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Managing Risk in the New World: A structured approach to defining and identifying risk

OJK - PAI - PT Prudential Life Assurance Enterprise Risk Management Seminar

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Risk

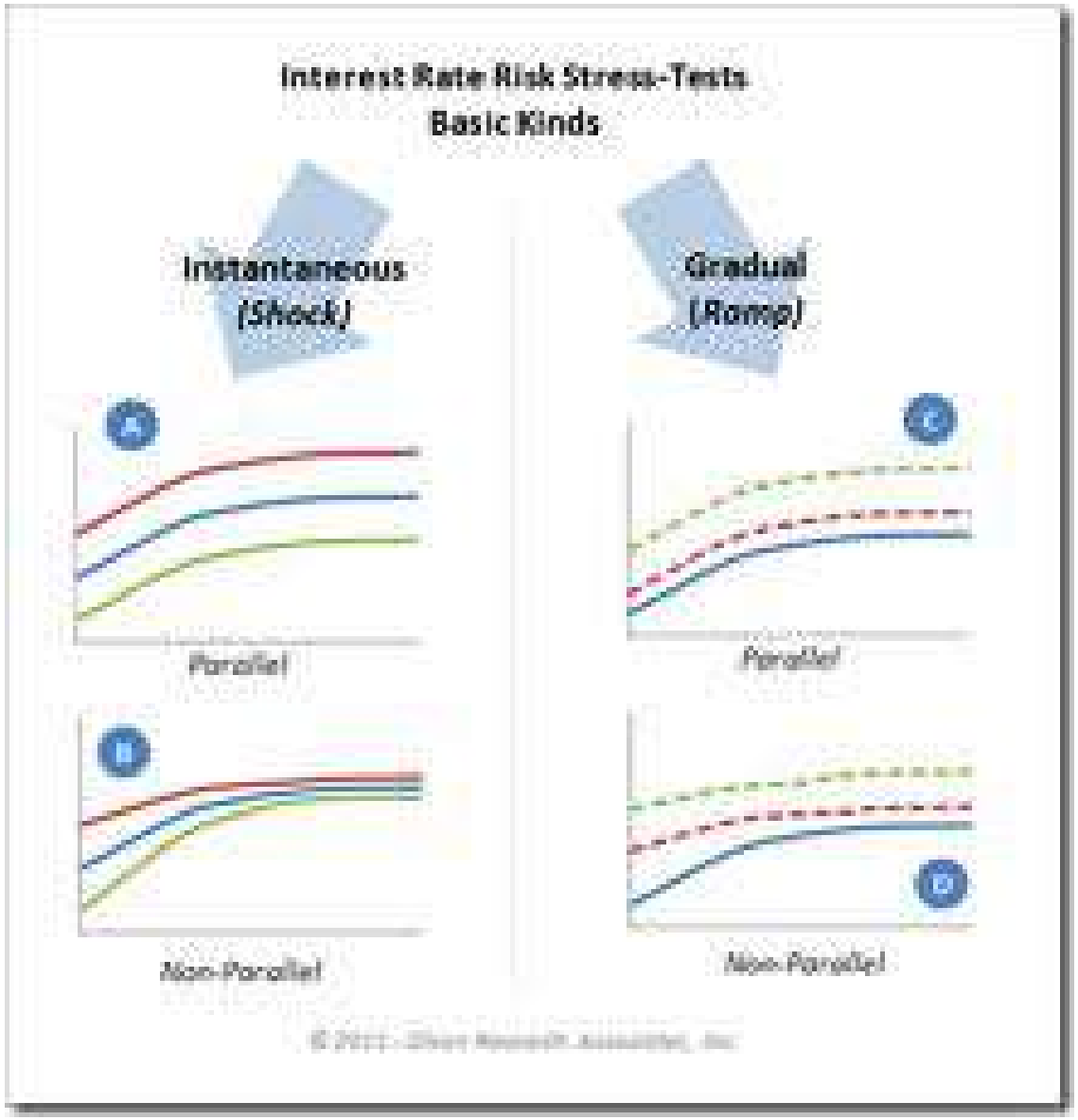
- What is risk?
- Using a risk framework to break down risk into components

S2 Internal Model Approval

"You should ensure that your internal model (VaR) calculation captures and measures all of the financial risks affecting the business, including interactions between those risks"

So we need a list of risks

- What would be on this list?
- What should not be on the list?



CITY EDITION

London Herald

LATE PRICES

WALL STREET CRASH!

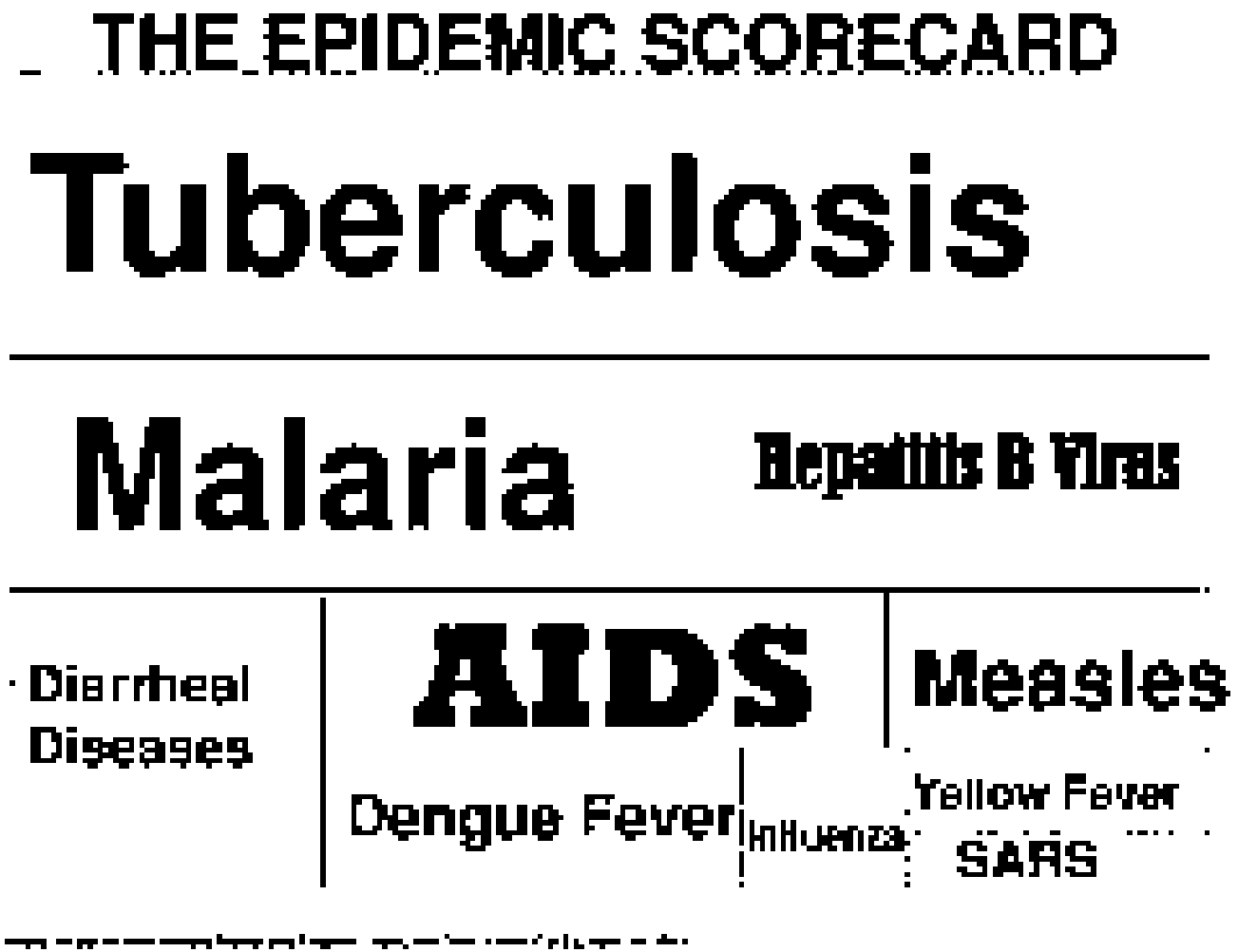
Black Thursday in America

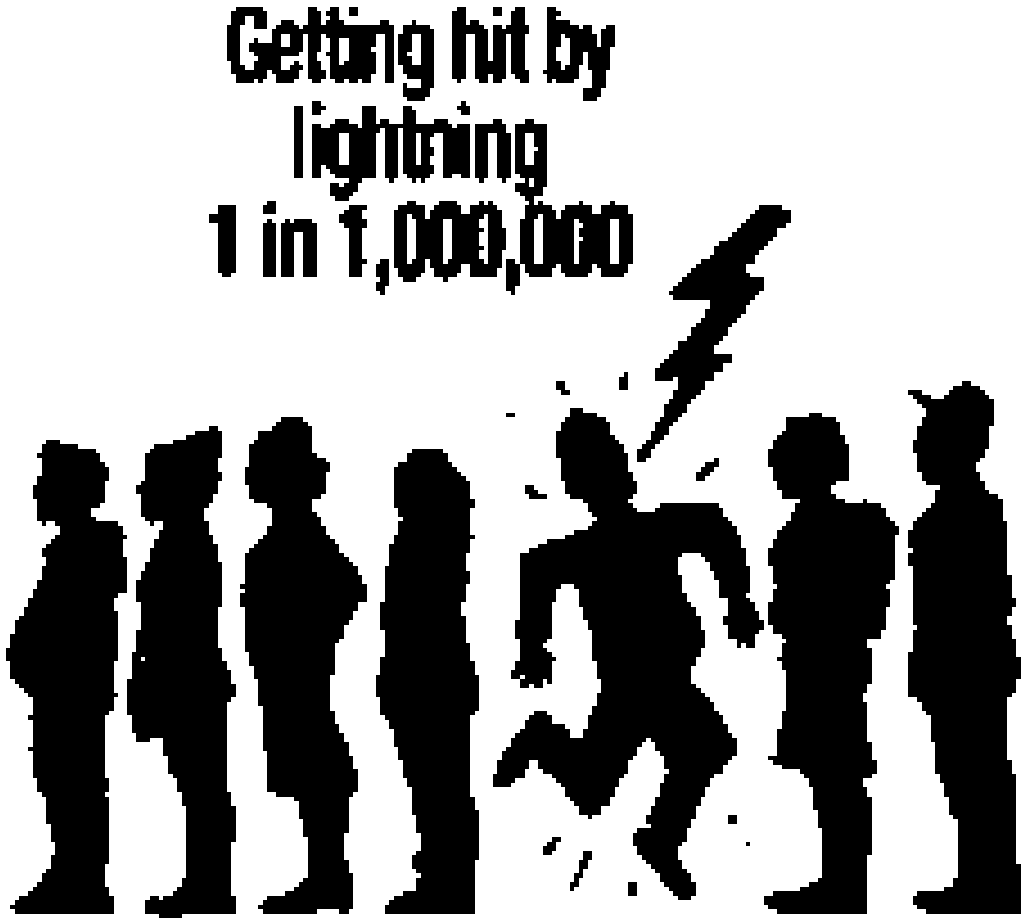
Stocks Plunge and Heroic Controls Suicide

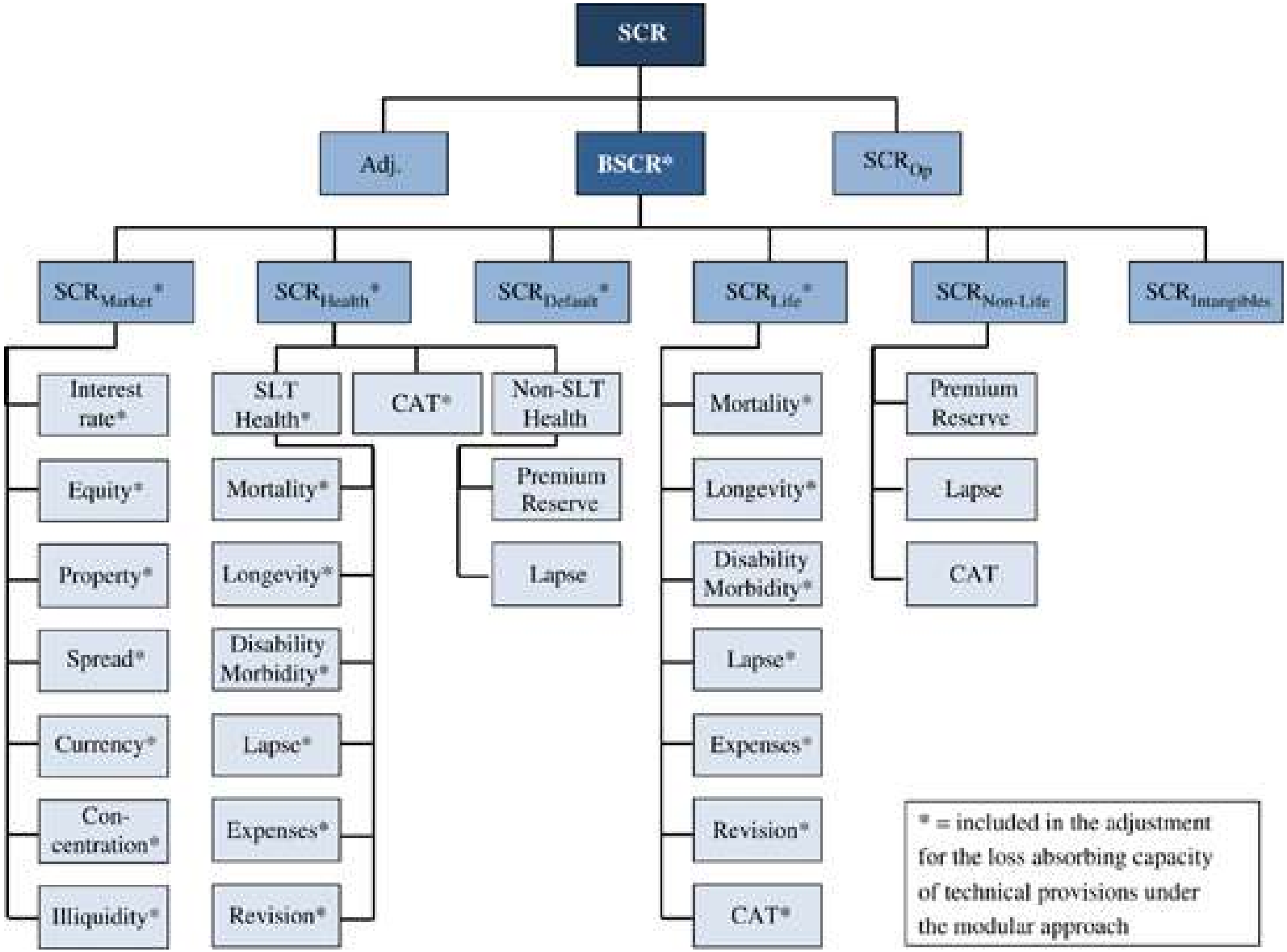
What Went Wrong?

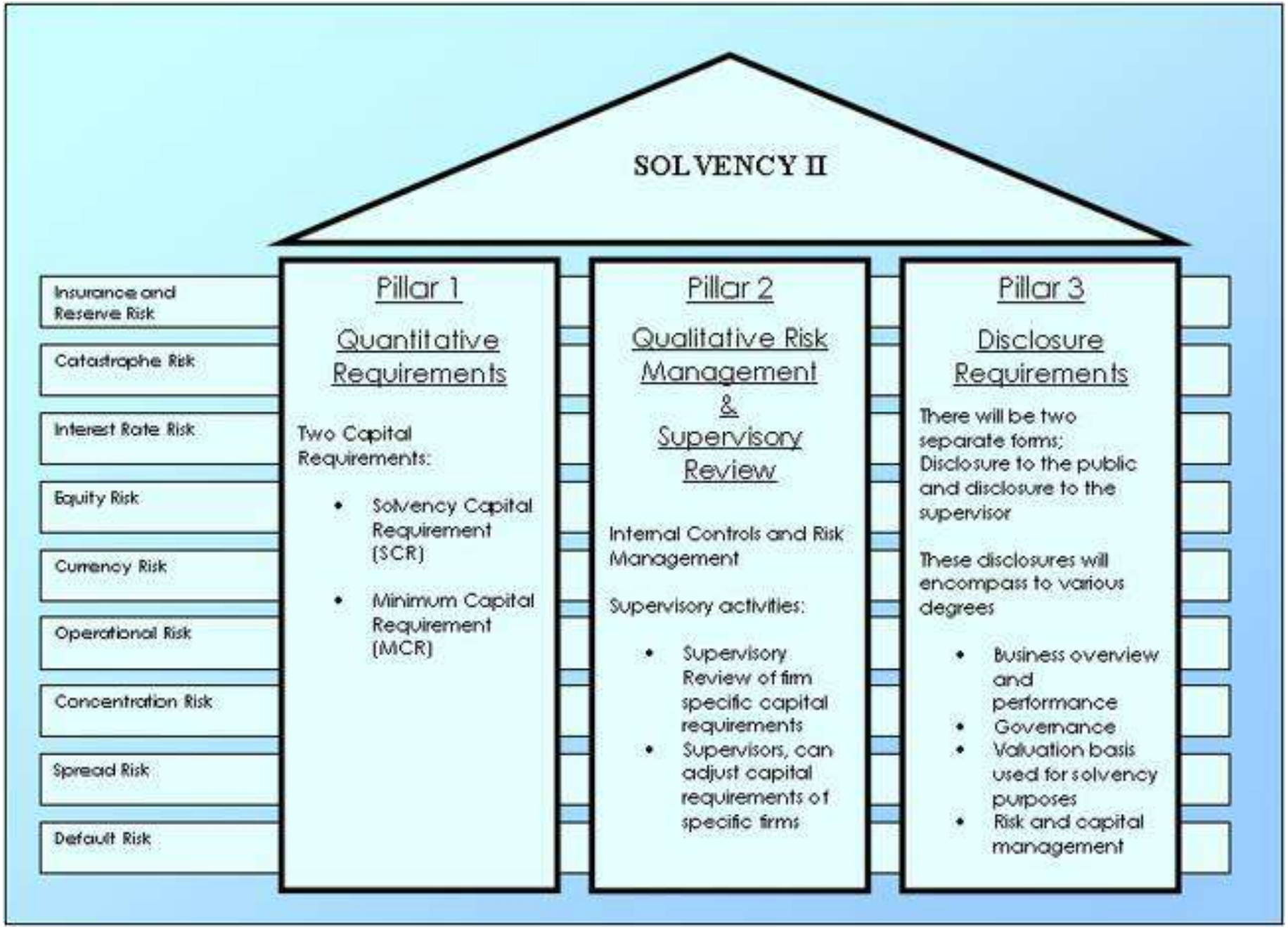
ALM Framework - I

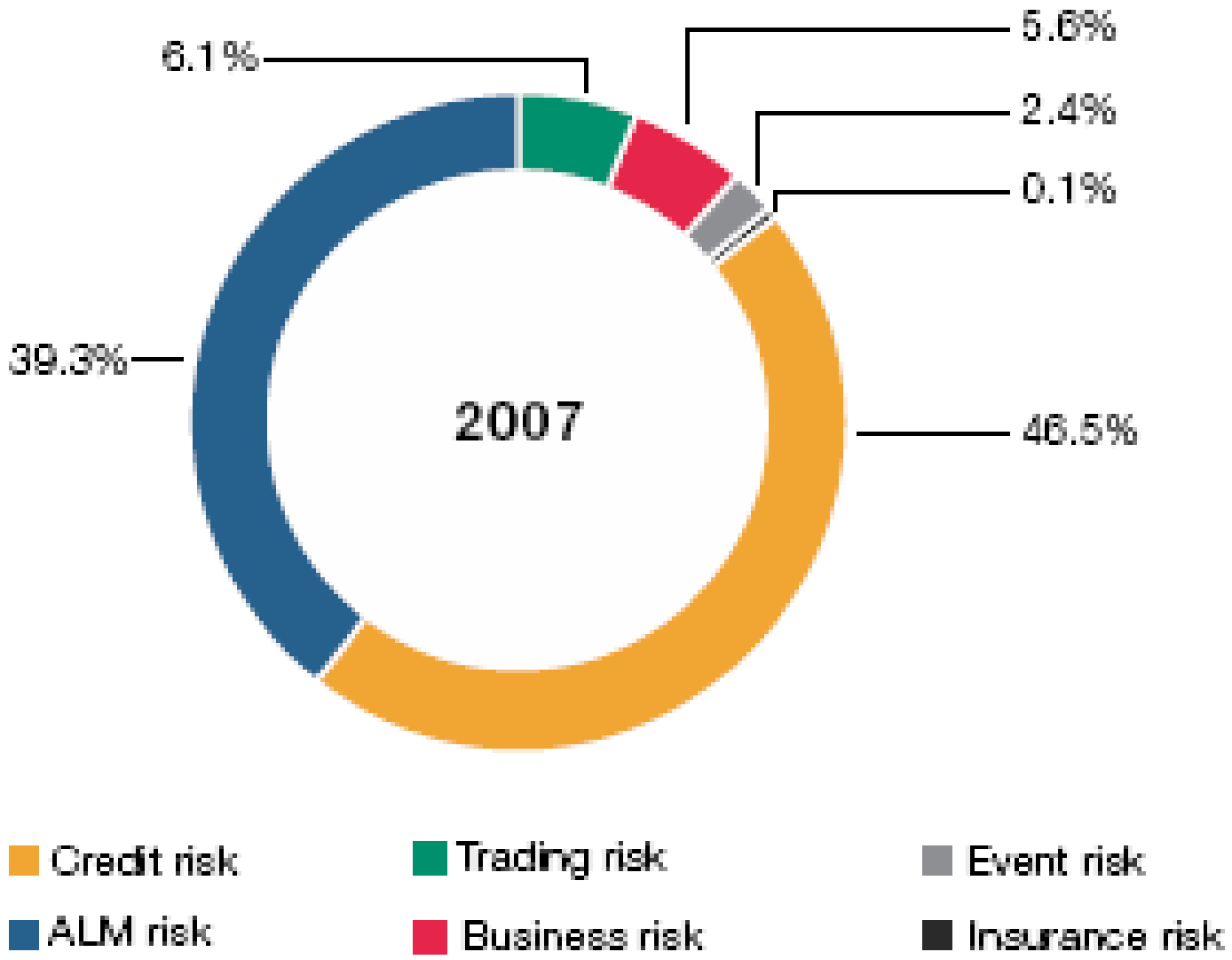
Building the ALM Model











Take-Away 1

- People use the word “Risk” to mean all sorts of things
- It helps if we are a bit more specific

Let's assume that:

For an insurance company, all "Risk" is ultimately *financial risk*

- i.e. the possibility of losing money, or not making as much money as you thought
- i.e. of having some value but maybe losing it

So:

Risk =

Having some value…

…but maybe losing it

More mathematically

Risk

= (some kind of) value at risk

= **Exposure** x **Uncertainty**

Check:

Stock market crash

=	**Exposure**	x	**Uncertainty**
=	Value of stocks	x	% drop in index

Reputation risk

=	**Exposure**	x	**Uncertainty**
=	Value of sales	x	% of sales lost

Take-Away 2

All risk is ultimately about

Exposure x **Uncertainty**

Concept 1: Exposure

Exposure is the value that you have assigned to something

Example: stocks

- Current market value
- Original purchase price

Example: BEL

- Calculated using best estimate discount rates
- Calculated using swap rates

Concept 2: Uncertainty

Uncertainty is the possibility that the exposure value changes

Example: stocks

- Potential drop in market value
- Potential drop in dividend income received

Example: BEL

- Potential change in discount rates
- Potential change in future cash flows

Linking the Two

Example: stocks

- Risk = **Exposure** x **Uncertainty**

  = Current market value x Potential drop in market value

  = **Non-zero value**

or = Original purchase price x Potential change in purchase price

= **Zero**

Take-Away 3

Risk depends on the Exposure measure

i.e. on the definitions you use for “value”

Identifying Uncertainties

In short, uncertainties are all of the things that you need to make *assumptions* about…

…when you calculate the current value of something

…or estimate how its value could change in the future

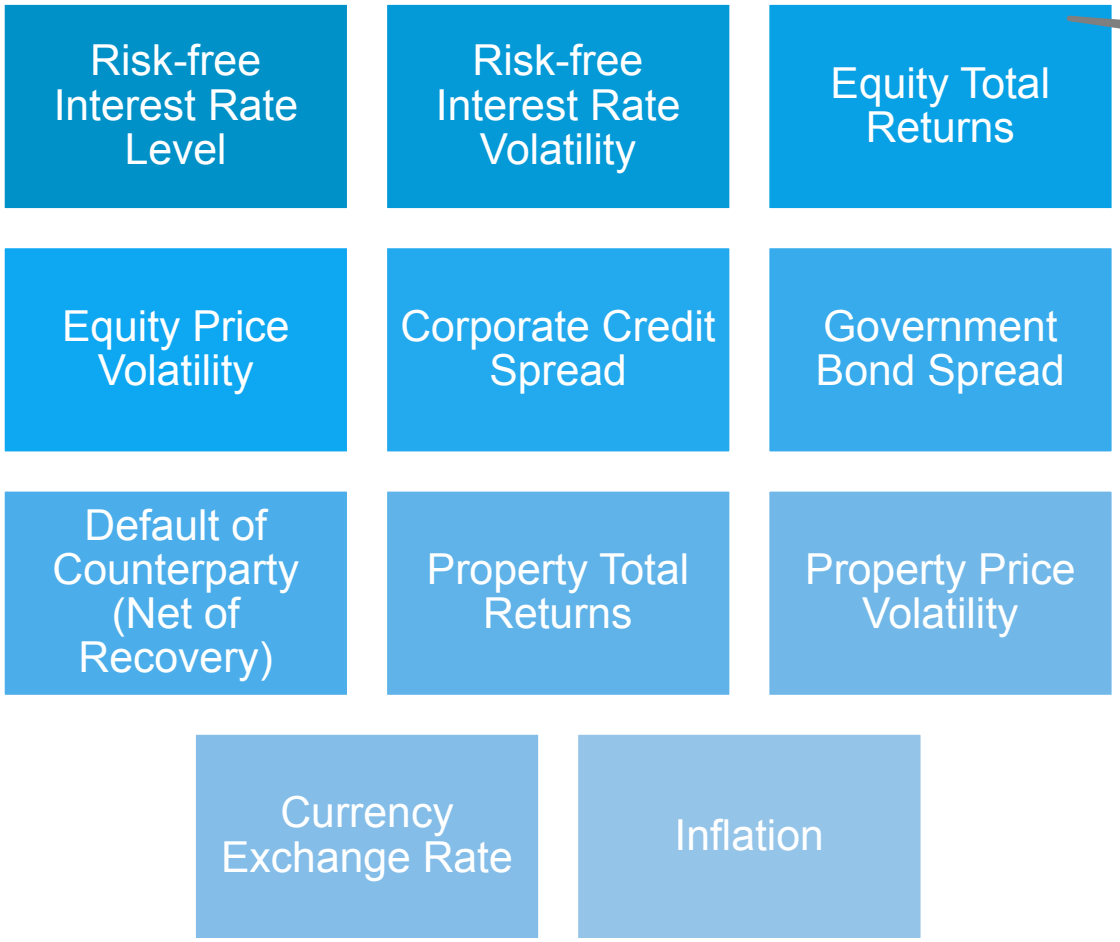
Think Mathematically

If you are thinking about uncertainties that affect the value of insurance liabilities:

- On a statutory basis, this means all of the assumptions that go into the GPV calculation

- On an economic basis, it would be all of the assumptions that would go into "the perfect BEL" (i.e. a GPV with everything in it, e.g. stochastic, every single policy feature, management action, policyholder option,…)

Market Uncertainties



The uncertainty is rated as follows:

Uncertainty	Equity Price
Asset Cash Flows & MV affected?	Only MV
Liability Cash Flows or MV affected?	Most par & linked products
Dimensions of Uncertainty: not Closely Correlated	Sectors / Industries, Geography, Currency
Major Underlying Influences	• Uncertainty in financial results • Changes in market sentiment
Correlated uncertainties	Risk-free Interest Rate Level Equity Price Volatility
"Worst Case" Events	• Stock market crash
Asymmetry	High asymmetry on upside
Statistical	High
Overall Variability	High
Reliability of Assessment	Medium

Policyholder Behaviour Uncertainties

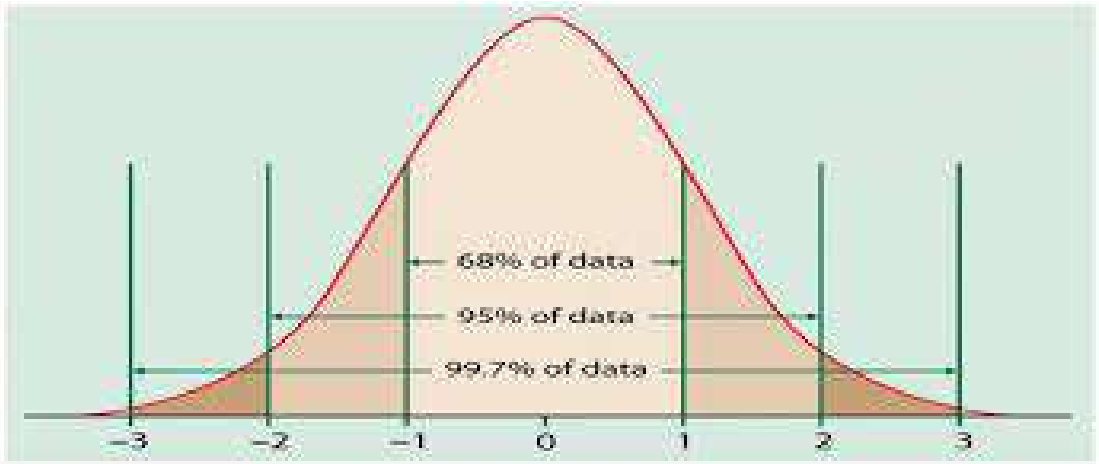
Lapse	Premium holiday	Partial withdrawals
Option to transfer	Mass lapse	Renew / extend policy term or increase cover
Conversion to paid up	Unit-linked fund switching	Annuity Commutation

The uncertainty is rated as follows:

Uncertainty	Premium Holiday
Asset Cash Flows & MV affected?	No
Liability Cash Flows or MV affected?	* Account Balance products * MV, via assumption changes
Dimensions of Uncertainty: not Closely Correlated	Incidence, duration, size of account balance
Major Underlying Influences	* Product design * Changes in market and economic drivers affecting liquidity needs of policyholders
Correlated uncertainties	* Lapse / Policyholder Termination * Partial Withdrawal - Incidence / Amount * Premium Top-Ups * Equity Price
"Worst Case" Events	* Economic downturn leading to low premium payments
Asymmetry	Some asymmetry towards higher PH levels
Statistical	Medium
Overall Variability	Medium
Reliability of Assessment	Bad

Take-Away 4

- Uncertainties are like assumptions needed in a BEL calculation
- If they need a best estimate, they are also subject to variation, i.e. uncertainty



Concept 3: Influences

Risk = **Exposure** x **Uncertainty**

Influences

Influences for mortality:

Major Underlying Influences	• Death by Accident: Safety regulations e.g. speed limits, Dangerous activities. Infrastructure • Death by Illness: Medical advances, Epidemics, Underwriting practices

Examples of Influences

Economic

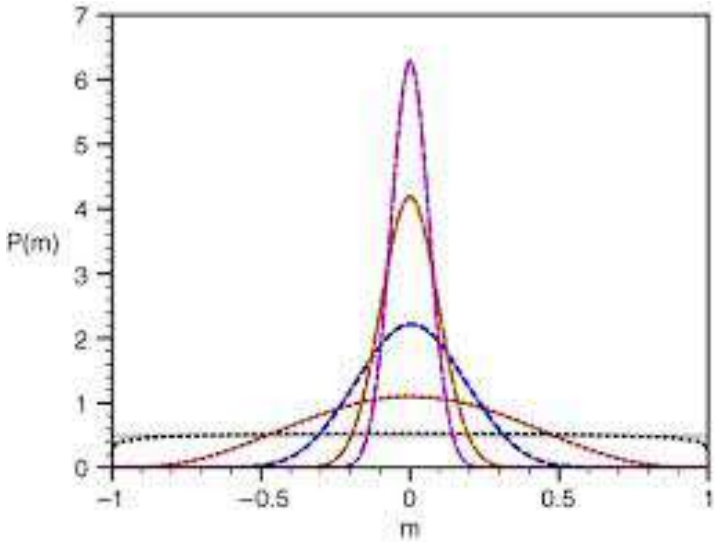
- Government policy
- Market sentiment
- Quantitative Easing

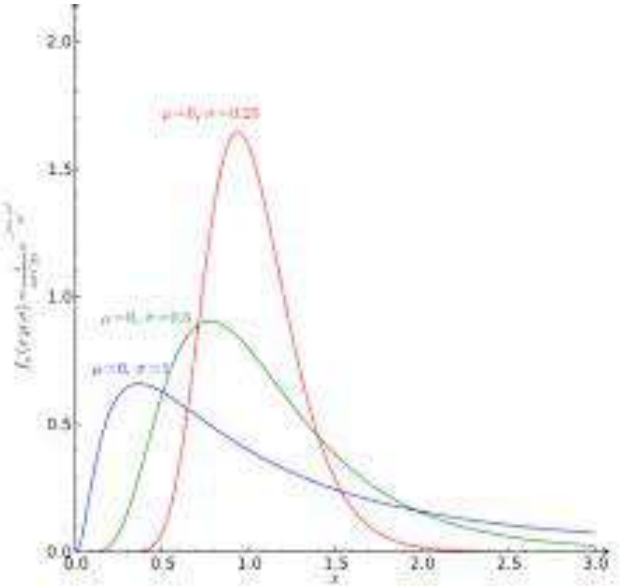
Lapse Rates

- Agent activities
- Availability & price of alternative investments
- Economy & policyholder’s need for cash
- Policyholder awareness

Take-Away 4

Influences are things that affect the shape of the distribution of outcomes of an uncertainty

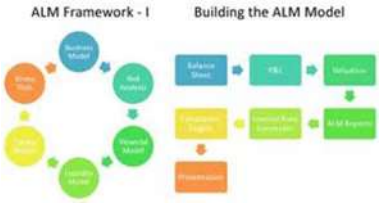


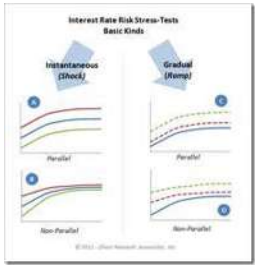


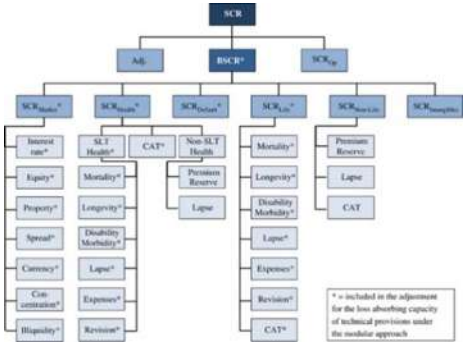
Bringing Everything Together

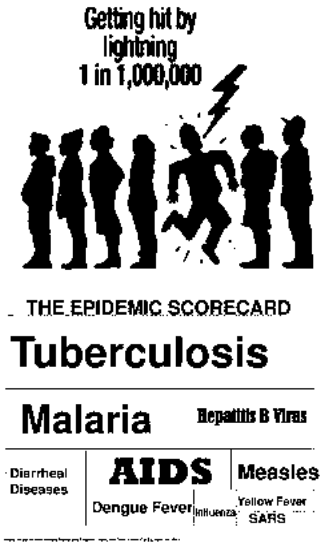
Risk = **Exposure** x **Uncertainty**

Influences





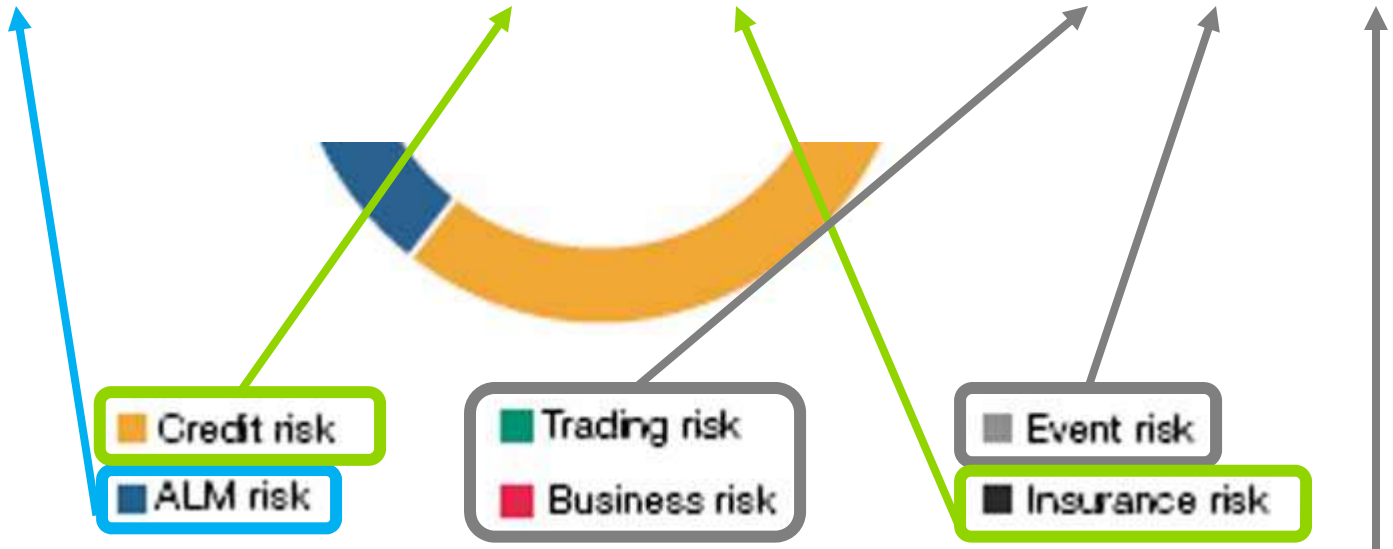




Bringing Everything Together

Risk =

Exposure x **Uncertainty** **Influences**



Operation Risk
Business Risk
Reputation Risk

Take-Away 5

When people say “Risk”, it could mean any of the following:

- An uncertainty interacting with more than one exposures (or even with other uncertainties)
  - E.g. ALM risk
- A single uncertainty / exposure combination
  - E.g. mortality risk
- An influence, i.e. something driving an uncertainty
  - E.g. Ebola
- A family of influences driving lots of uncertainties
  - E.g. operational risk

Summary of Take-Aways

- People use the word “Risk” to mean all sorts of things
- All risk is ultimately about

  Exposure x **Uncertainty**

- Risk depends on the Exposure measure,
  i.e. on the definitions you use for “value”

Risk Dashboard Demonstration

- Communicating risk visually
- Example: response to SARS

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