ERM : Consultancy Viewpoint

Observations on Current Practice

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Society of Actuaries

Dublin, Ireland
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Breaking News

Boring in Oregon votes to pair with Dull in Perthshire

The US town of Boring in Oregon has voted in favour of "pairing" with the village of Dull in Perthshire.

Dull in Perthshire approached Boring in Oregon about forming a partnership

Boring decided for the move in the interests of trans-Atlantic relations, tourism and humour, after being approached by residents in Dull.

The decision means both places can sell novelty tourist items, get quirky road signs made and plan exchange visits.

The difference in size between Boring and Dull meant they could not officially become twin towns.

Boring has a population of 12,000 while Dull is a tiny village.

The Boring Community Planning Council voted in favour of a "declaration of pairing" after being approached by the Dull Women's Book Club.

The BBC's Alastair Leithead in Los Angeles says both settlements

Related Stories

Vote due on Dull and Boring link

Dull village seeks Boring link

Agenda

- Introduction
  - Regulatory Pressure for ERM
  - Different Approaches to ERM
- Adding Value from ERM
  - Enterprise
  - Risk
  - Management
- Current CRO Agenda Items
  - EMIR & Basel 3

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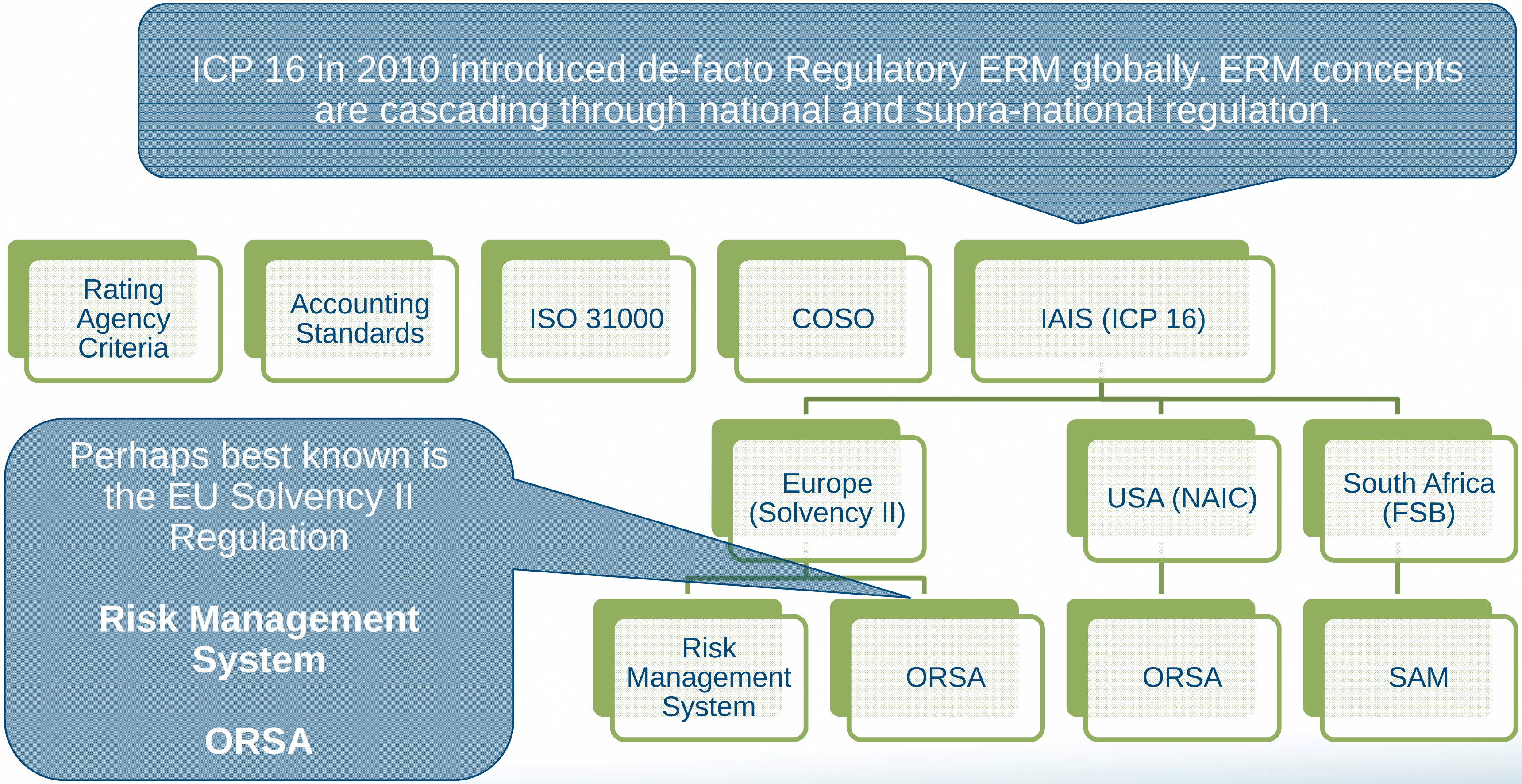
Introduction

Pressure to implement ERM



Introduction

Solvency 2 ORSA : Three Approaches

Pillar 1 is main focus as it is tangible and immediate.

Minimum compliance with ORSA.

Doing ERM because regulation requires it.

Not seen as a compliance exercise.

See ORSA as a proxy for a holistic ERM framework that benefits the insurer and adds value.

Not a function of firm size – more a function of senior management philosophy.

Pillar 1 Focussed

Compliance Focussed

Added Value Focussed

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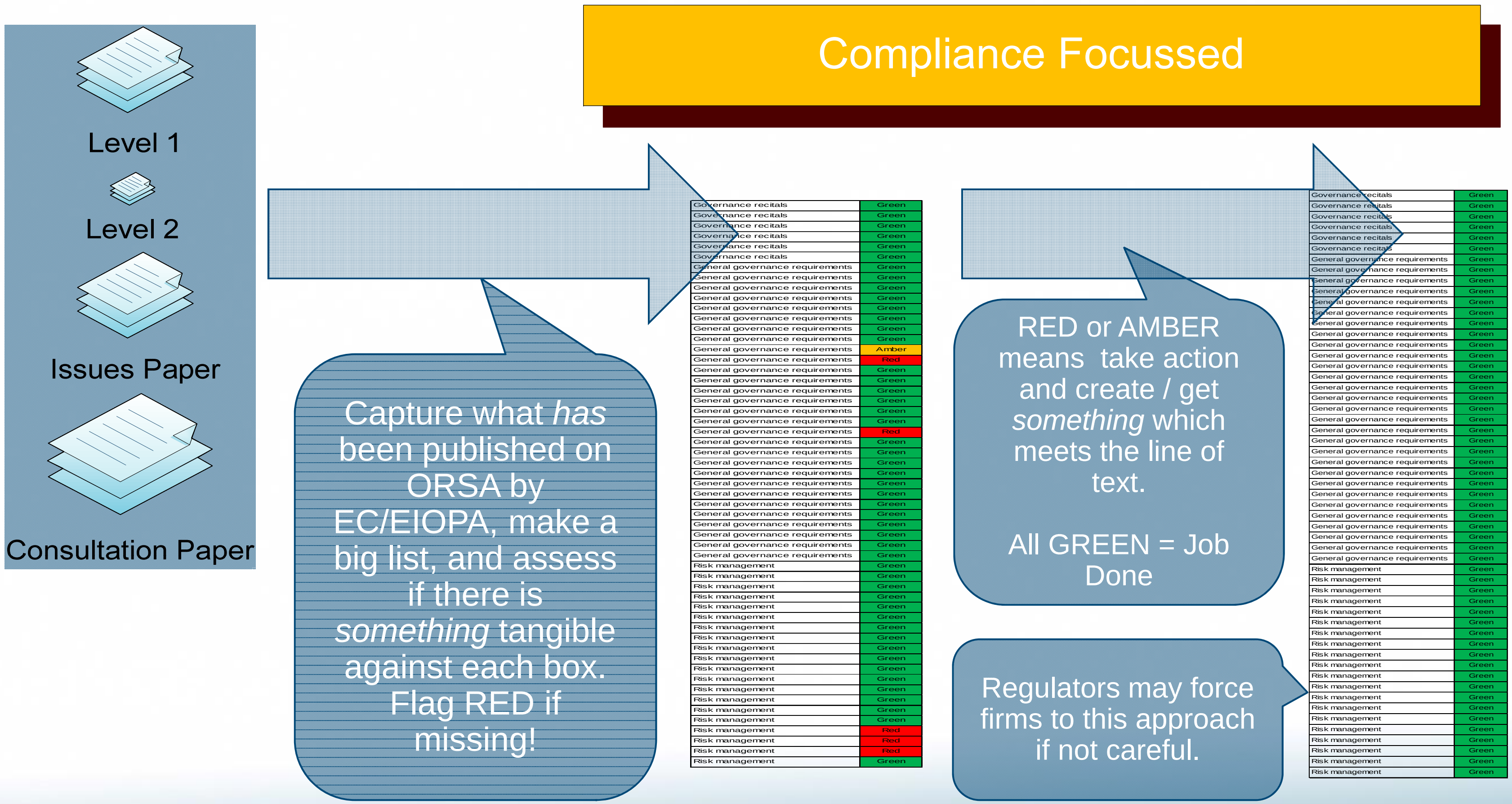
Introduction

Compliance Focussed Viewpoint



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Introduction

Breaking Apart ERM

Added Value Focussed

E R M

Enterprise

- *Who* is affected by ERM in the enterprise?
- *What* is affected by ERM in the enterprise?

Management

- Approaches to decision making.
- Considerations for embedded ERM in the organisation.

Risk

- What do we *really* mean by Risk?
- Issues with measuring Risk using Capital Models.

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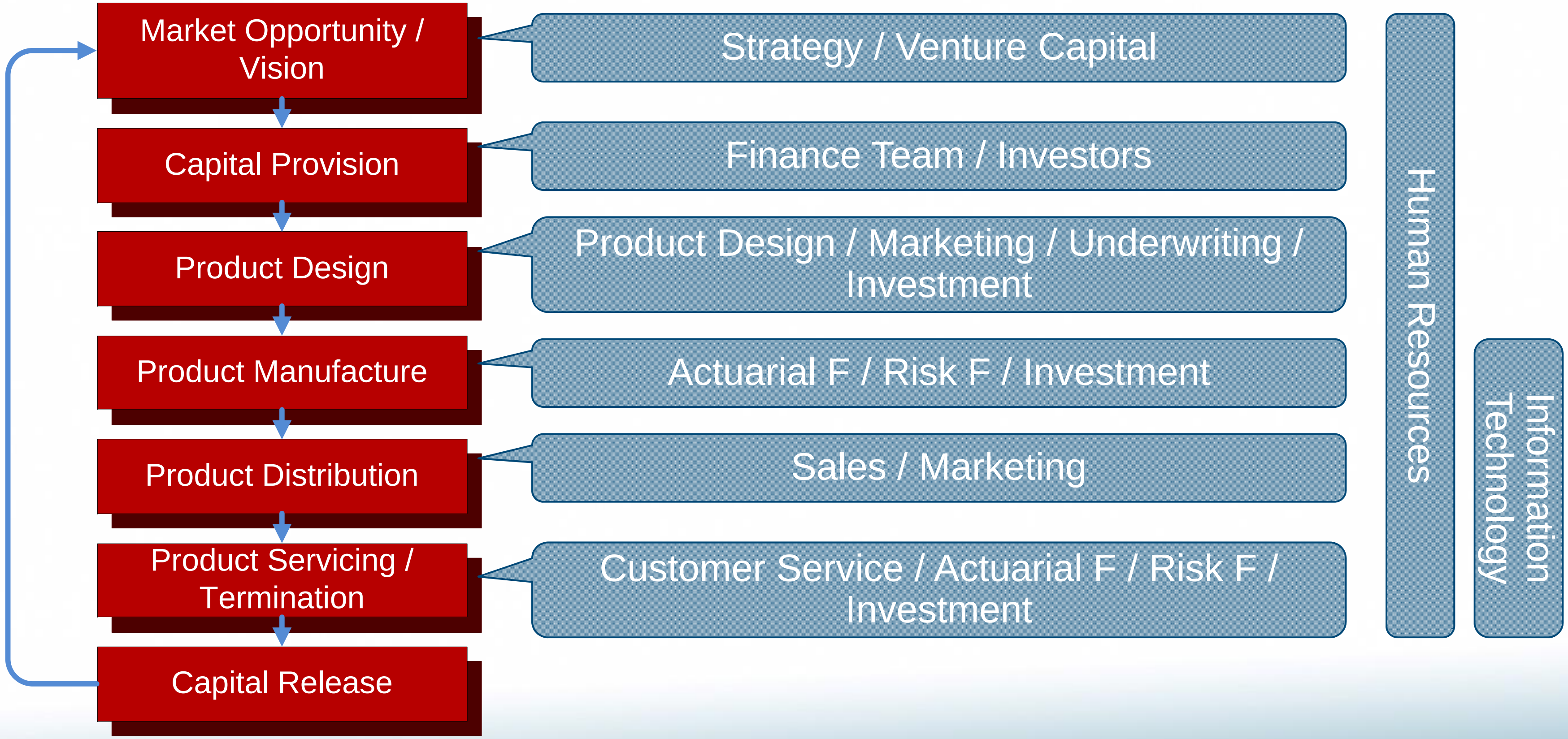
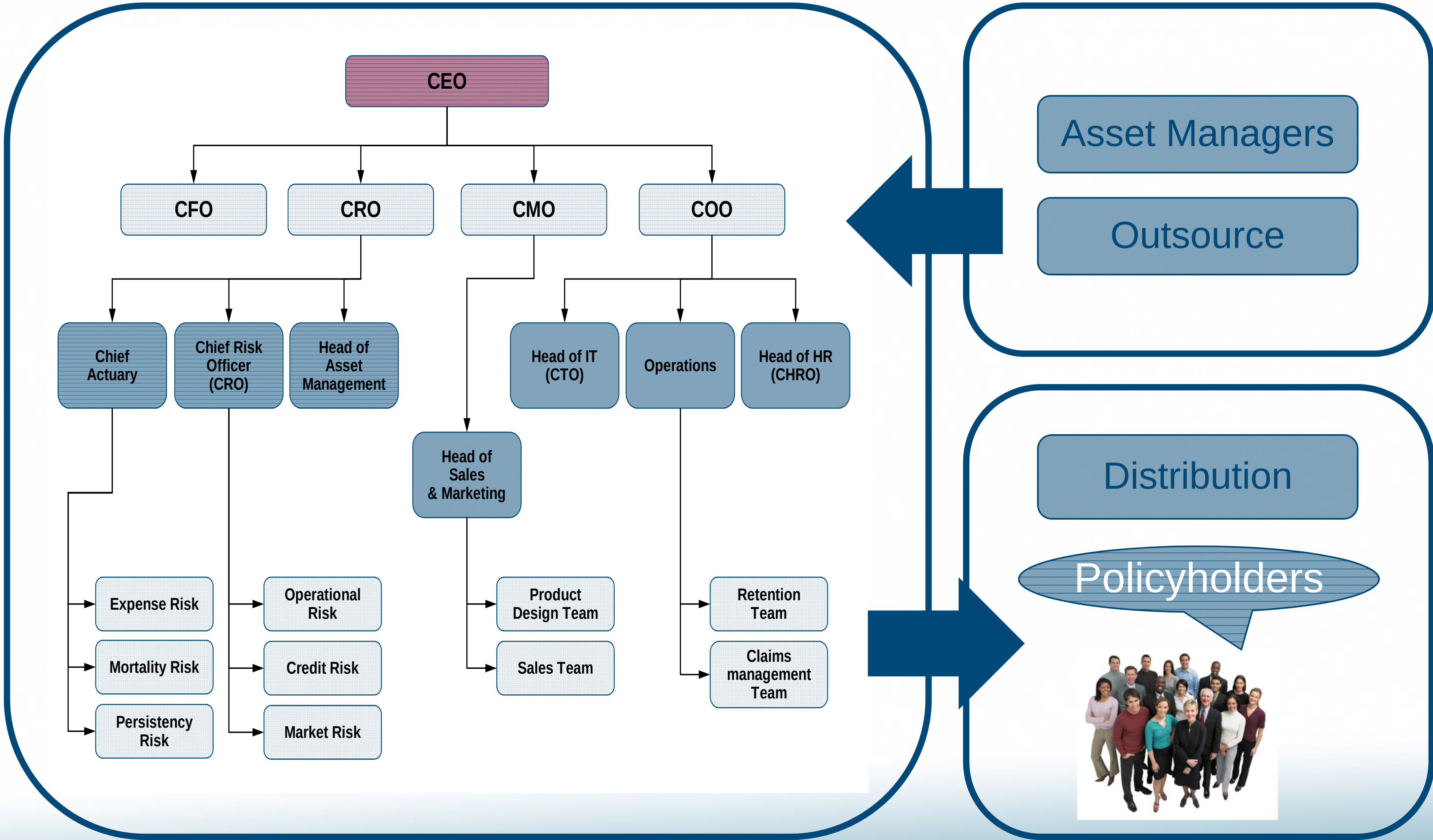
E : ERM and the Product Lifecycle

It can be helpful to map to the product lifecycle of the insurance product and consider the risk to own funds introduced at each stage.



E : Don’t Forget Extended Enterprise



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R : Types of Risks

These are the risks that an economic capital approach (internal model) would deal with.

A quantifiable risk being one that can be statistically estimated – which invariably mean using time-series data.

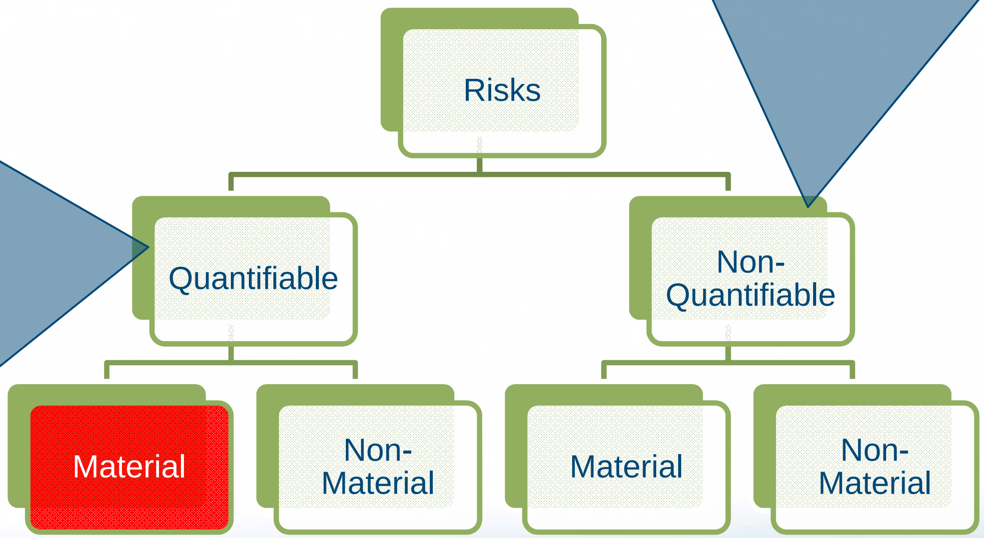
Examples:

- Market Risk
- Credit Risk
- Lapse Risk
- Expense Risk

Non-Quantifiable Risks generally considered to be those that do not lend themselves to a statistical approach or have been hard to classify.

Examples:

- Reputational Risk
- Liquidity Risk
- Strategic Risk



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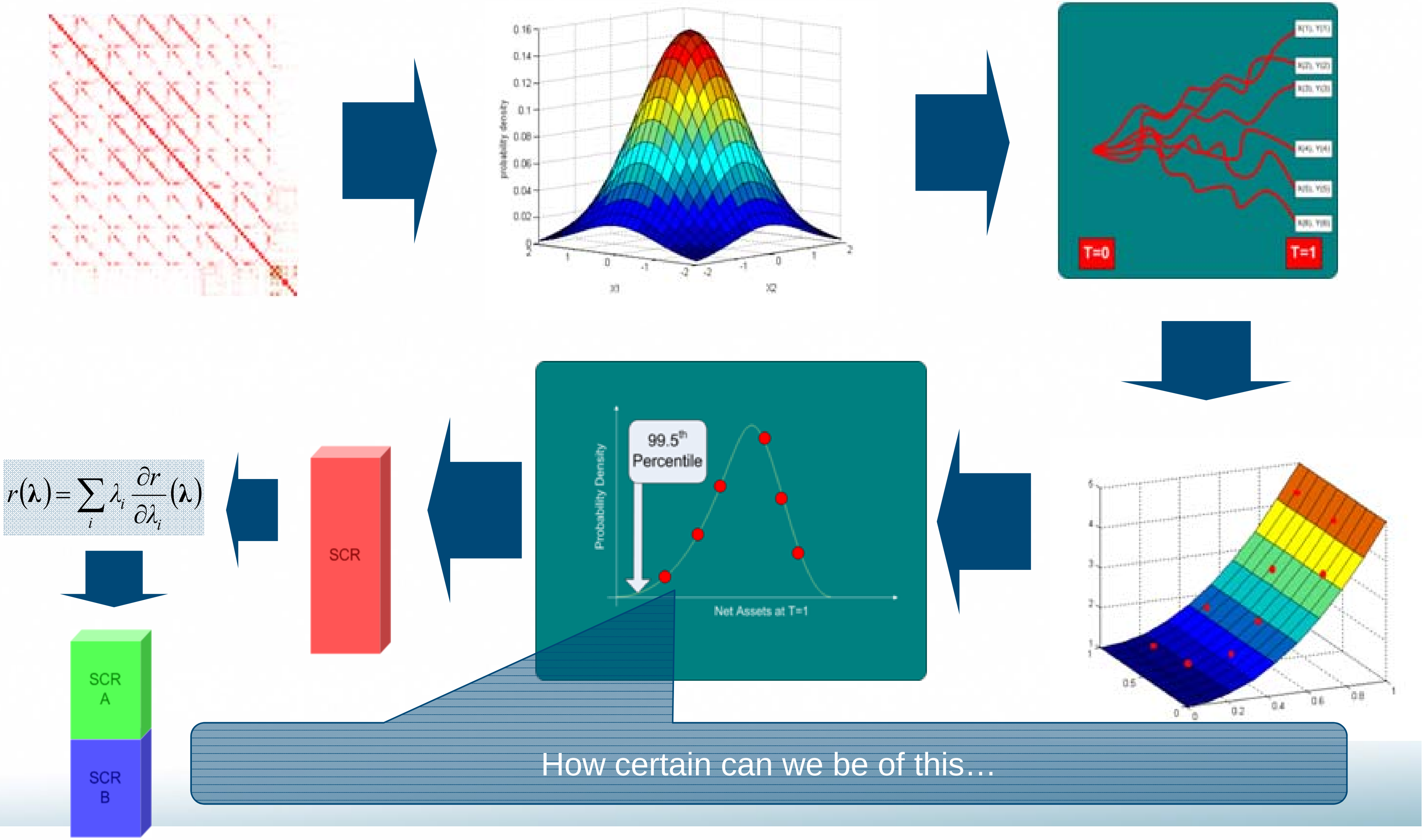
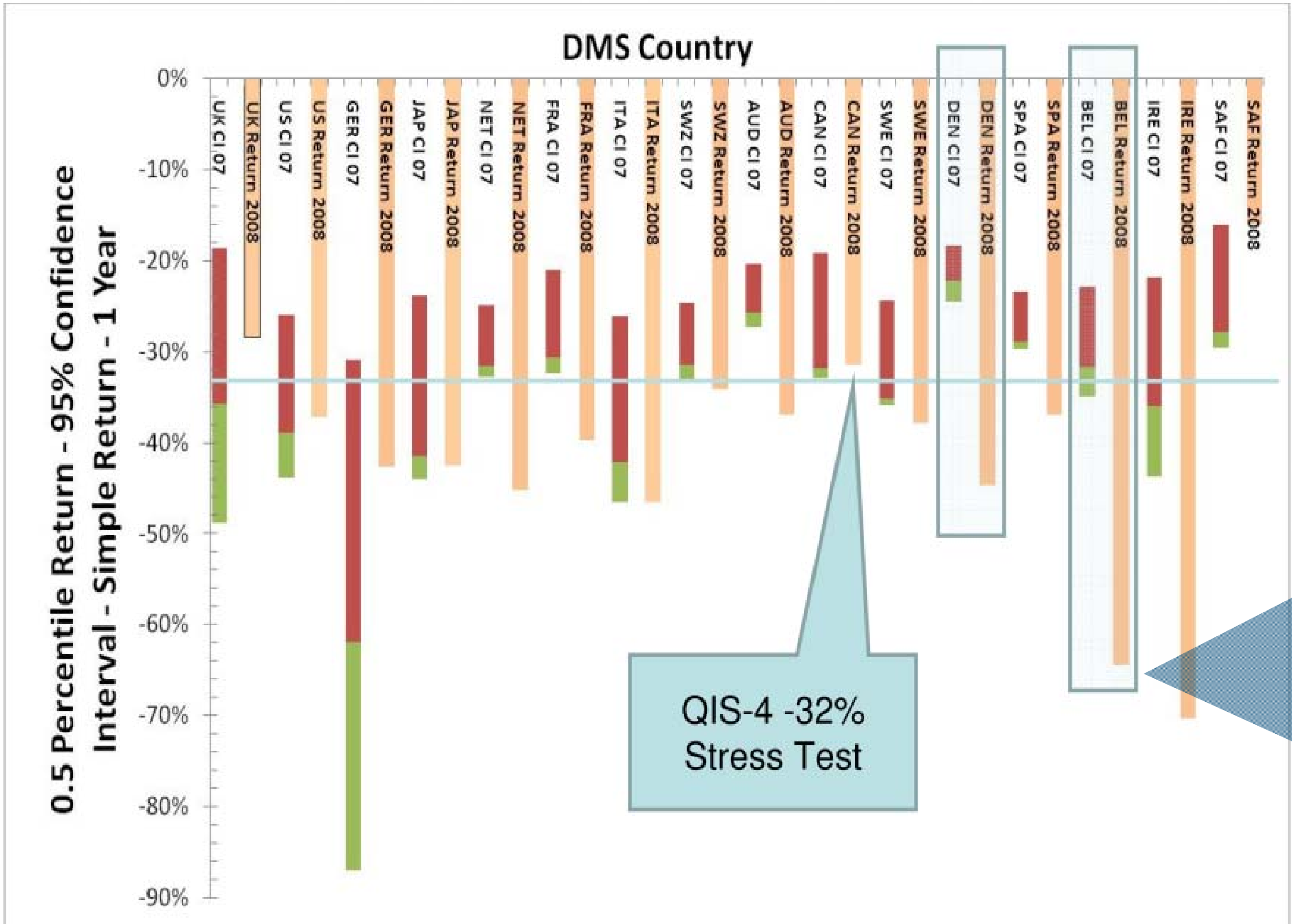
R : Economic Capital in pictures...



$$r(\boldsymbol{\lambda}) = \sum_i \lambda_i \frac{\partial r}{\partial \lambda_i}(\boldsymbol{\lambda})$$

R : Fallacy of the 1 in 200 estimate



95% Confidence Intervals for a 1-in-200 shock using data from 1900-2007 and a *frequentist* approach.

UK ACTUARIAL RESEARCH – EXTREME EVENTS WORKING PARTY - 2009

R : Fallacy of the 1 in 200 estimate

Model Error Confidence Intervals for a 1-in-200 fitting a selection of different distributions (models) to monthly data from 1970-2008

UK ACTUARIAL RESEARCH – EXTREME EVENTS WORKING PARTY - 2009

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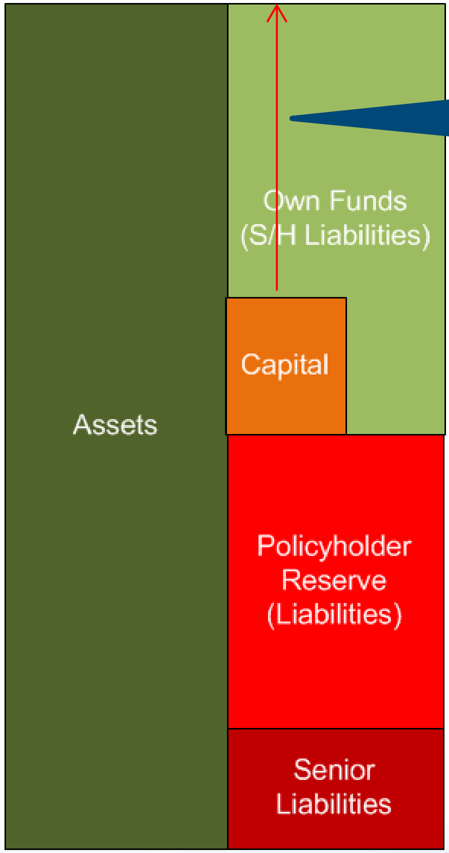
R : Economic Capital Balance Sheet

What do we really care about in Economic Capital?



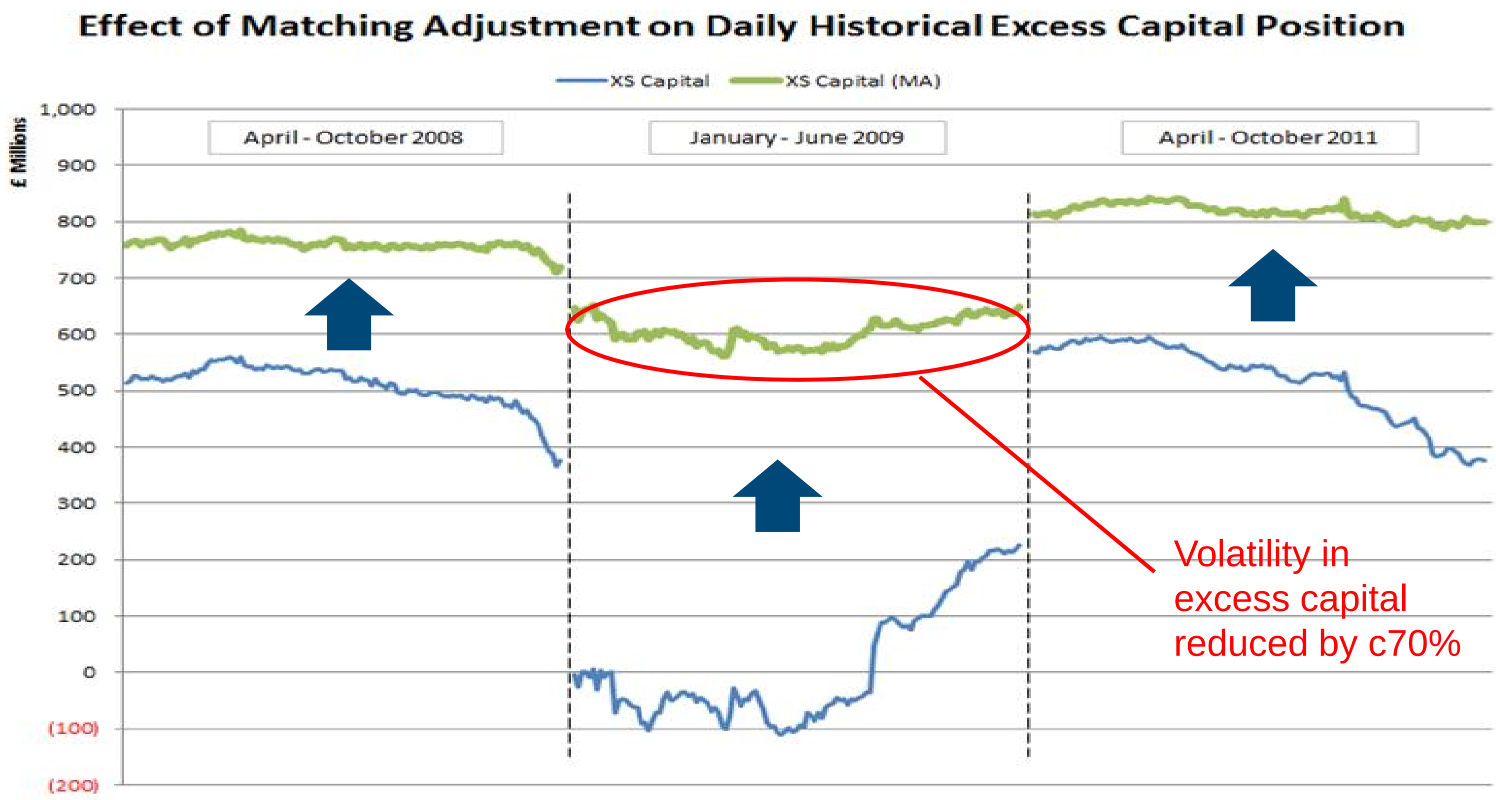
Own Funds in excess of the capital are what insurers need to control.

If you can lower the volatility of this metric – you can make a case for operating with a lower capital buffer – even within the same risk appetite.

But models typically run quarterly so can we really see the daily volatility of this metric?

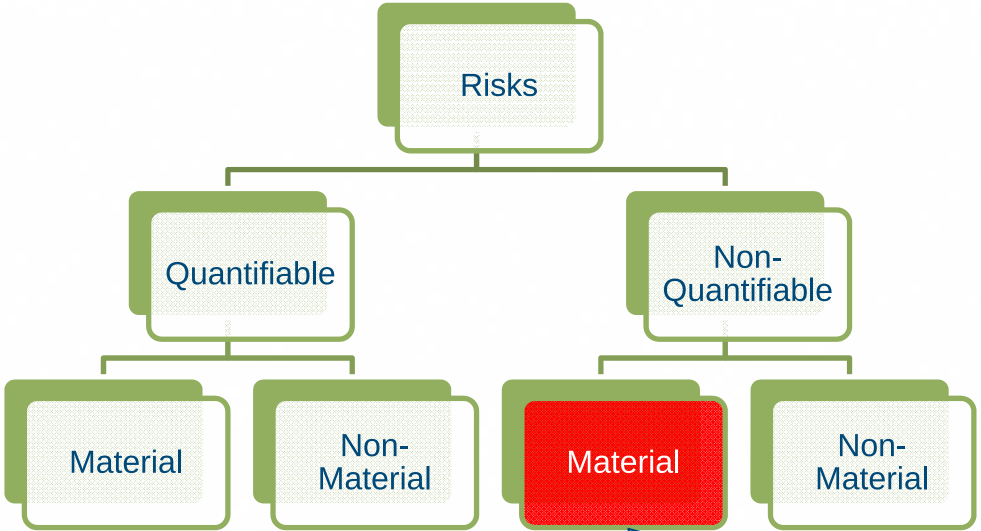
R : Economic Capital Balance Sheet

Daily Movements In Excess Capital – MA Added



Average	Month	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
	A Spread	2.23	1.98	2.05	2.24	2.34	2.67	5.28	4.99	5.11	5.06	4.27	3.57	1.77	1.80	1.99	2.08	2.39	2.85
	B Spread	7.36	6.58	6.90	8.19	8.67	9.25	17.63	17.79	19.43	17.53	14.73	13.27	4.82	4.92	5.34	5.72	7.54	8.85
	MA (Eligible)	0.49	0.42	0.42	0.48	0.51	0.60	1.23	1.24	1.24	1.25	1.08	0.91	0.39	0.41	0.45	0.48	0.56	0.68
	MA (Prorated)	0.41	0.35	0.36	0.40	0.43	0.50	1.03	1.04	1.05	1.06	0.91	0.76	0.33	0.34	0.38	0.40	0.47	0.57

R : Types of Risks



This bucket should worry us.

What if a risk is ***material*** and ***un-quantifiable***?

This means the risk is likely to be ***big*** and ***invisible*** to our Economic Capital Model.

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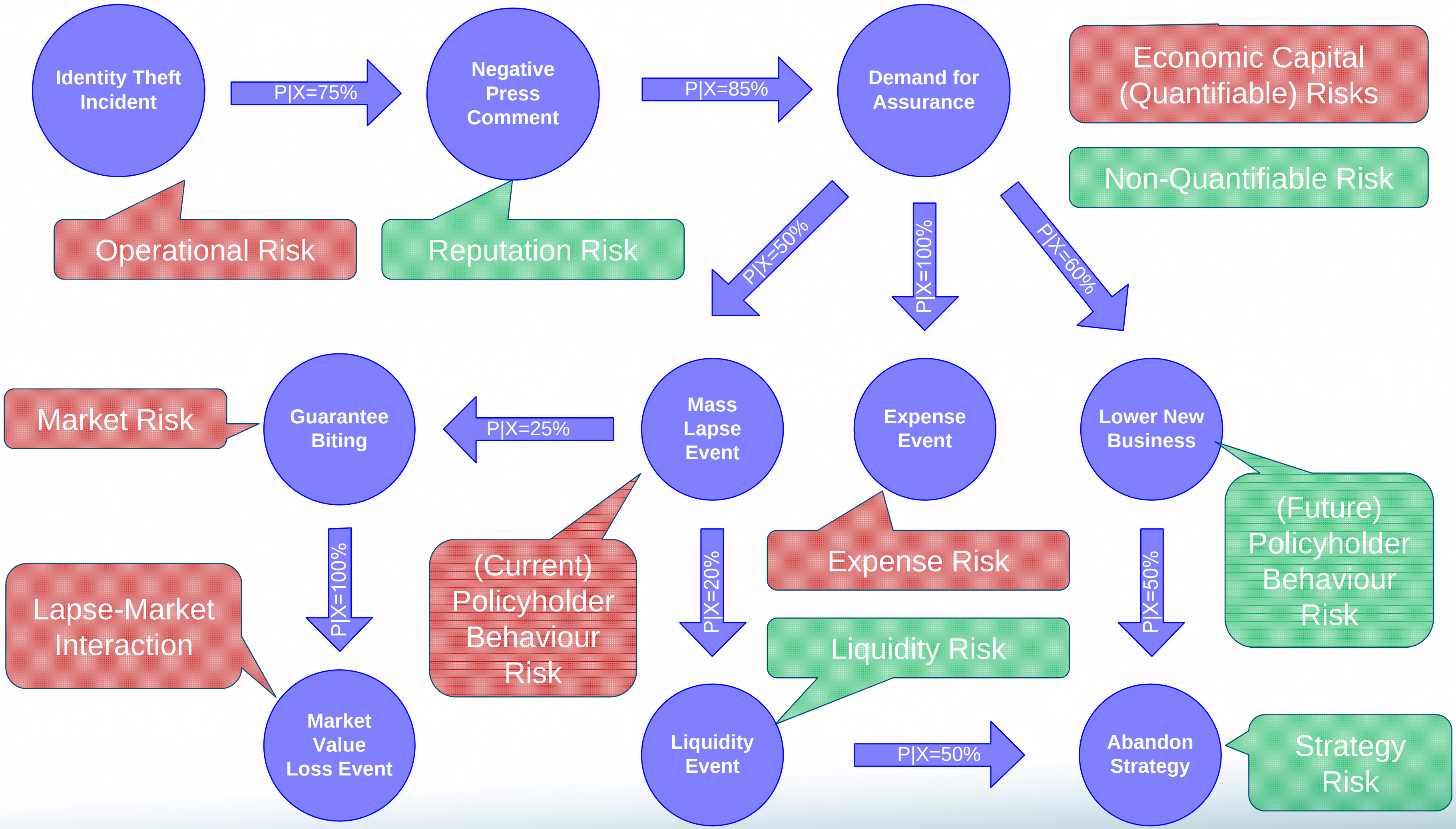
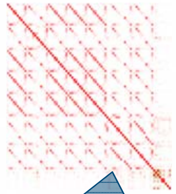
R : Quantifiable - Non-Quantifiable Risk Interaction



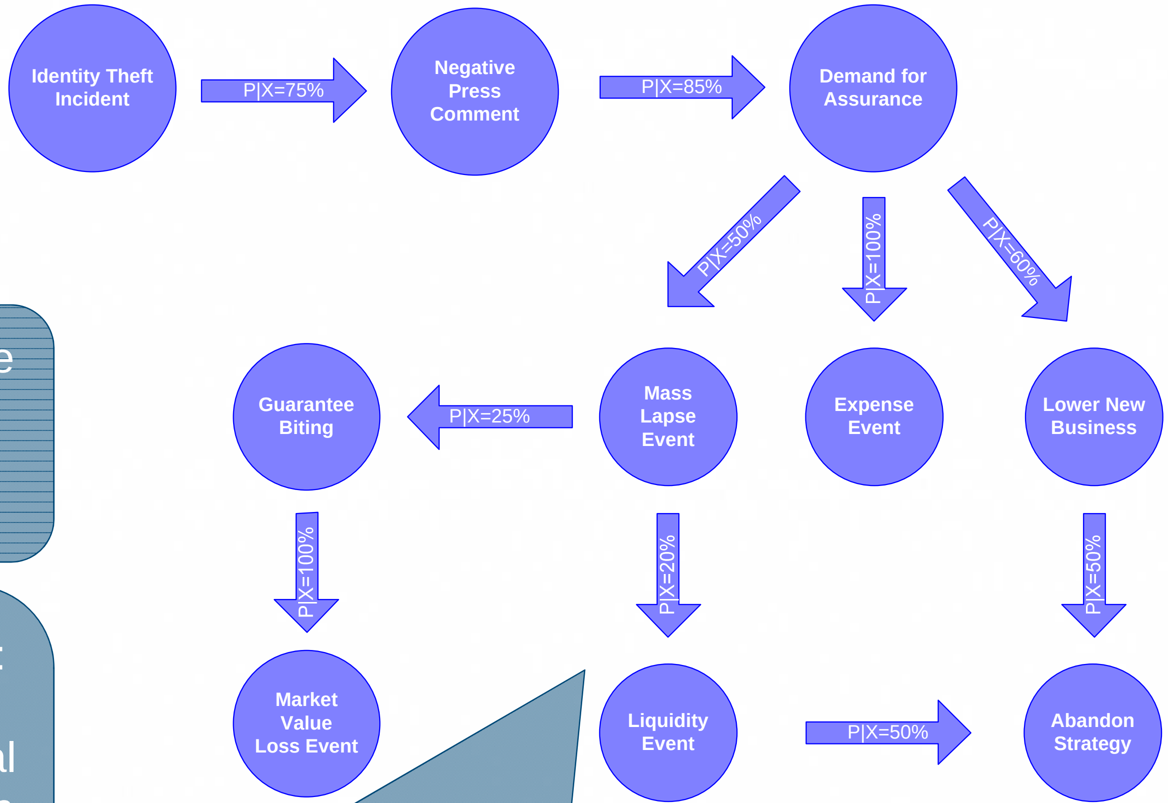
R : Associative vs. Causal Dependency



Economic Capital Models use associative measures of dependence – like this correlation matrix.

But associative dependence:

a) Needs abundant historical data for reliable calibration.
b) Has no recognition of *why* an event has occurred – only that they *tend* to happen at the same time.

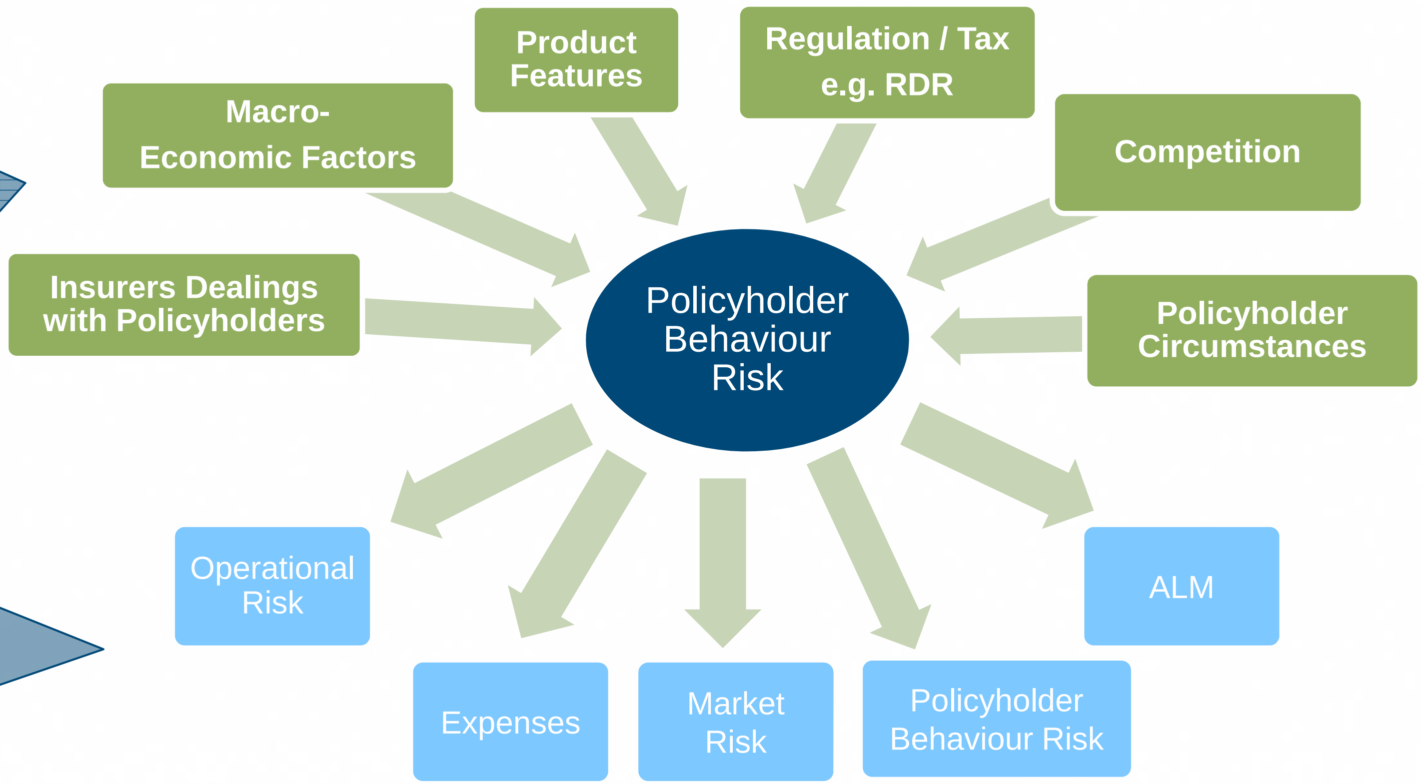


Modelling causes:
a) Helps identify solutions.
b) Helps connect market and non-market risks.

R : Causal Dependency Example

Understanding Policyholder Behaviour

Many (interacting) influences over the behaviour of policyholders suggests that the risk will need to take into account a good deal of complexity to be well modelled.



Interaction with several key areas of the economic balance sheet suggests that policyholder could be a potent driver of uncertainty in level of own funds.

Understanding how we can model policyholder behaviour better and bring in all the information an insurer has at its disposal is the subject of the second half of this presentation.

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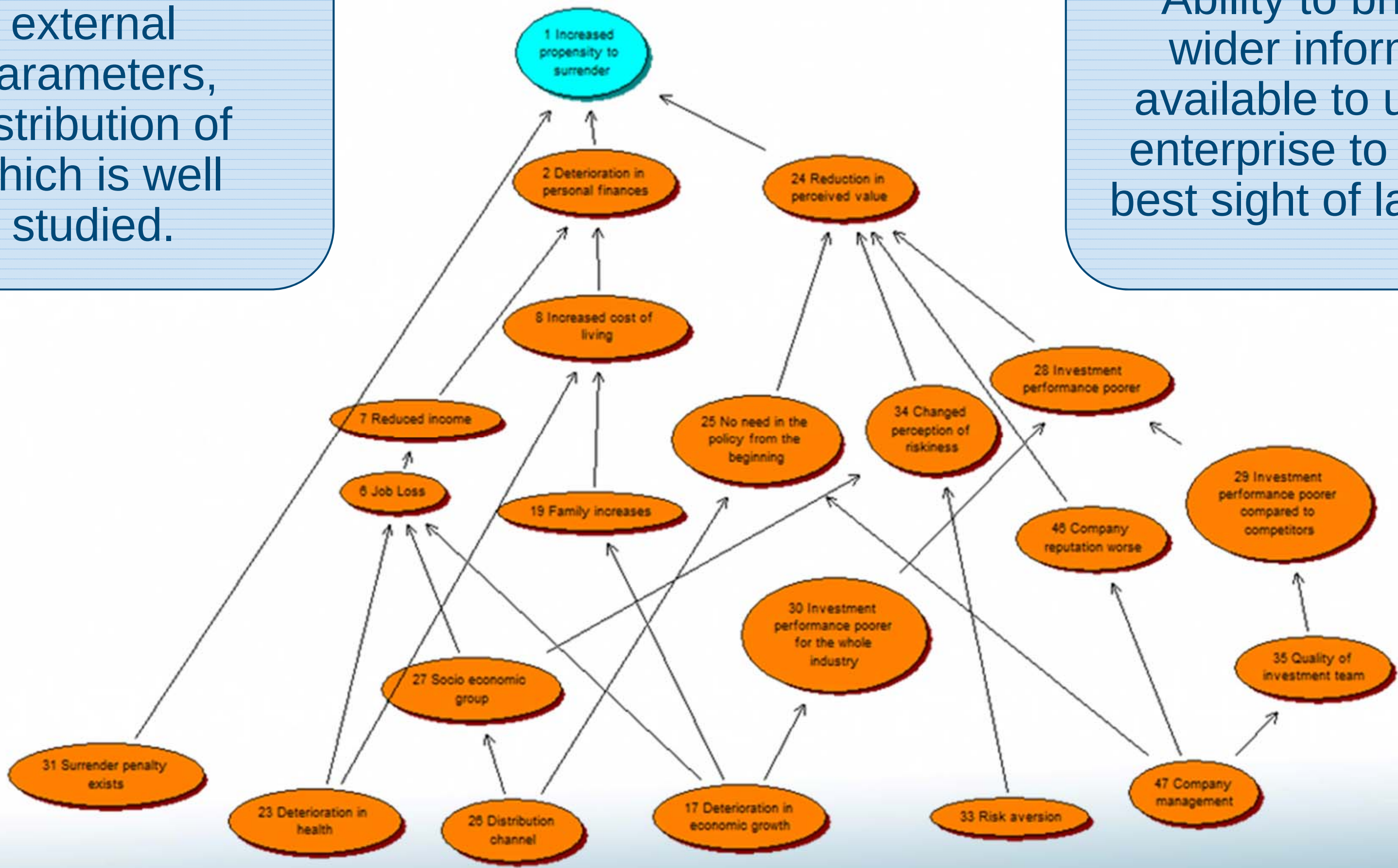
R : Causal Dependency Example (Lapse)

Applying Complexity Science

Can capture external parameters, distribution of which is well studied.

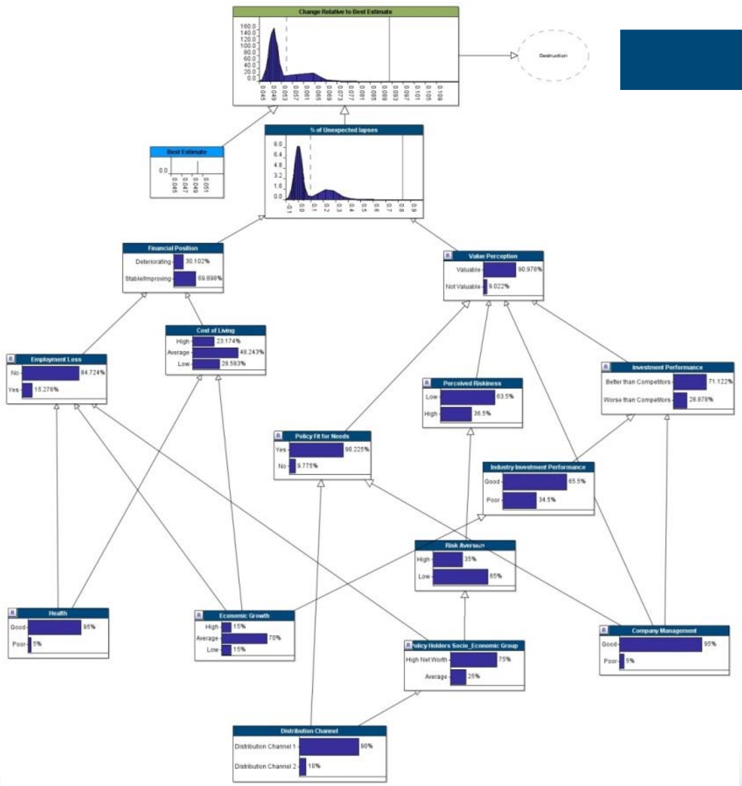


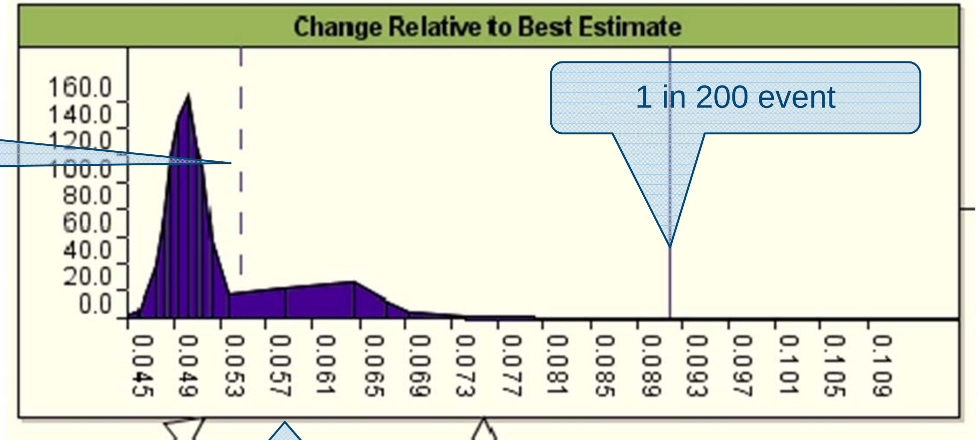
Ability to bring the wider information available to us in the enterprise to give the best sight of lapse risk.

R : Causal Dependency Example (Lapse)

Aggregated Causal Distribution

Best estimate lapse rate





1 in 200 event

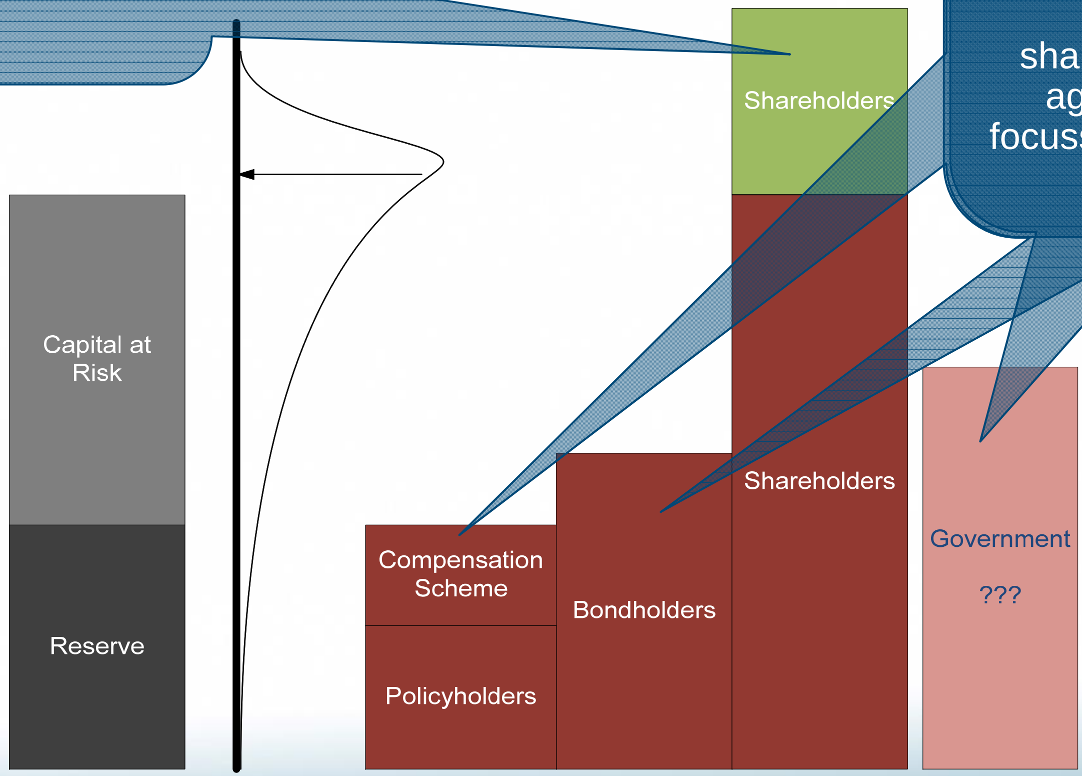
- The result of the model is the density distribution function of the lapse rates.

M : Who is this Model For Anyway?

Multiple Stakeholders

Not some many focussed on upside but upside incentivised employees and directors (e.g. sales) and shareholders will be.

Plenty of stakeholders represented by rating agencies, regulators, existing policyholders and to some extent shareholders and their agents in the board focussed on the downside risk.



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M : Risk Appetite Design

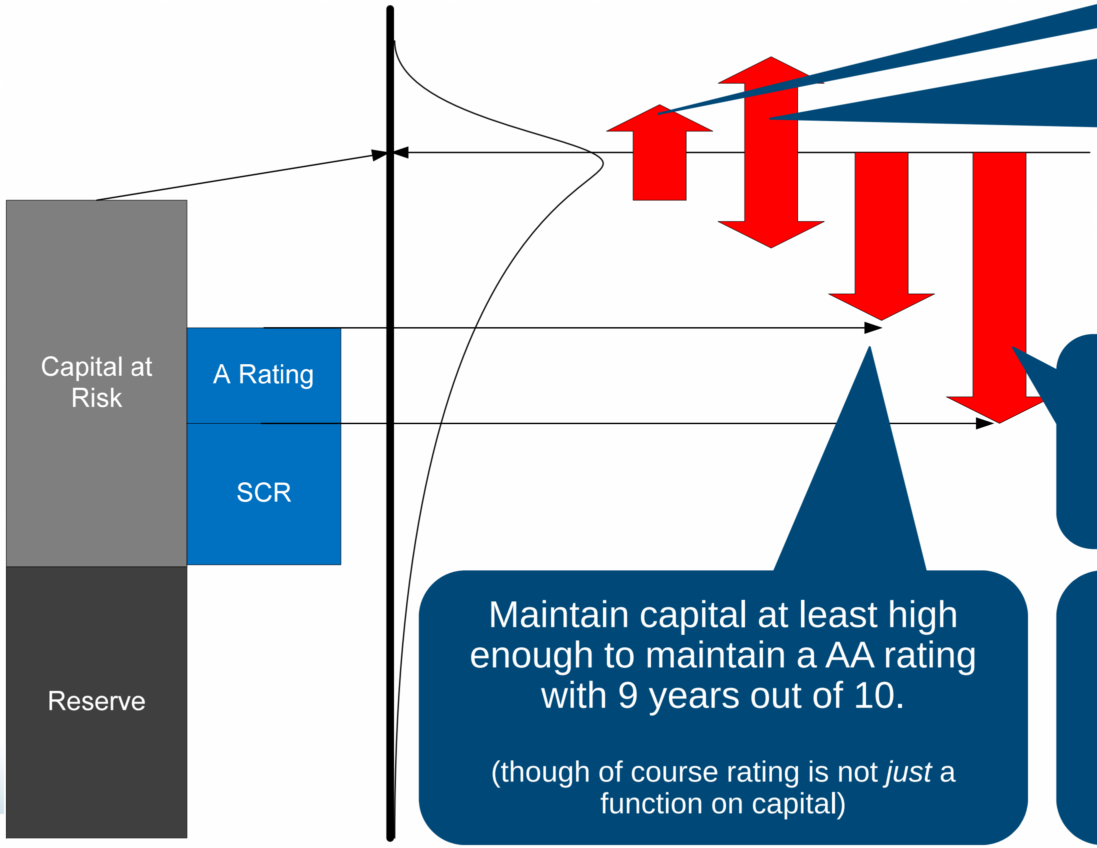
Quantitative Criteria Examples

Some statements can be mapped to the probability of future capital-at-risk (own funds).

Deliver an (economic) profit 7 years out of 10.

Ensure that economic profit and loss volatility is within a range of +/10%

(In practice P&L measures may well differ in how “economic” they are – IFRS Earnings, EEV Earnings are often referred to.)



Avoid regulatory intervention due to a capital requirements breach.

(typically *any* regulatory intervention is considered undesirable)

Maintain capital at least high enough to maintain a AA rating with 9 years out of 10.

(though of course rating is not *just* a function on capital)

These statements may well impose some tough constraints on the distribution of Capital at Risk. There may need to be push-back from finance / risk on what is achievable.

M : Linking 3 Important Tests

This is where the M of Management takes place.

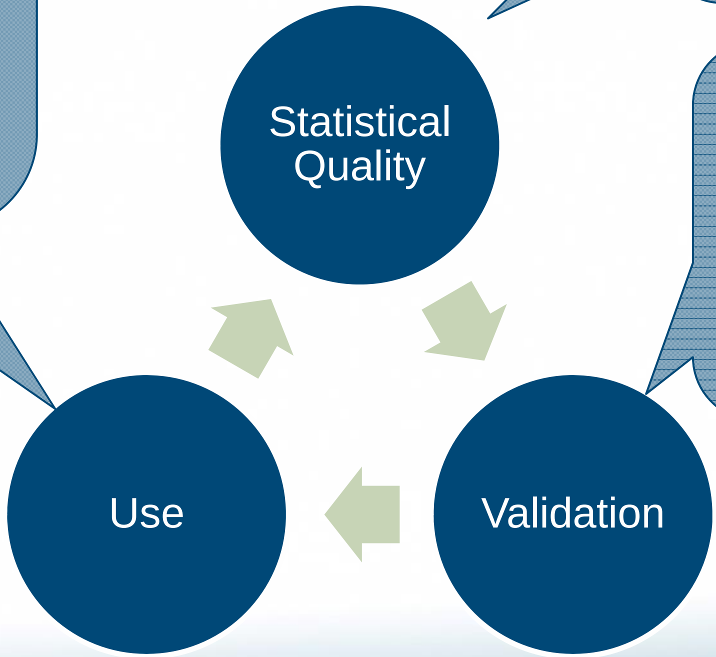
For us to pass this we need to show that the people making (big) decisions in the organisation are using the risk management systems and the models.

Easy?

We should all be well versed in this ... even if we are realising it is just revealing the extent of Expert Judgement in our models and reinforcing the need for the RMS as well as the model.

How many people get excited by this one?

Maybe we should reconsider the role of validation?



M : Better Model Validation

There is much validation focus on this paragraph on Level II

We have seen a great deal of emphasis on this aspect of validation – the peer benchmarking exercise. Often this has been placed at the centre of validation exercises.

Reasons include reference to this line of Level 2 and past experience of FSA benchmarking.

(3) The validation of the actuarial and statistical methods referred to in Article 121(2) of Directive 2009/138/EC shall be based on:

(a) current information, taking into account, where it is relevant and appropriate, the actuarial progress and the generally accepted market practice;

(b) a detailed understanding of the theory and assumptions underlying the methods.

However we would argue that the value-add and the primary purpose of validation is to focus on (3)(b) and develop a deep understanding of the theory, assumptions underlying the methods – and above all – their limitations.

M : A Tale of Two Directors

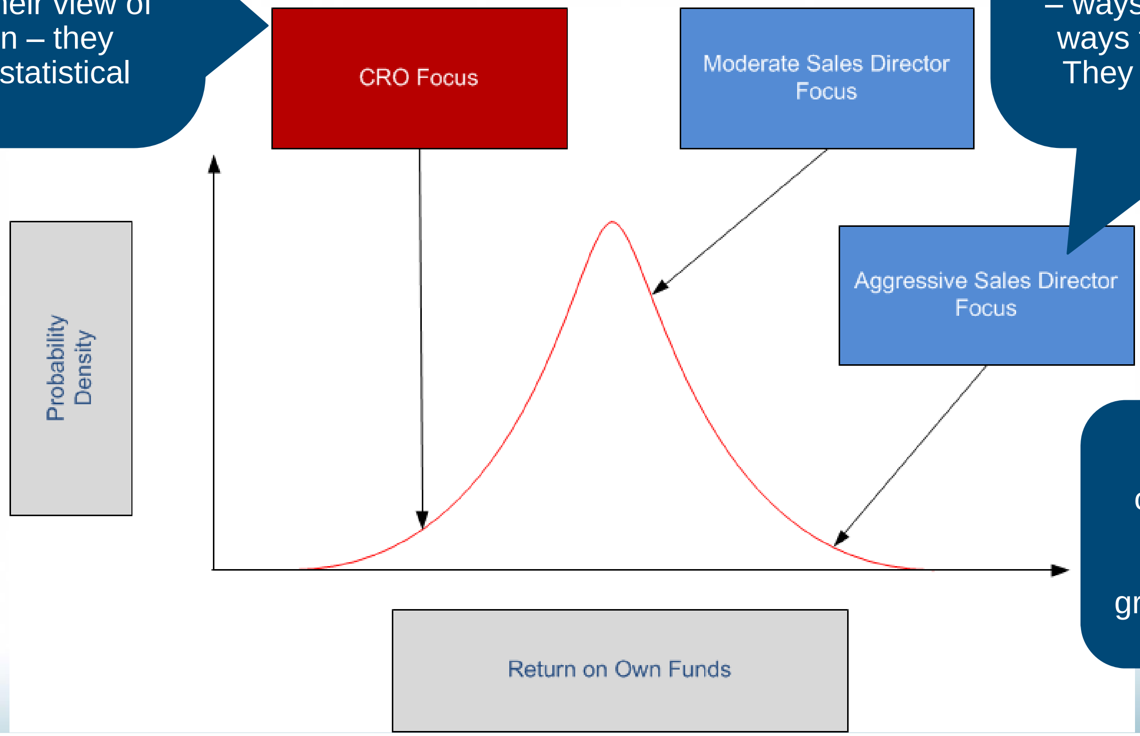
Sales Director and the CRO

Risk is a downside phenomenon – so “risk culture” will seem natural to a CRO. A CRO may not even seen it as distinct from organisational culture.

The CRO tends to focus of (past) data to form their view of what could happen – they naturally occupy a statistical domain.

Opportunity is an upside phenomenon – so “opportunity culture” will seem natural to Sale Directors.

Sale Directors tend to focus on the opportunity of real options – ways to get market share – ways to open new markets. They occupy a speculative domain.



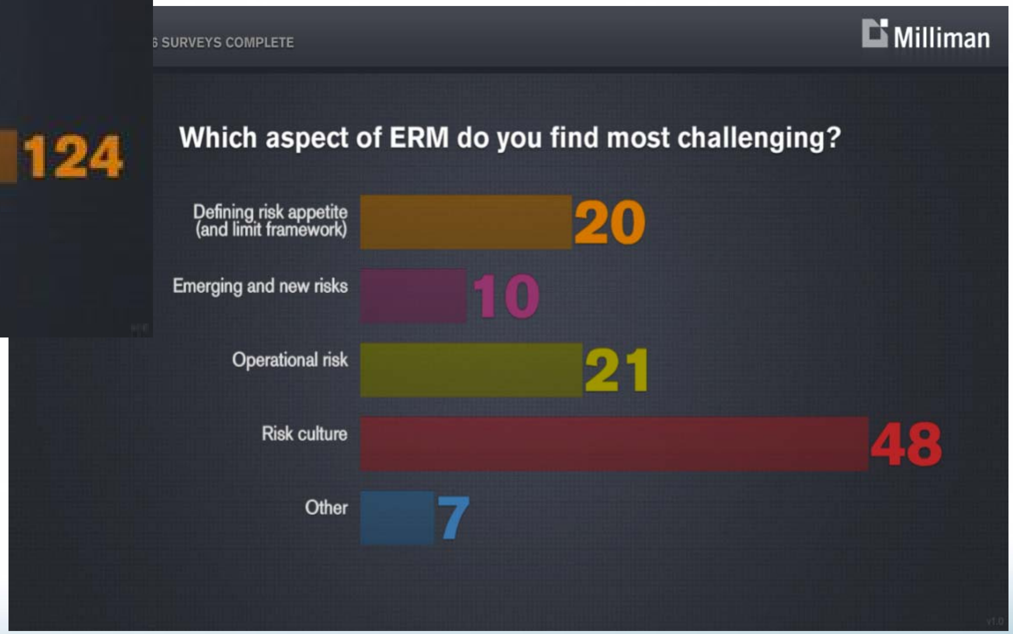
We could have used other directors such as CIO or CFO – but the Sales Director offers greatest contrast to CRO.

M : Risk Managers and Risk Culture

Results from a recent survey on CRO / Actuarial Hot Topics

Note: Respondents were actuaries and risk managers. They (we) are not unbiased observers.

Source: Milliman iPad survey at UK Actuarial Profession Life Convention 2012



Source: Milliman iPad survey at RiskMinds Insurance 2013, Amsterdam

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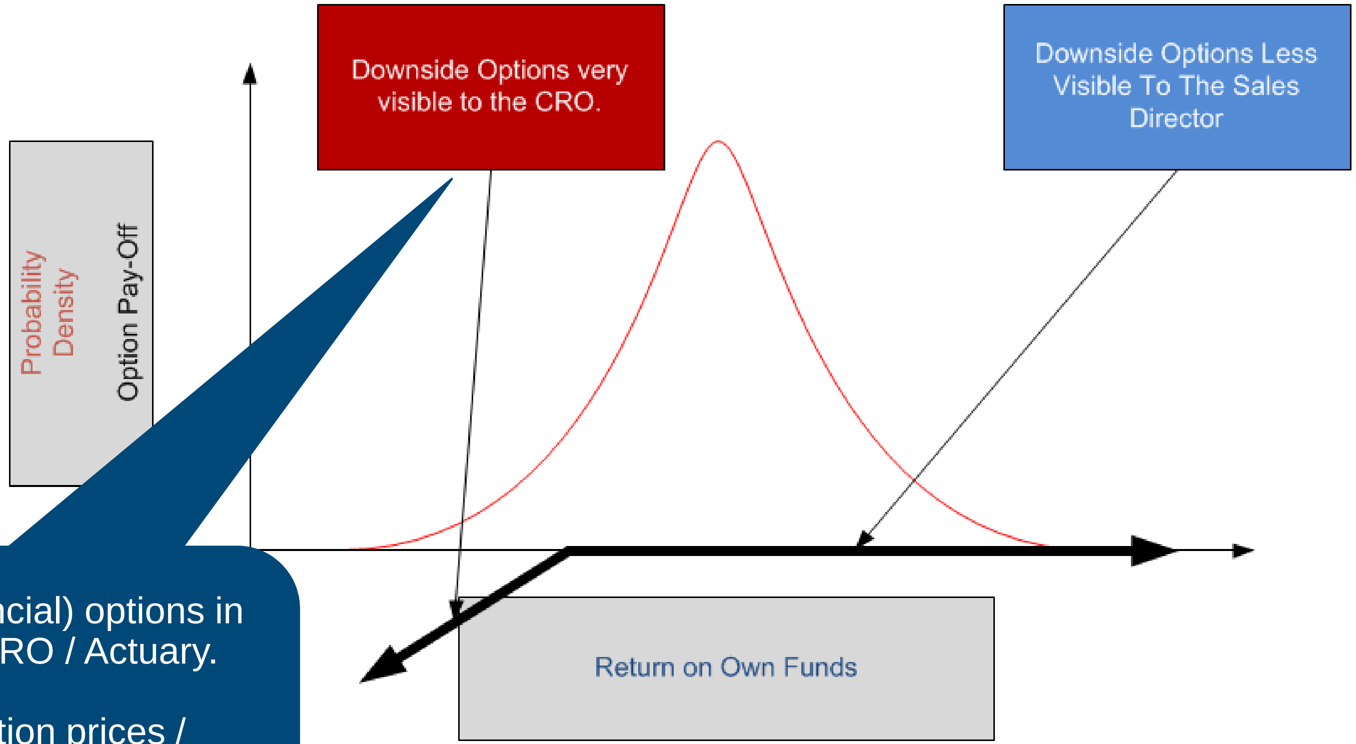
M : CRO (Option Perspective)

The world is full of (downside) put options.

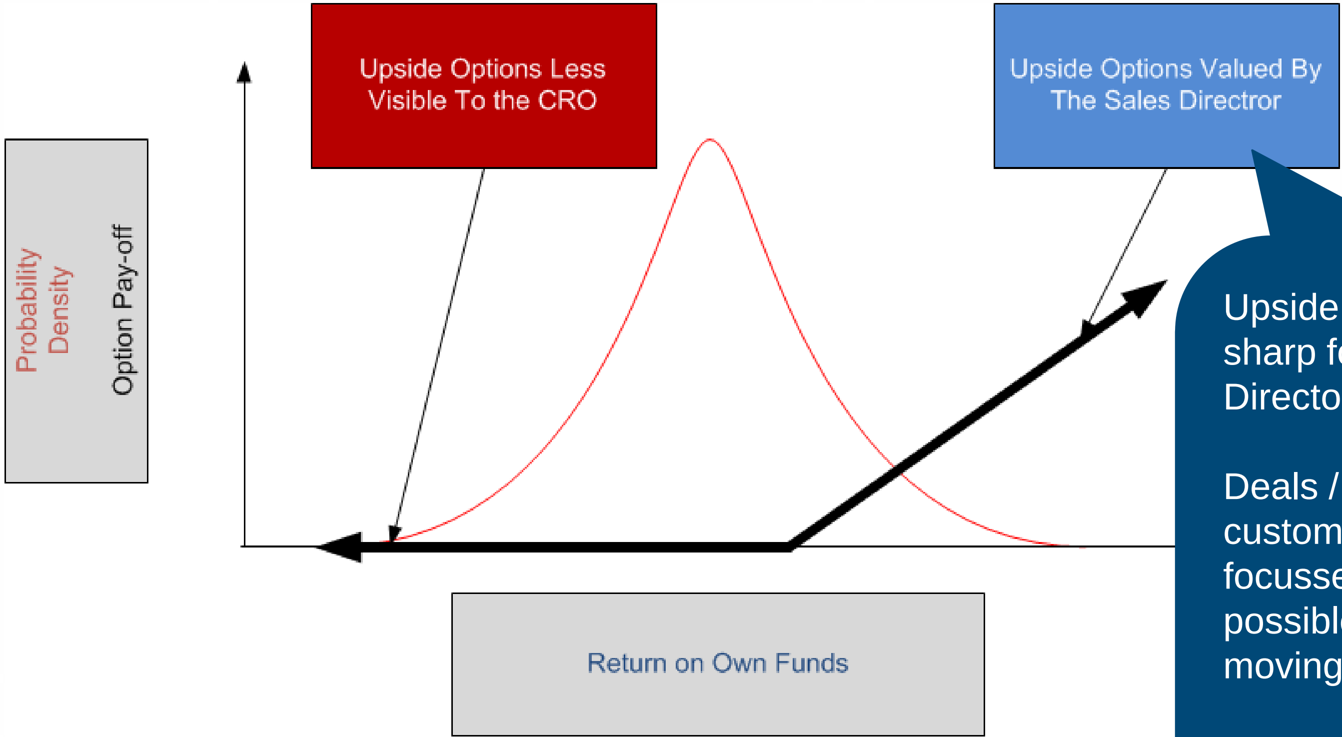


Downside (esp. financial) options in sharp focus for a CRO / Actuary.

Historic data / option prices / conservative assumptions are focussed at not undercooking the value of the downside puts.

M : Sales Director (Option Perspective)

The world is full of real (upside) (real) call options



Upside (esp. real) options in sharp focus for a Sales Director.

Deals / relationships / customer focus groups are focussed on uncovering all possible upside options and moving them into the money.

Many (not all) decisions are made here – this is the use domain.

M : A Better Use for Model Validation

Reconciling Statistical and Use Domains (Not Just For Compliance)

CRO

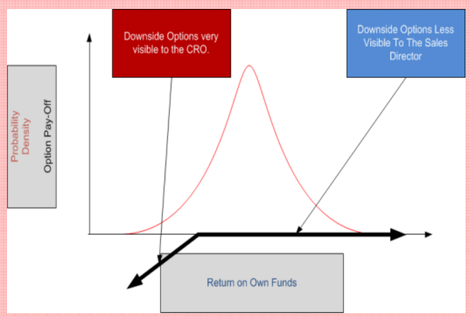
CEO

Sales Director

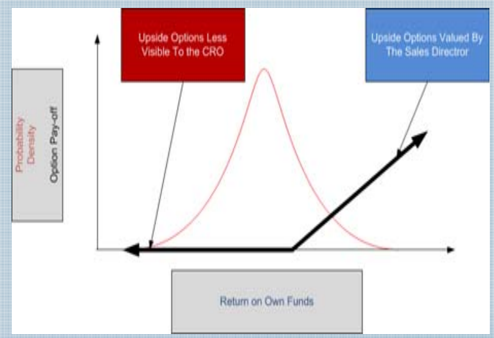
Statistical Quality

Validation

Use



Validation is the links from the statistical domain model to the usage domain. Validation has the capacity to build trust with internal stakeholders.



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M : Decision Making Approaches

DMUU still believes that there is one optimal truth if only we can find it. I separate risk and uncertainty to distinguish whether we claim to know the distribution of the outcome (Risk) or not (Uncertainty).

Making decisions based on the best estimate – more common than one would like to think.

DMUC
- Decision making under certainty

DMUU (Risk)
- Decision making under risk.

DMUU (Uncertainty)
- Decision making under uncertainty.

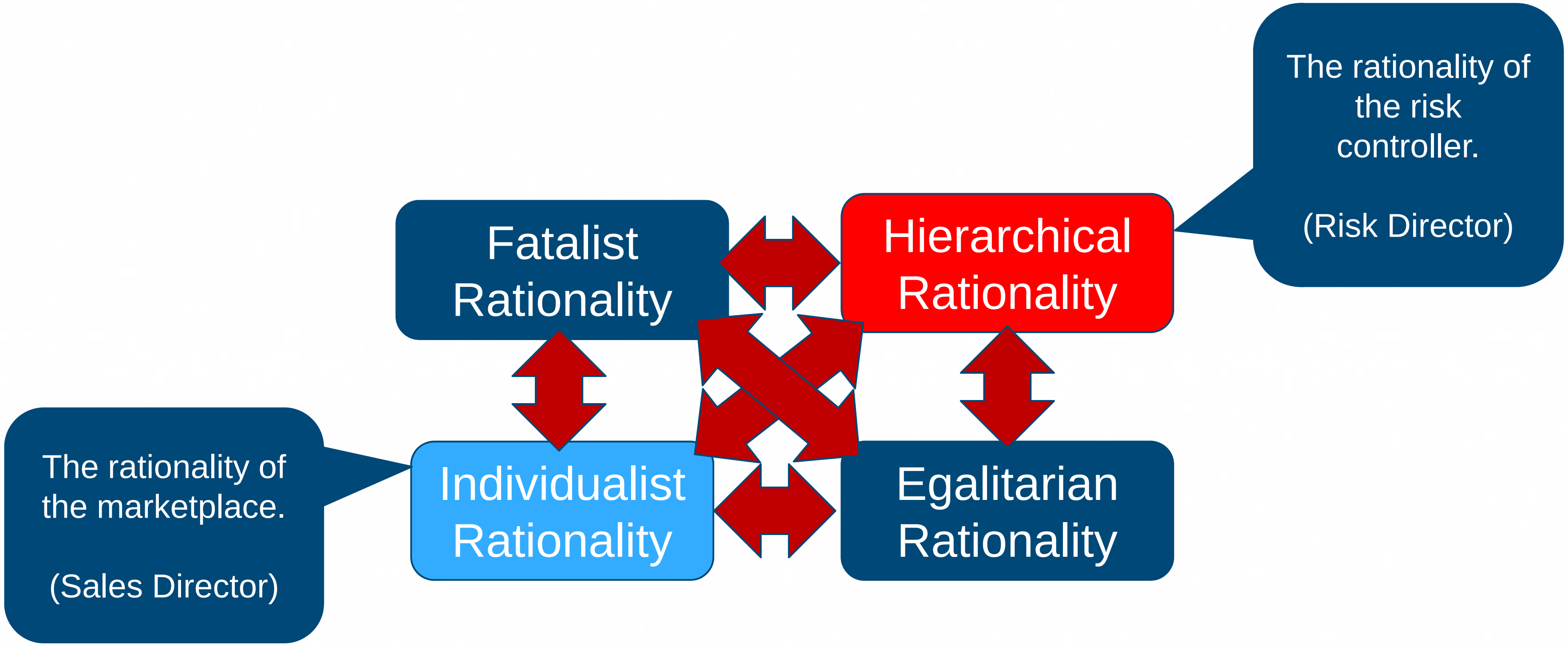
DMUCC
- Decision Making under Contradictory Certainties

What if there are fundamental differences of view or constraints on resource / time in making the decision?

How do optimal decisions get made then?

M : Lessons from Anthropology

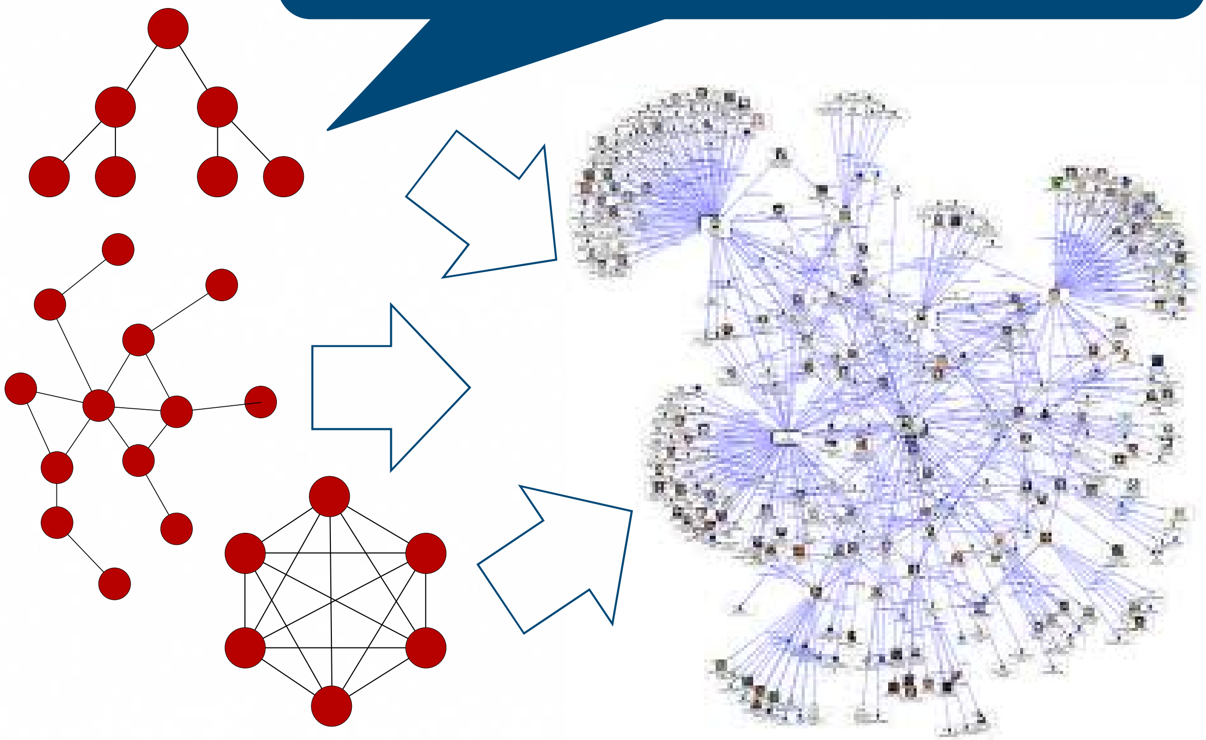
Cultural Theory of Risk



Mary Douglas was for many years the leading UK Social Anthropologist. She developed a Cultural Theory of Risk (now well established in Anthropology) that brings in two more rationalities. Former colleagues Michael Thompson takes this work forward.

M : Embedding ERM

Three fundamental sociological patterns of how people connect to each other and decisions get taken.



The reality of organisations is that all these structures can co-exist in a organisations – especially large organisations.

Anthropology teaches us that people do what works for their environment so if **Risk** if not part of their environment then Risk needs to find a way to propagate into their environment.

How this is achieved is the challenge facing CROs.

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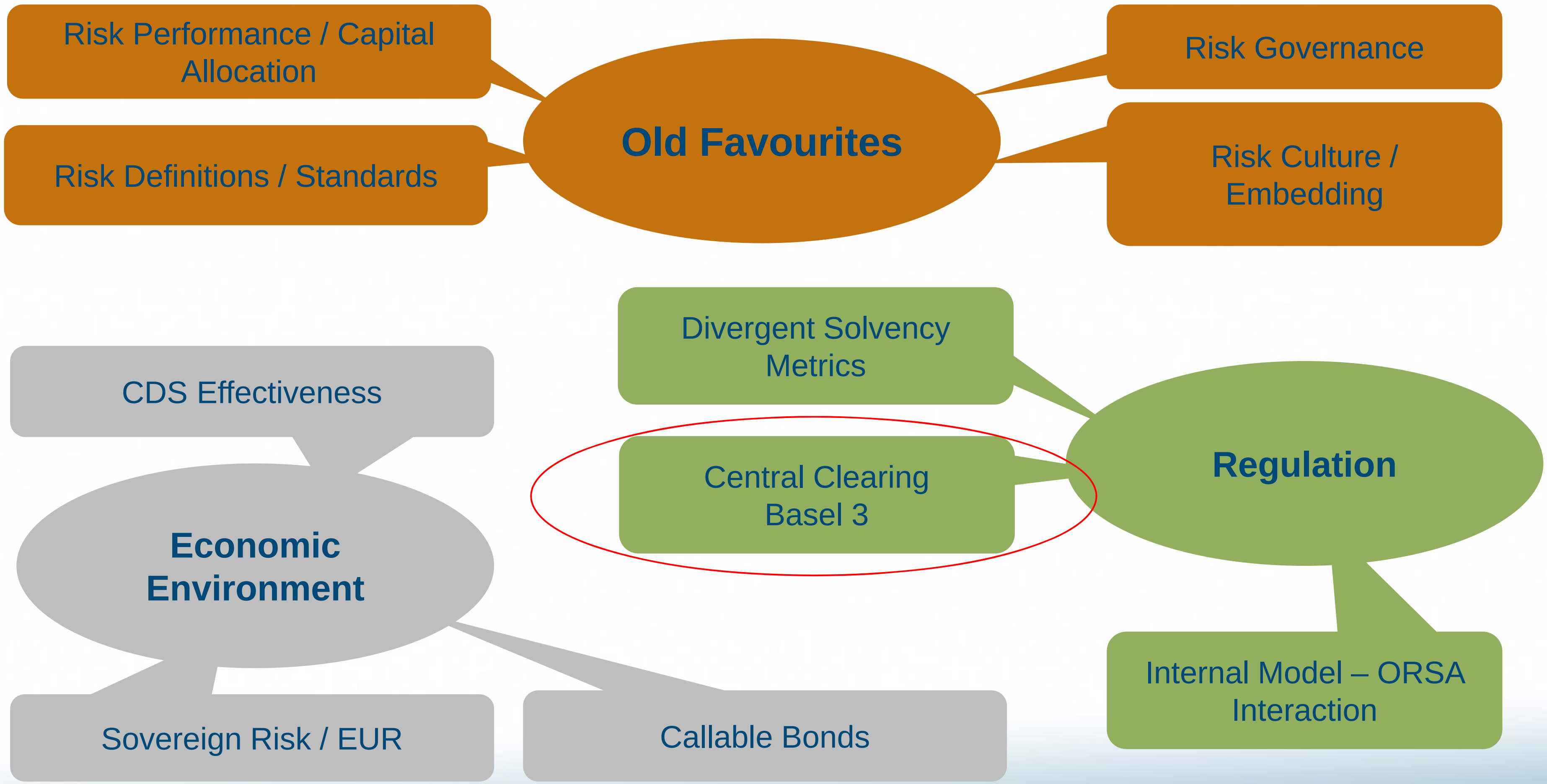
10 CRO Agenda Items…



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EMIR - Implications For Insurers

Collateral Requirements – How Much Variation Margin?

Risk Measure	Cash Collateral Required (£m / % assets backing annuities)
VAR – 99.5% 1 day	£20m / 0.3%
Max call – 1 day	£40m / 0.6%
VAR – 99.5% 1 week	£50m / 0.8%
Max call – 1 week	£85m / 1.3%

Figures assessed using daily data over the period 2005 - 2012

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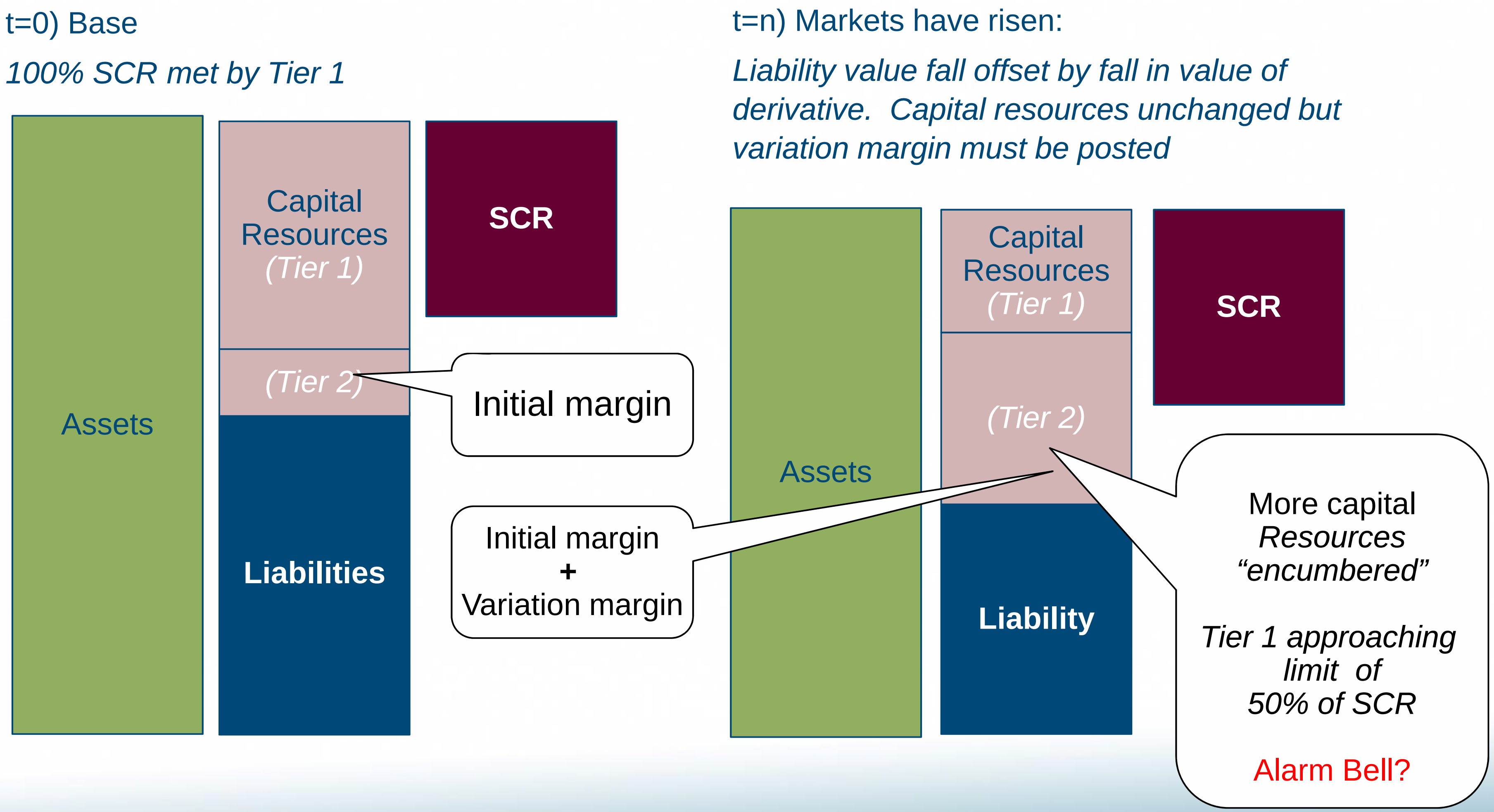
EMIR - Implications For Insurers

Potential Encumbrance



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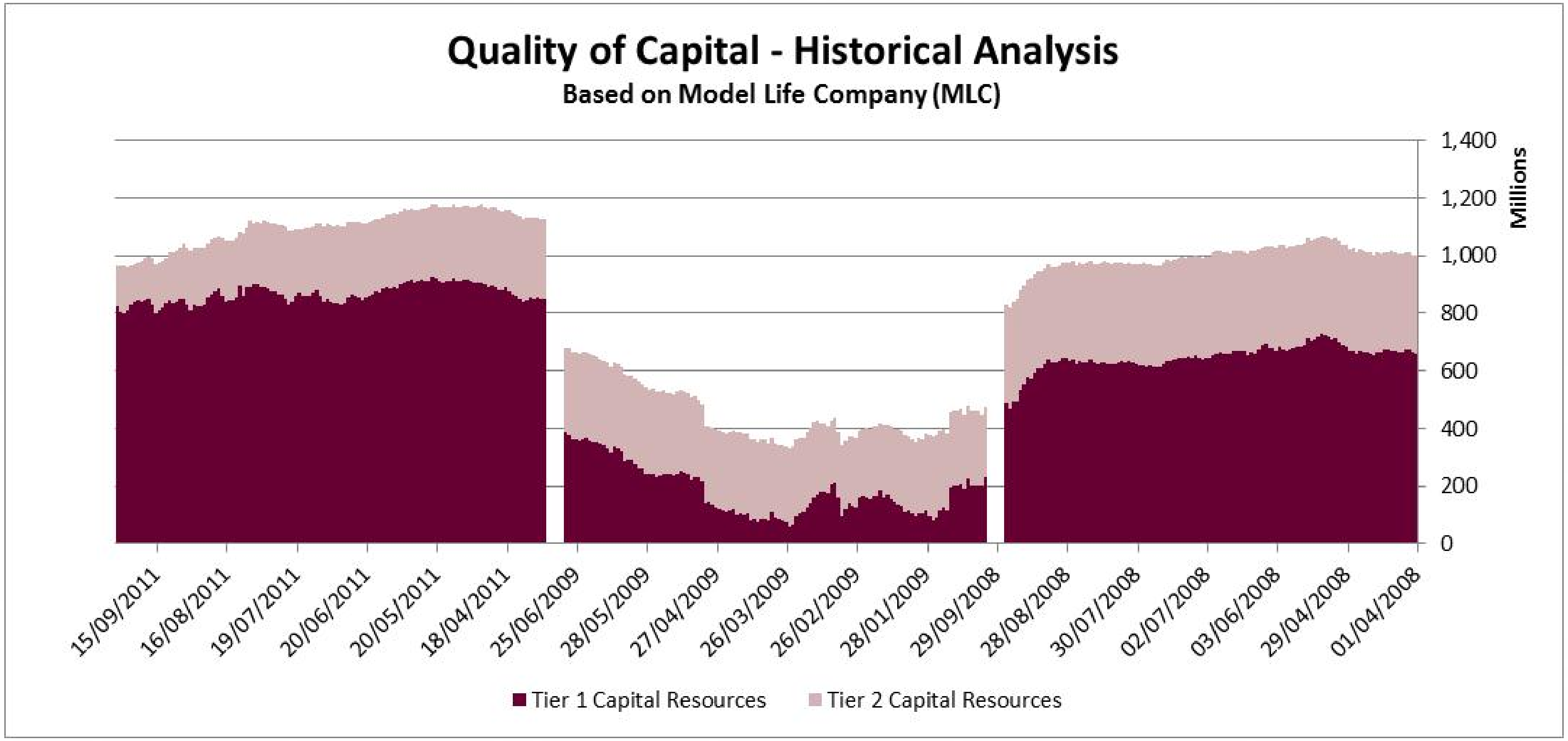
EMIR - Implications For Insurers

Potential Encumbrance – Historical Analysis



Looking back over recent history of Own Funds (time-reversed), margin calls would have had a material impact on capital quality - and on MLC's ability to cover the SCR

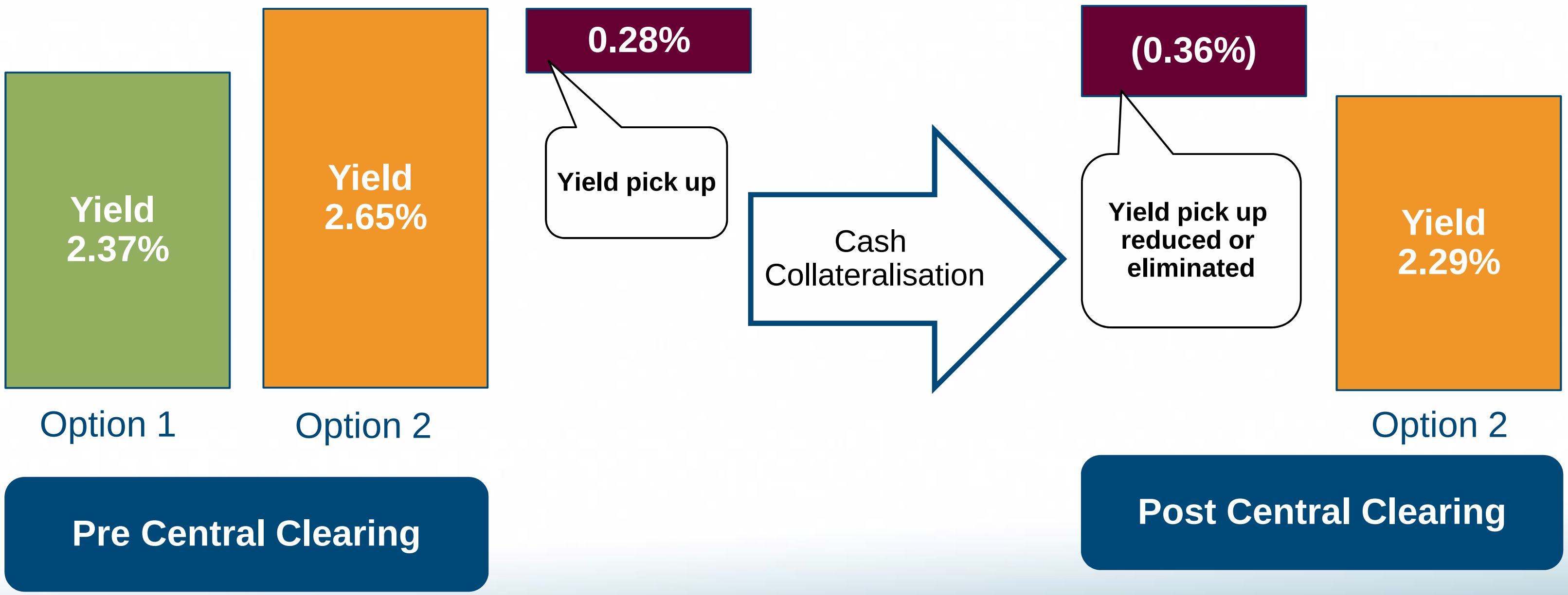
Source: Milliman analysis

B3 / EMIR - Implications For Insurers

Yield Enhancement Through IRS

Matching a simple level annuity:

- Option 1: Hold a portfolio of cash Gilts of similar duration:
- Option 2: Hold shorter corporate bonds and use IRS to match duration

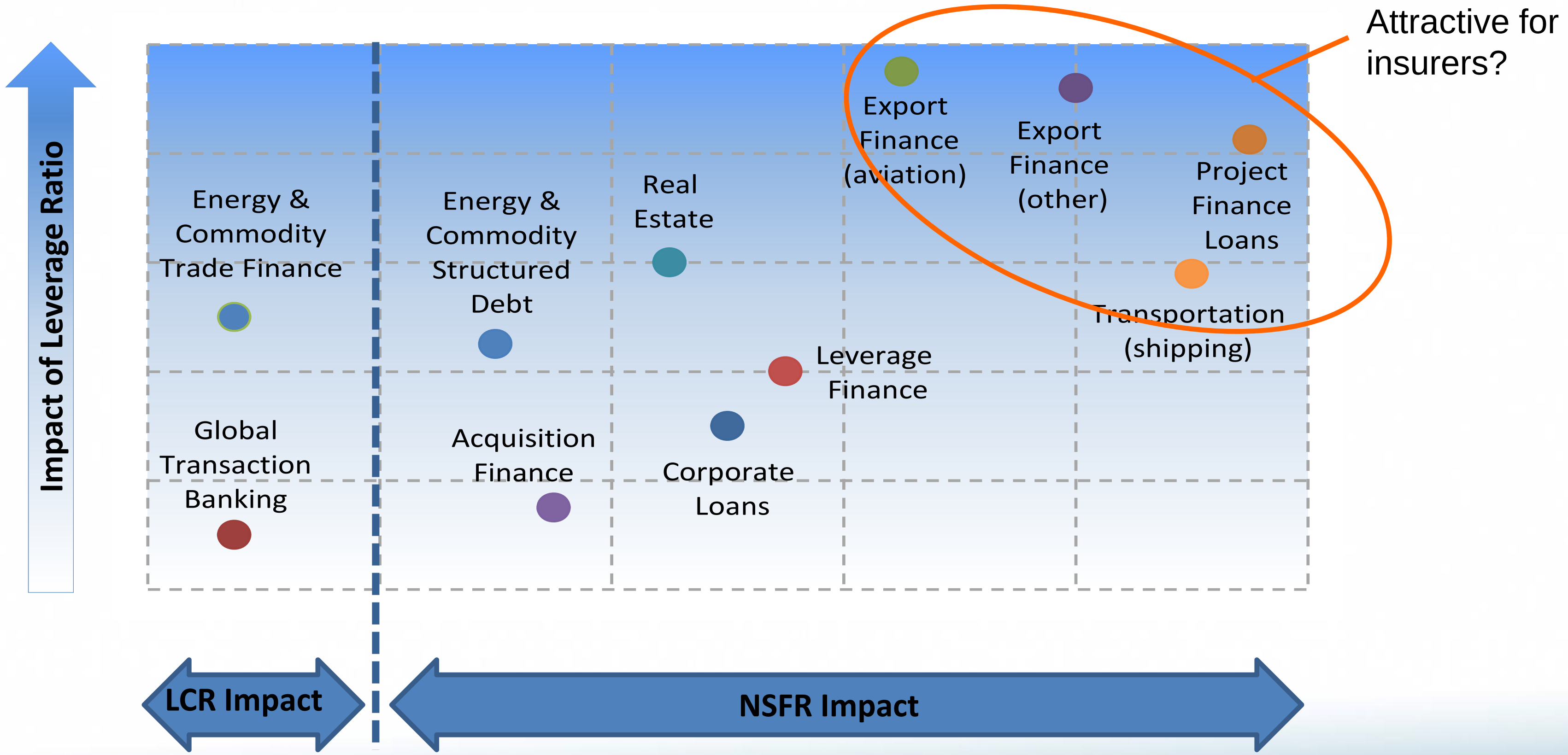


Source: Milliman analysis

B3 - Implications For Insurers

Opportunities in Alternative Assets?

The asset mix on bank balance sheets will be changed



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