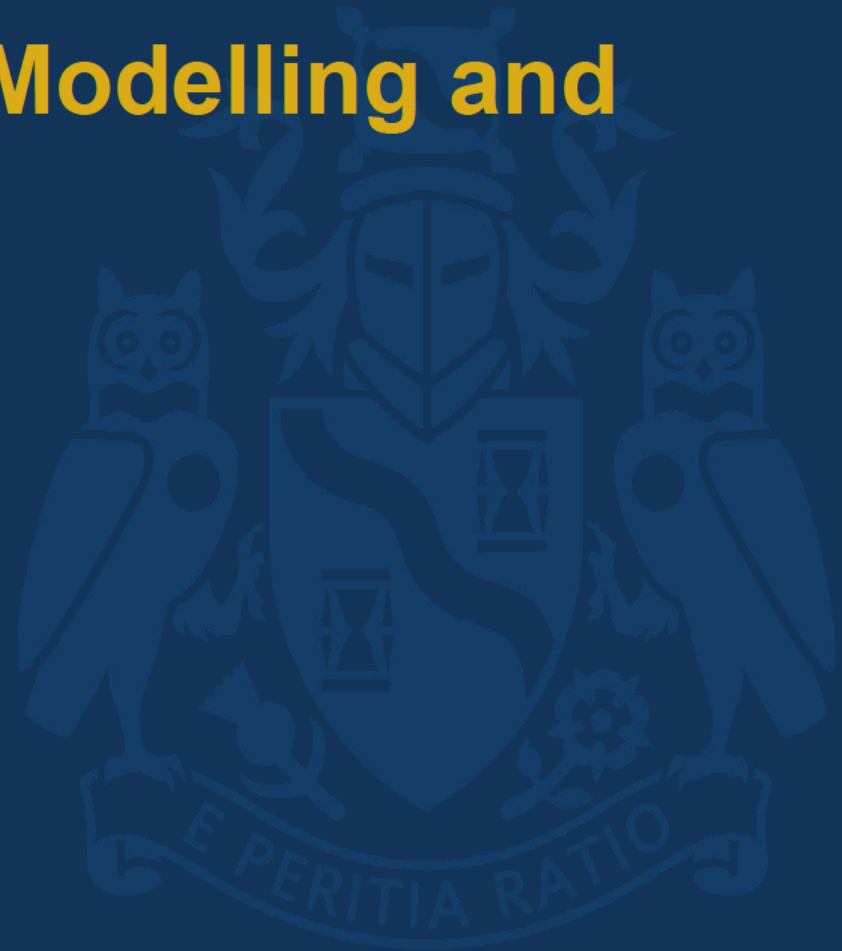
Joining Up Op Risk Modelling and Management

Neil Cante



IT TAKES VISION

26 September 2016



The “Problem”



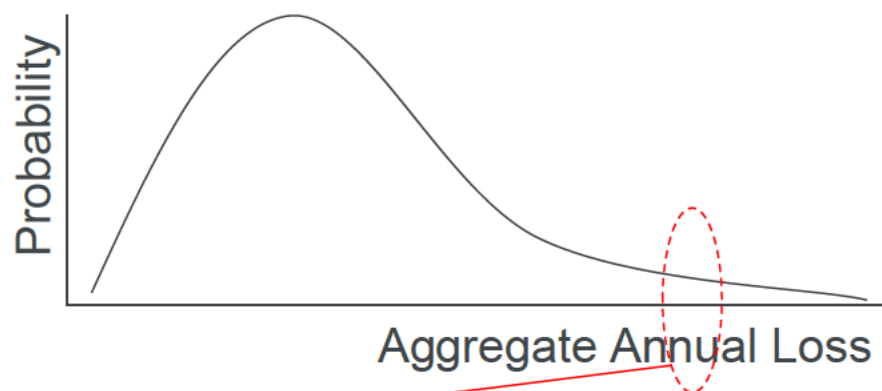
Modelling typically avoids “how” and directly assesses “what”

Managing typically more interested in “how” and in a different “what” to the modellers



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Loss Models – Approaches



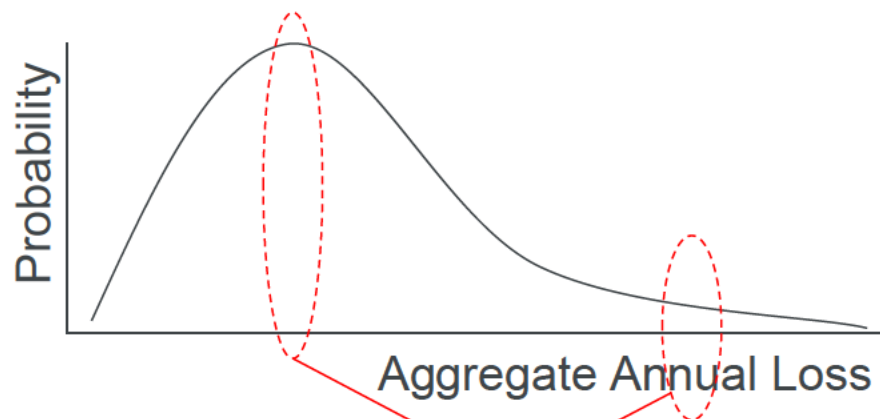
① Scenario

Estimate an
“extreme” outcome



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Loss Models – Approaches



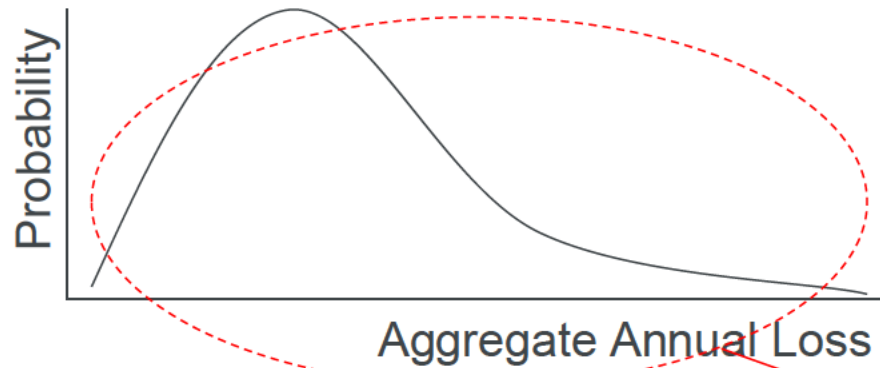
② Fit Curve

Make an assumption about the shape of the loss curve and fit by estimating points on the curve (e.g. mode/tail)



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Loss Models – Approaches



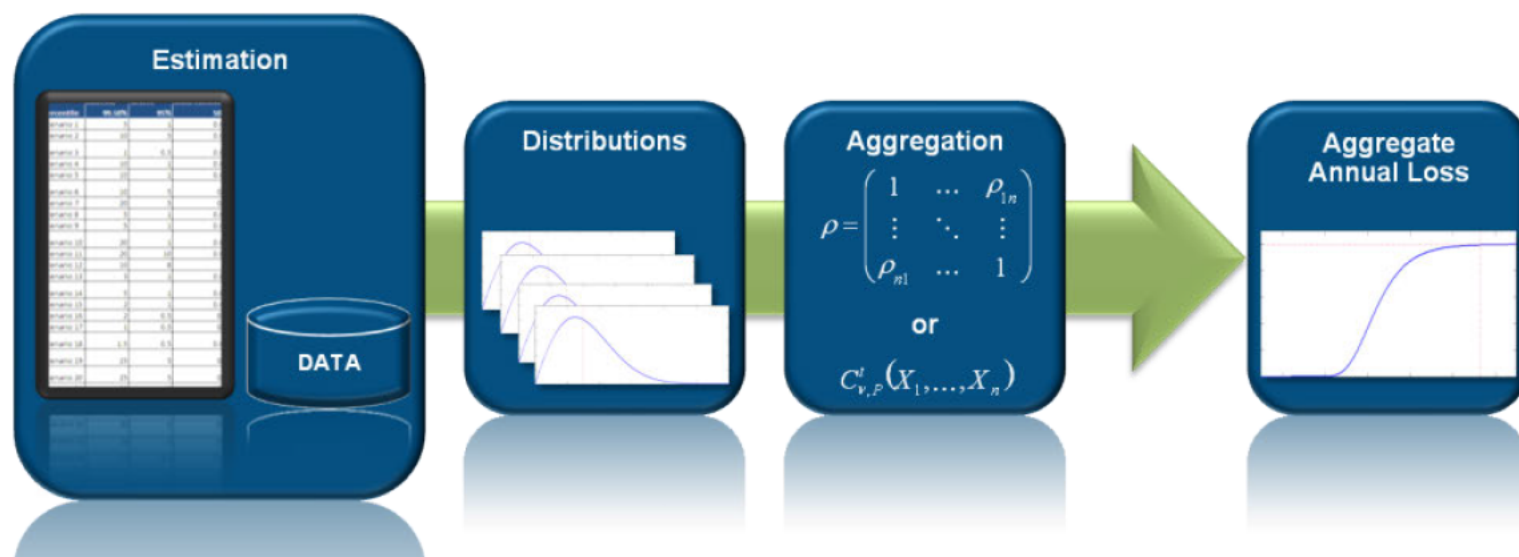
③ Whole Curve

Produce an estimate of the whole curve



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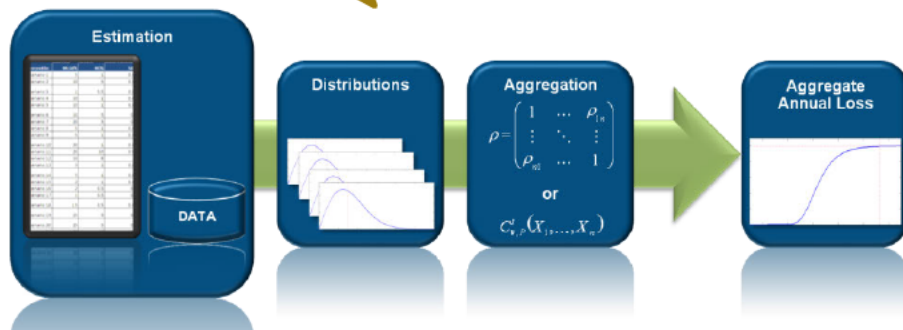
Typical Modelling



“Expert Input”

We have calibrated our model with past loss data and it says that there is a 10% chance of losses exceeding £4m and a 5% chance of losses exceeding £6m. What do you think Dave?

No idea. We have never had a loss that big. We added some new controls last month so maybe we should reduce the figures a bit. How about £3m & £5m?



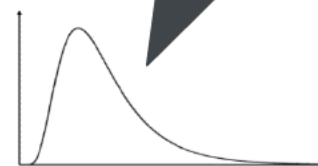
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Scenario Overload But Incomplete

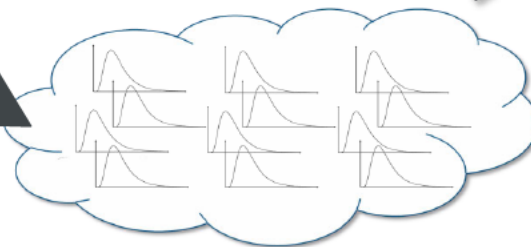
These are lots of different variations we thought of for how loss type X could happen



They are actually specific examples contributing to the aggregate loss of type X



...but so are these that we didn't think of!



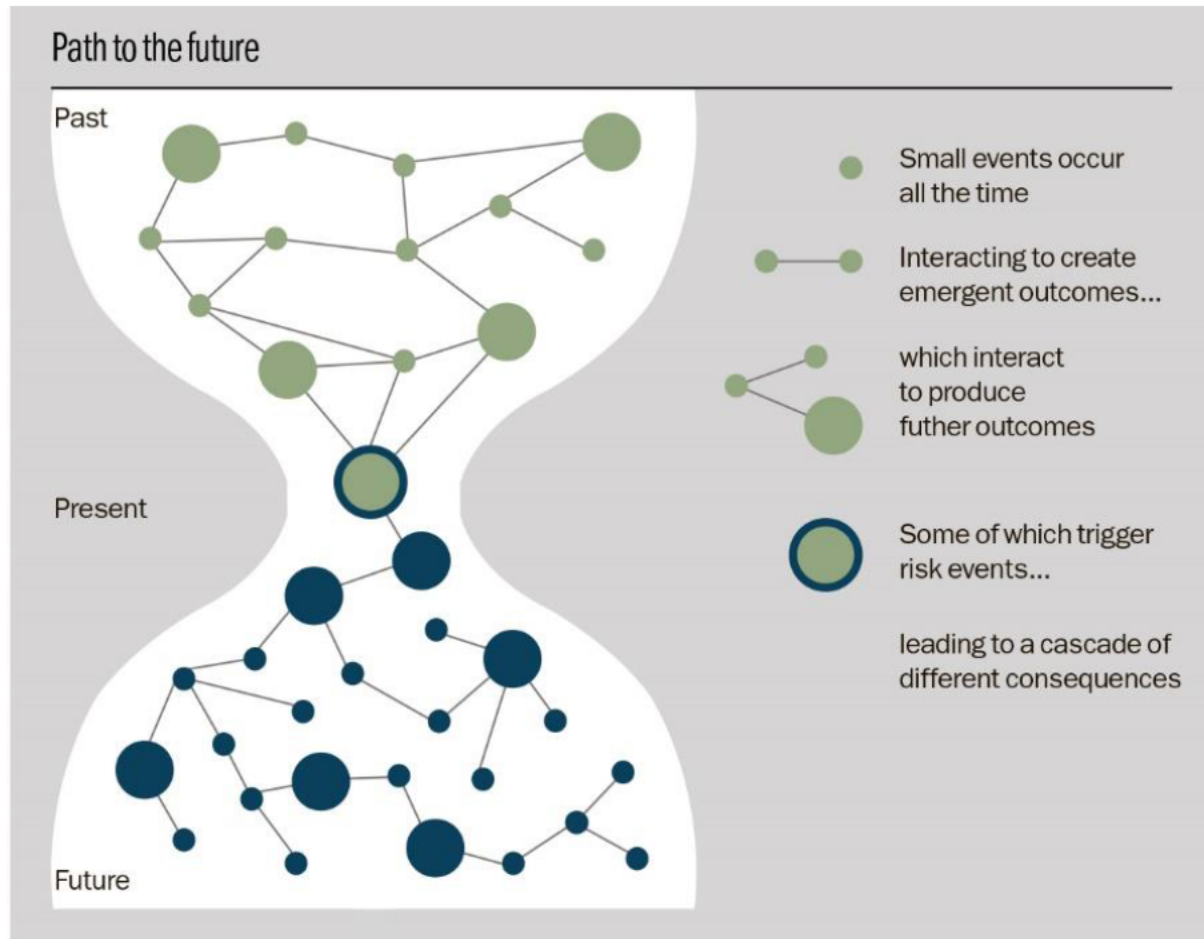
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Modelling The Past



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Operational Risk



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Implementation



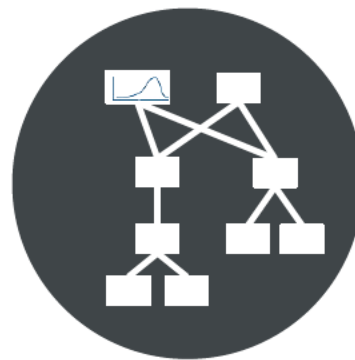
Engage experts to describe operational activity and its impact on company goals



Analyse narrative to form a “minimally complex” understanding of the operational “system”



Determine set of operational risk dimensions to be modelled, which cover profile



Each dimension is discussed with experts, summarised to a “minimally complex” form and modelled using a causal model

Maintenance



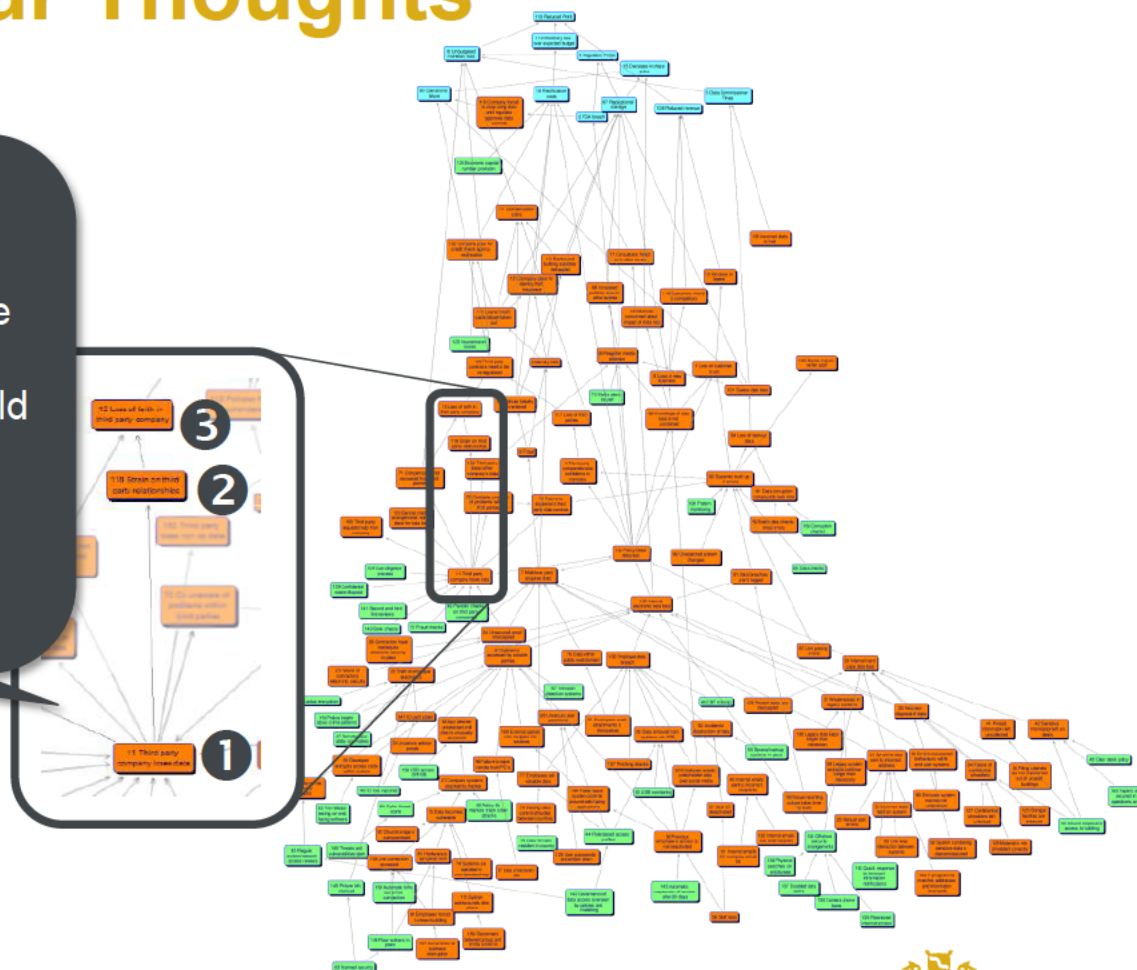
During ORSA, consider whether any changes are required to operational dimensions being modelled



Periodically validate with experts that no material operational changes have occurred and use management information to confirm model calibrations

Picturing Your Thoughts

“If the *data was lost by a partner* there would be contractual issues to resolve which would *strain the relationship* and there would be damages to claim. This could cause a *loss of confidence in the partner* themselves..”

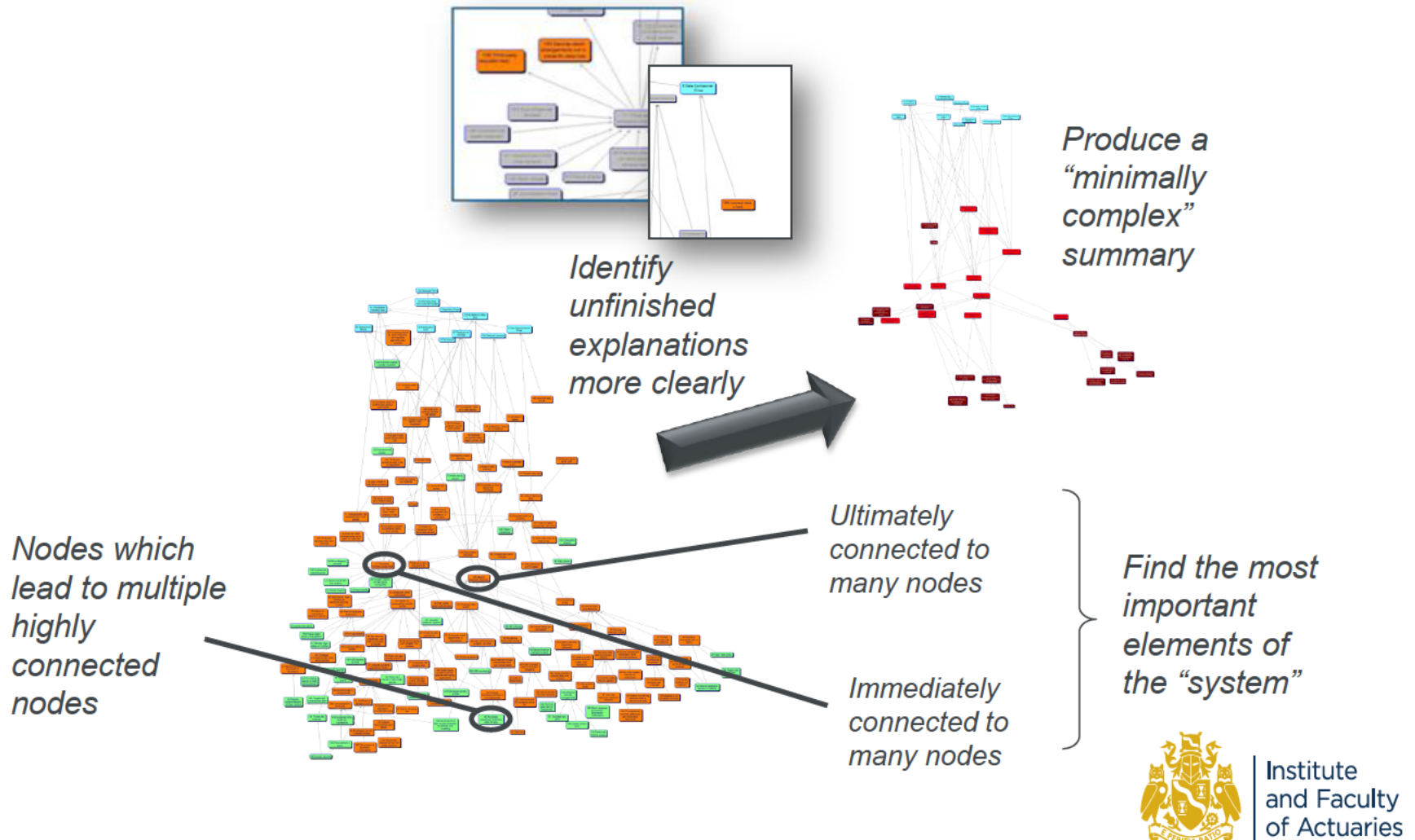


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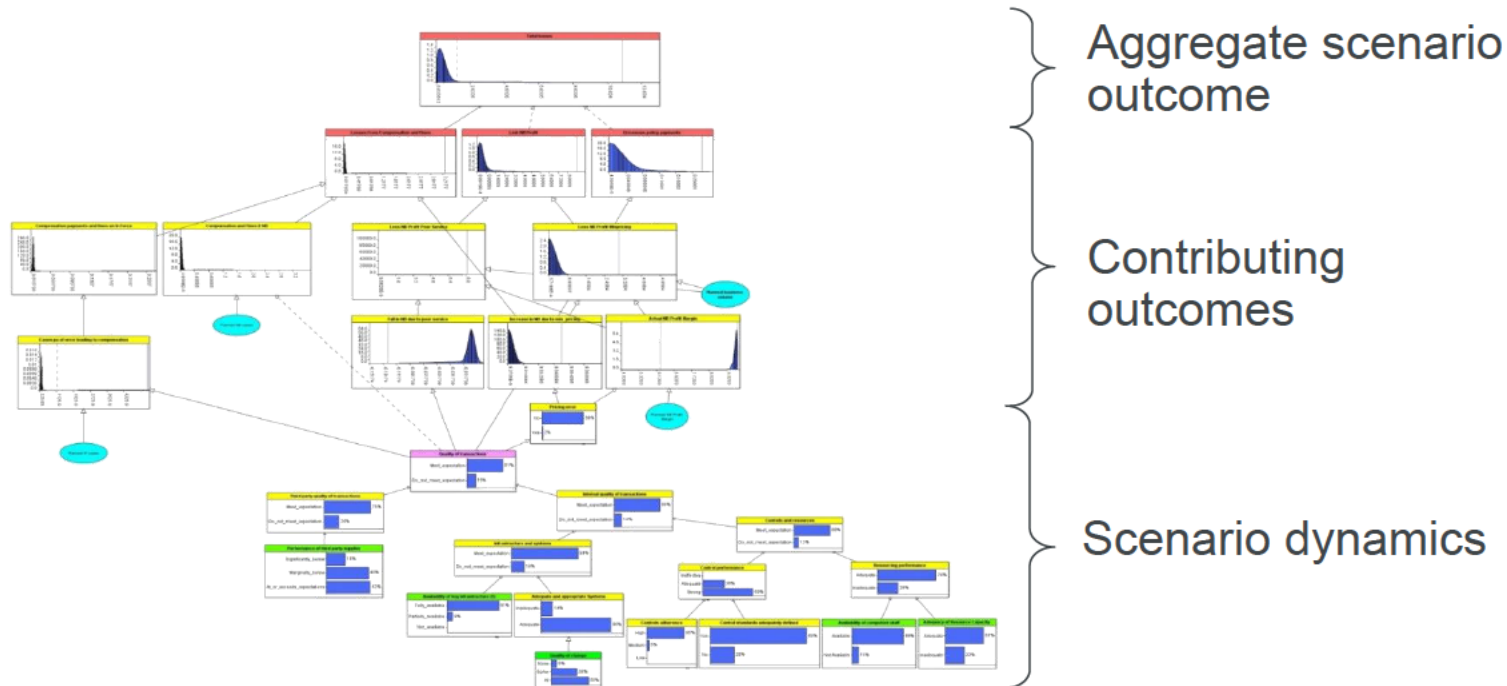


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Cognitive Analysis



Bayesian Network Models

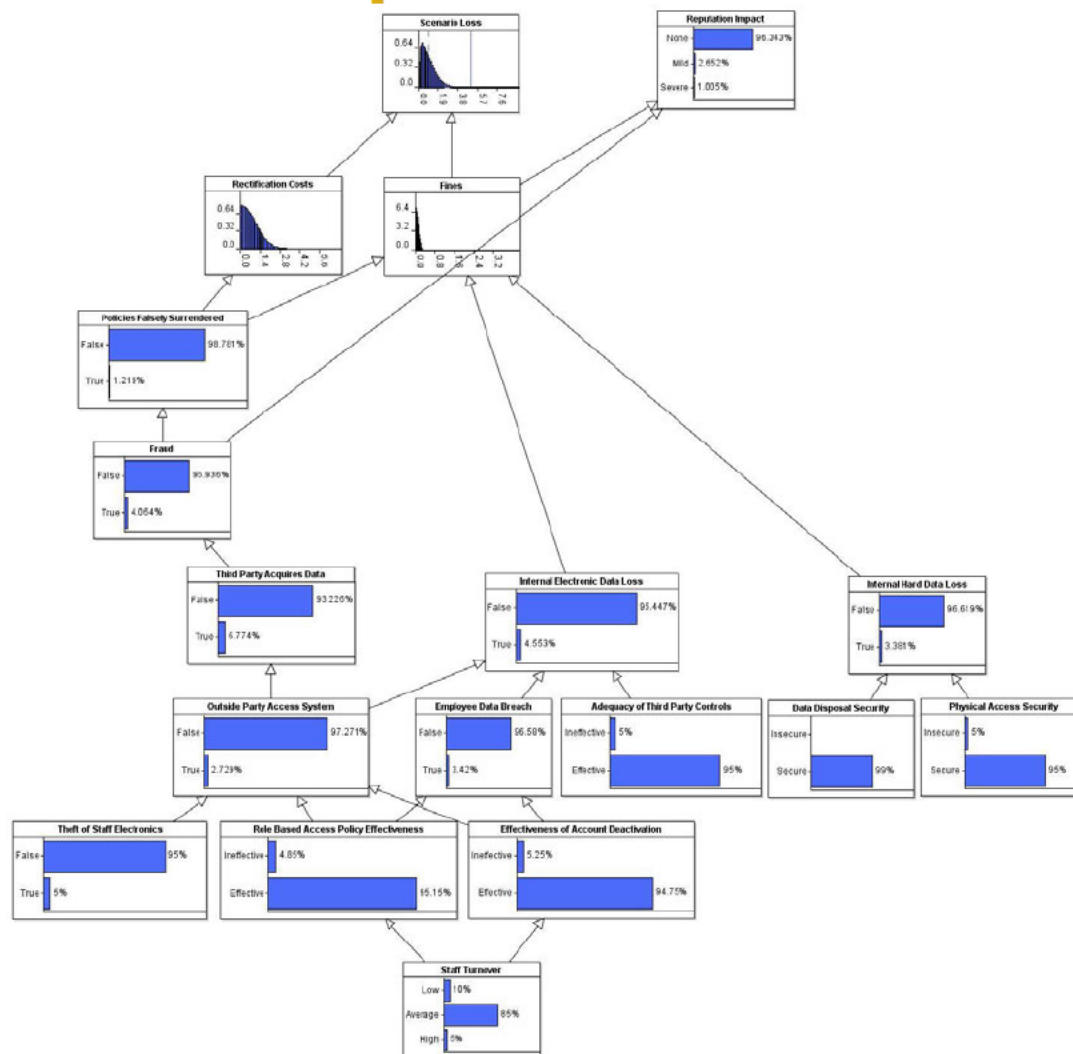


Source: Milliman, using AgenaRisk™

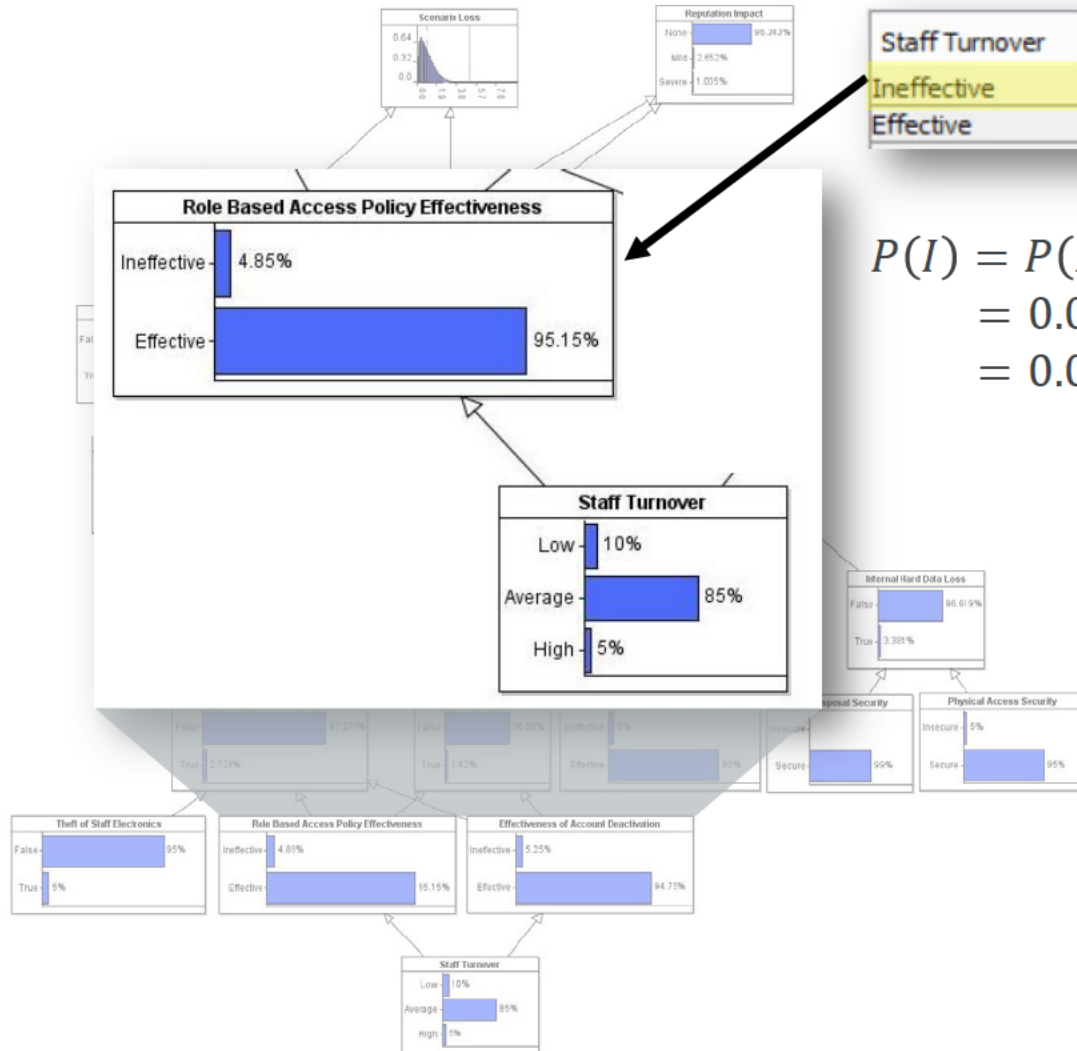


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Data Loss Example



Data Loss Example

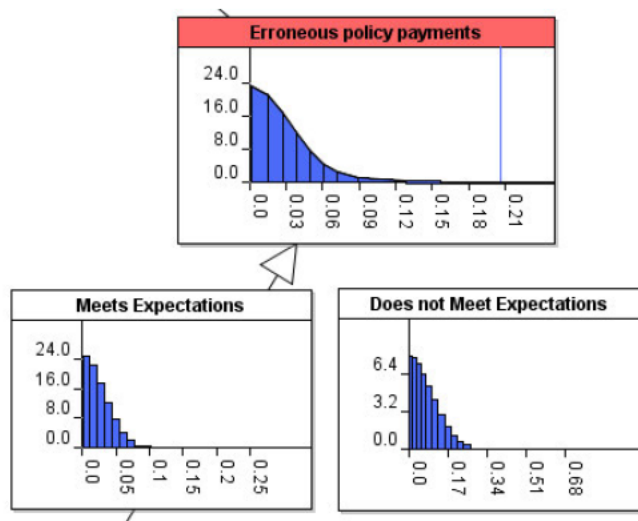


Staff Turnover	Low	Average	High
Ineffective	0.01	0.05	0.1
Effective	0.99	0.95	0.9

$$\begin{aligned}
 P(I) &= P(I|L)P(L) + P(I|A)P(A) + P(I|H)P(H) \\
 &= 0.01 \times 0.1 + 0.05 \times 0.85 + 0.1 \times 0.05 \\
 &= 0.0485
 \end{aligned}$$



Estimating Outcomes



Bayesian Network is taking estimates of outcomes relating to a particular “state” of the scenario components and then “mixing” them to create an aggregated view

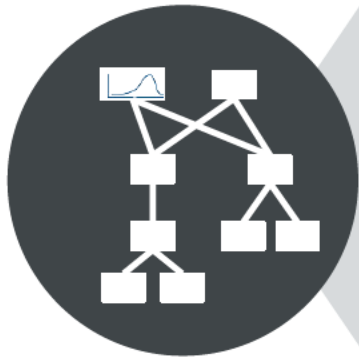
If servicing quality meets expectations I think policy payments are more or less zero

If servicing quality does not meet expectations I think policy payments are still mostly zero but there is more chance of higher amounts



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Uses



“What if” scenarios can be used to explore the outcomes associated with particular sets of initial conditions



“Reverse stress” – particularly useful for determining multivariate scenarios of moderate stress which lead to a highly adverse aggregate outcome



Projections for operational risk outcomes can be achieved by entering estimates for future conditions

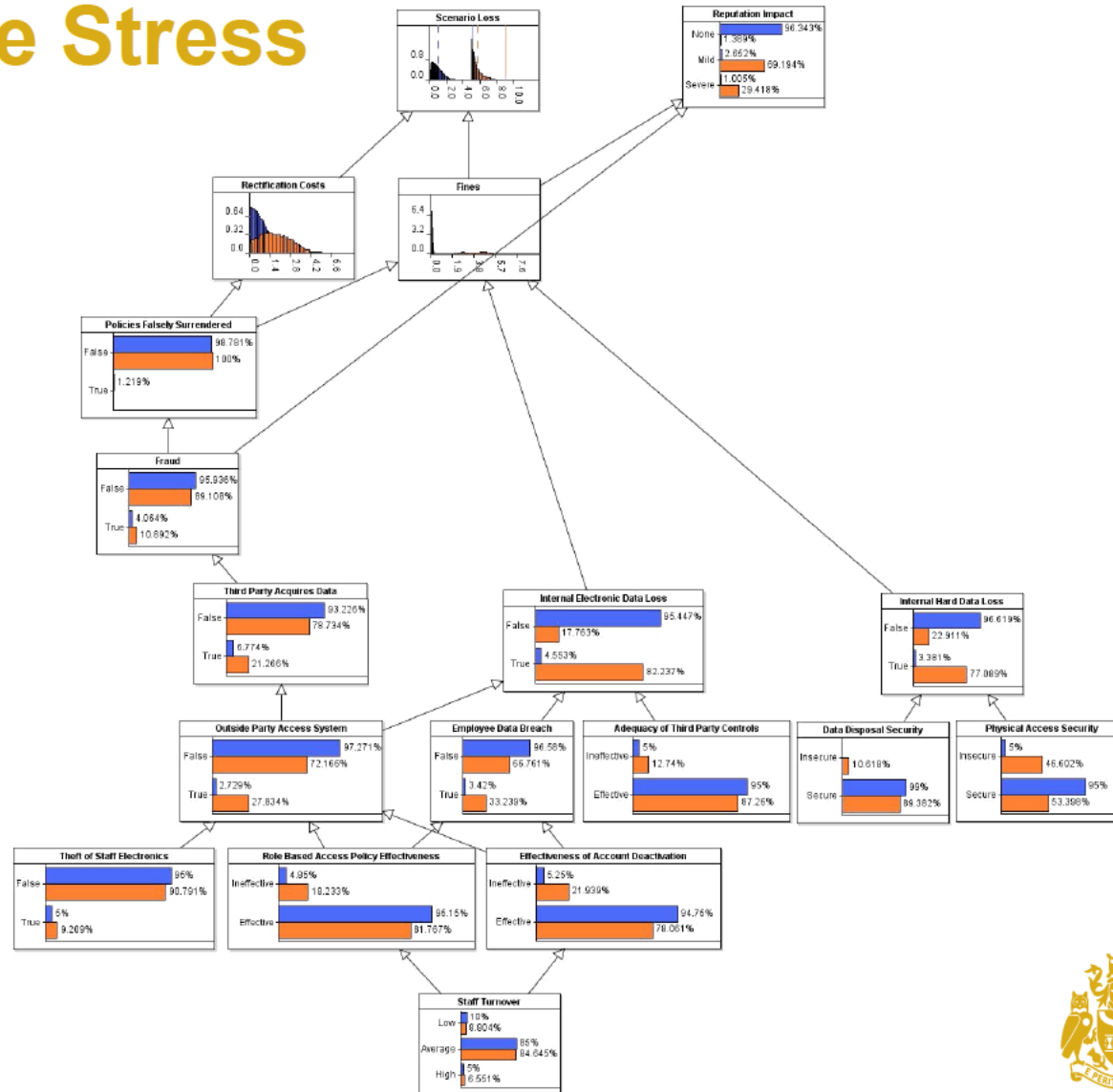


Models can be used in business case preparation and decision-making by highlighting the impact of proposed actions on multiple objectives

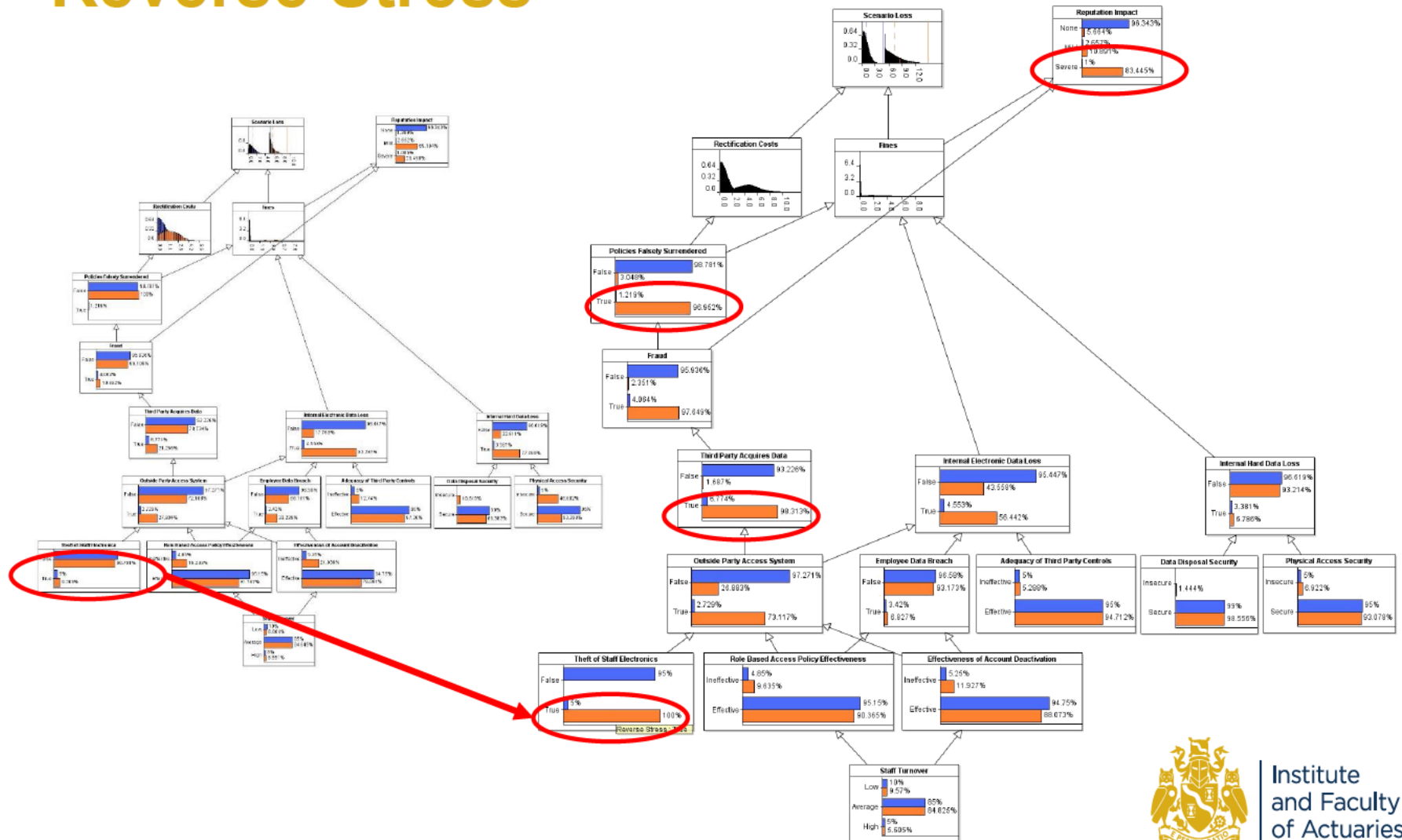


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Reverse Stress

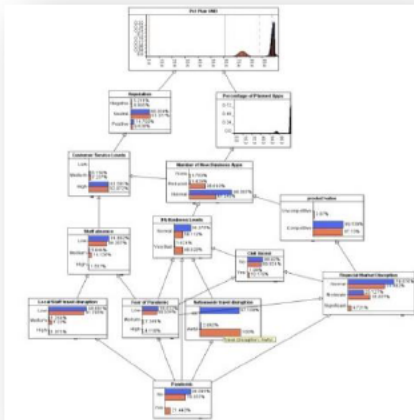


Reverse Stress

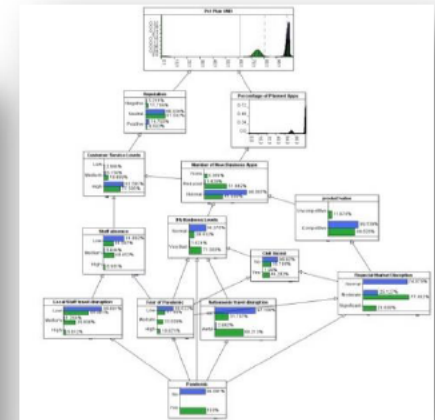


Recovering Scenarios

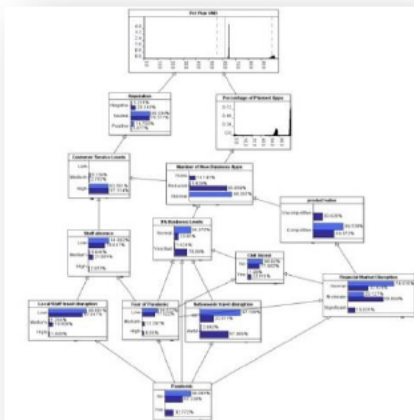
Travel Disruption



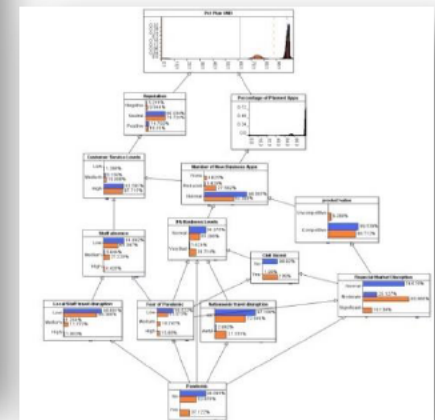
Pandemic



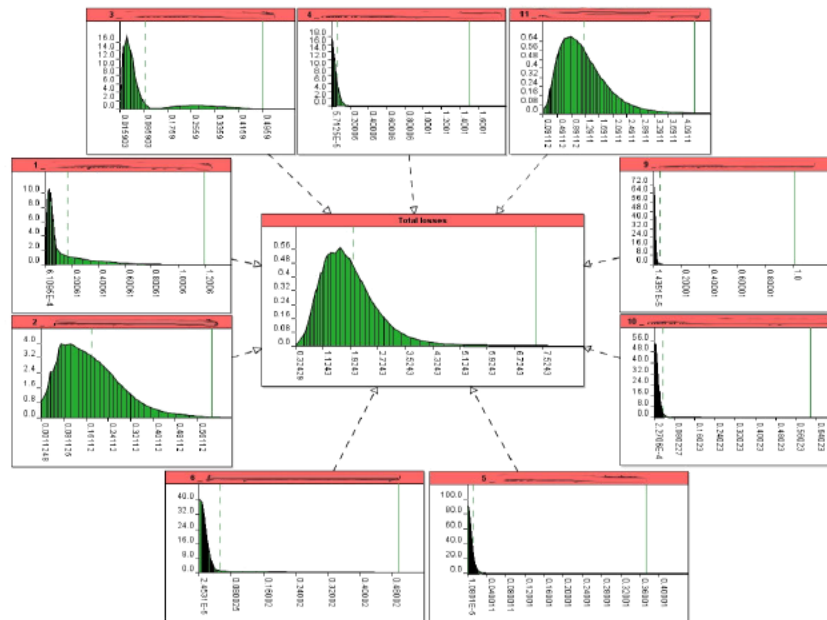
Reverse Stress



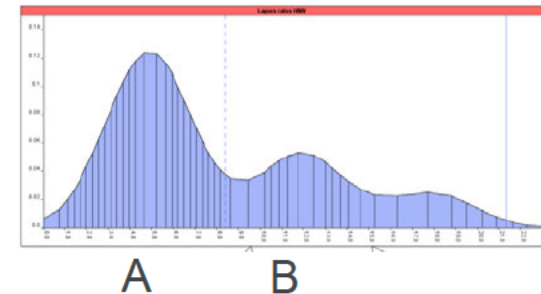
Civil Unrest



Real Features



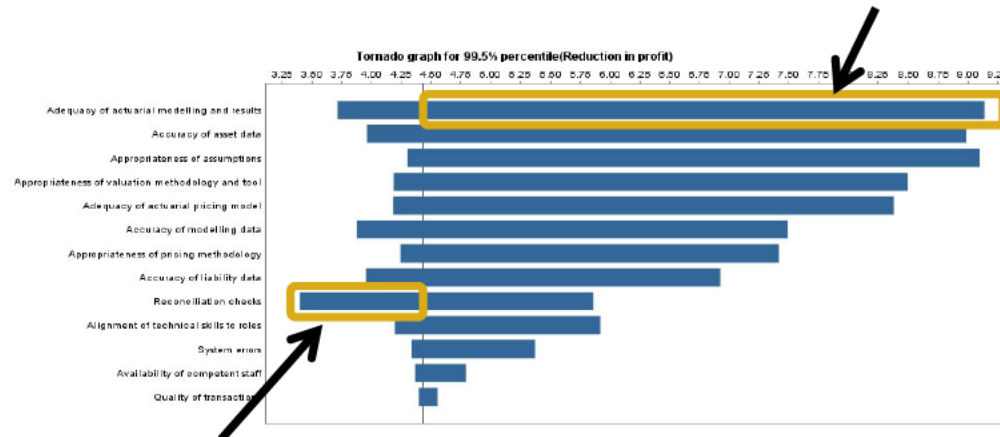
The transition from A to B will be sudden not smooth



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Asking/Answering Questions

Biggest potential to make tail worse

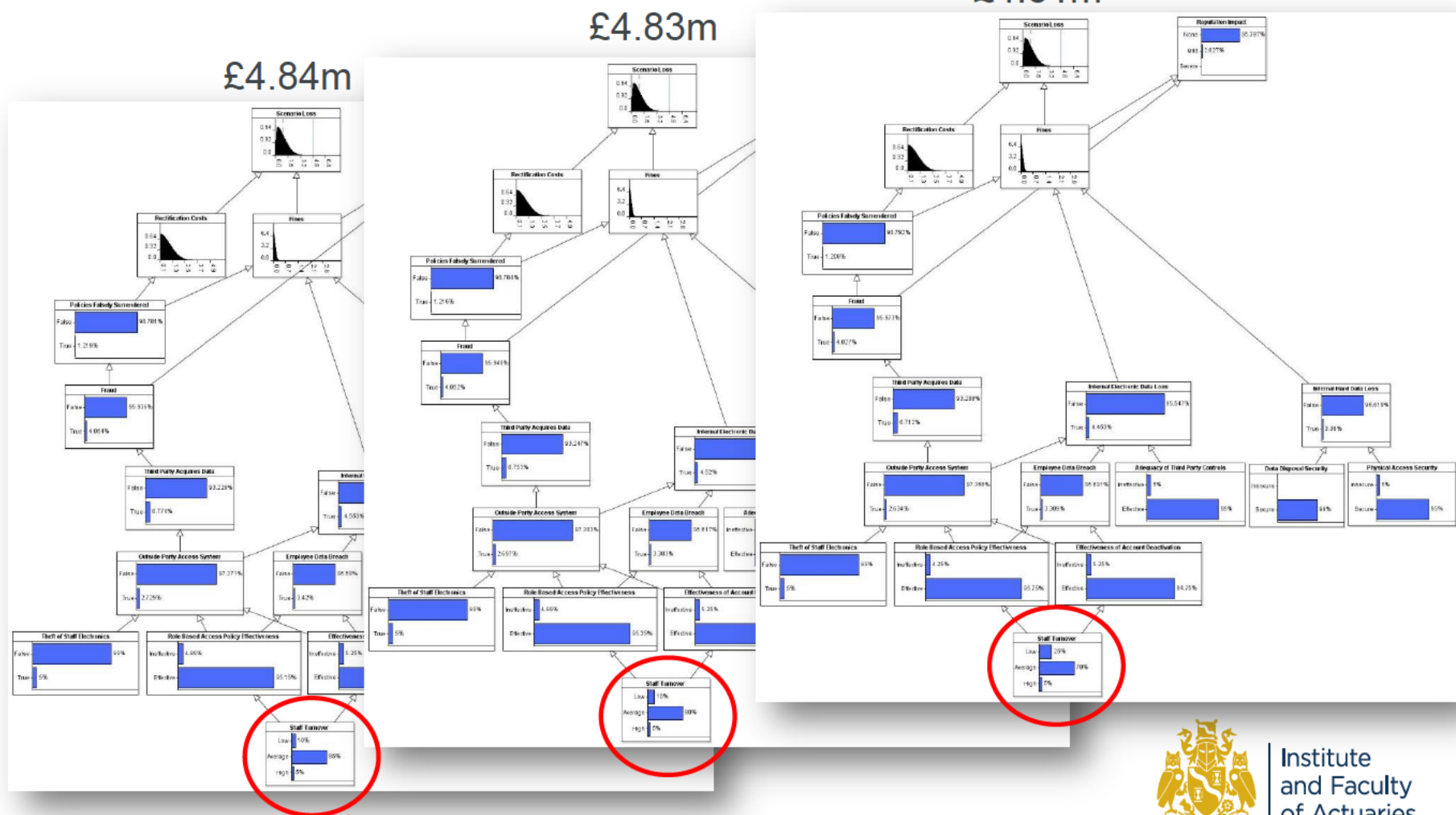


Biggest potential to make tail better



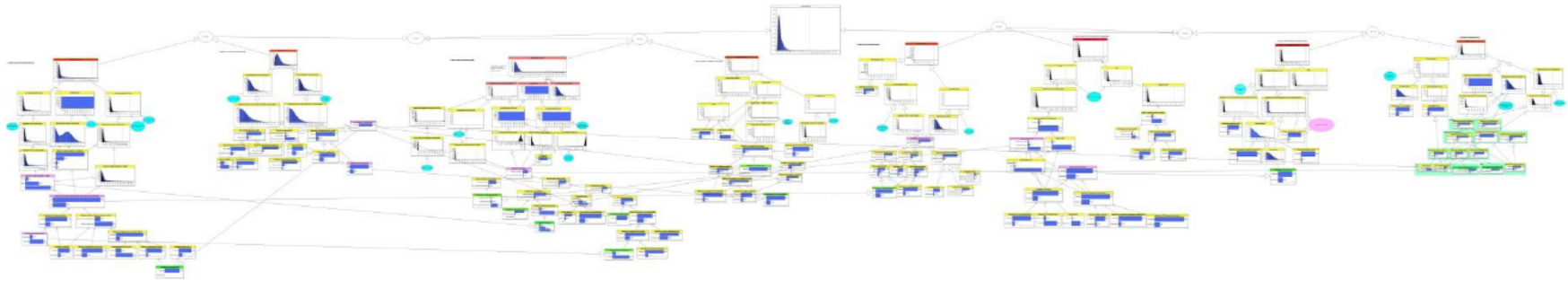
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Projecting Op Risk



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Correlation from cause

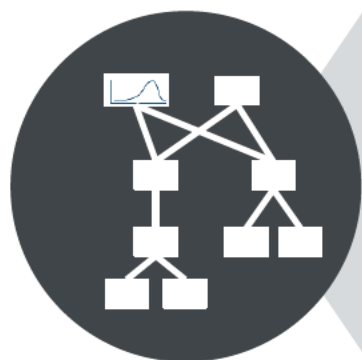


$$\rho = \begin{pmatrix} 1 & 0 & 0.02025 & 0 & 0.0043 & 0 & 0 & 0.000013 \\ 0 & 1 & -0.000001 & 0.00048 & 0 & 0 & 0 & 0 \\ 0.020835 & -0.000001 & 1 & 0 & 0.011645 & 0.044774 & 0.00211 & 0.000397 \\ 0 & 0.00048 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0.0043 & 0 & 0.011945 & 0 & 1 & 0 & 0 & 0.000007 \\ 0 & 0 & 0.044774 & 0 & 0 & 1 & 0.004908 & 0.000006 \\ 0 & 0 & 0.00211 & 0 & 0 & 0.004908 & 1 & 0.000003 \\ 0.000013 & 0 & 0.000397 & 0 & 0.000007 & 0.000006 & 0.000003 & 1 \end{pmatrix}$$



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Other Applications



Policyholder behaviours can be modelled using this approach to provide dynamic assumption setting



Dependency assumptions can be validated from first principles



Integration of soft and hard outcomes to assist with risk appetite assessment



Development of monitoring frameworks for emerging risks using Bayesian learning process



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Questions

Comments

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