

# Introduction to ERM

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# Agenda

<b>1</b>	<b>Historical context</b>
<b>2</b>	<b>Solvency II</b>
<b>3</b>	<b>Key components of ERM</b>
<b>3.1</b>	<b>Elements of traditional risk management</b>
	Risk Enquiries
	Quantitative Risk Assessment
	Economic capital models
	Extreme Scenarios
	Process controls
<b>3.2</b>	<b>Risk culture</b>
<b>3.3</b>	<b>Strategic risk management</b>
	Risk and return
	Emerging risks

# Setting the Scene

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## Historical background

The reasons of emergence: a series of catastrophic events...

- Natural Catastrophes: Andrews, Lothar – Martin, Eastern Europe floods.
- Human made Catastrophes: Bhopal, Piper Alpha.
- Terrorism: London, WTC.
- Companies distress: Enron, HIH, Independent, Monoliners.
- US Casualty Crisis (uwv 1998- 2002), IDI in France: under pricing and under reserving.
- Financial crises 1987, 2001-2002, 2007- 2008....

# Setting the Scene

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## Historical background

- The fear of cumulating consequences of low probability events, e.g.
  - a big Hurricane or Earthquake in 2001 after the WTC eventhave triggered a fear of a lack of reinsurance after a collapse of the reinsurance market
- Systemic risks for the Insurance Industry came into focus
- At the end many stakeholders came to the conclusion that
  - more capital was needed
  - but also a more efficient and effective Risk Management approach in the Insurance/ Reinsurance Industry
- As a consequence, the industry developed much more holistic risk management concepts than in the past, trying to address these systemic risks

# Setting the Scene

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## First attempts at stochastic modelling

- A comprehensive risk model is a core part of any holistic risk management
- In the 1990s, the NAIC set the RBC framework and implemented, as a second step, scenarios testing and dynamic models.
- Dynamic Financial Analysis (DFA)
  - Popular in the P&C industry during this period
  - ...but, mainly due to the silo organisation of most of the companies, not very unsuccessful.
- ALM
  - Significant stochastic modelling efforts on the Life side
- Success of Cat Models after Hurricane Andrews (1992).
- ERM is benefiting today from these approaches, but also from incentives coming from the investors, the Rating agencies and the Regulators.

# Setting the Scene

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## Regulatory developments

- The EU solvency regulation (Solvency I) does not consider the different risks and is based on global considerations which do not trigger a need for a better Risk Management.
- After the US RBC framework, many countries in the world have moved to a more Risk oriented regulation:
  - Canada
  - Australia
  - UK – Individual Capital Assessment (ICA)
  - Switzerland - Swiss Solvency Test (SST)
- The Basel II project launched in 1999 with its 3 pillars' approaches for the Bank industry regulation gave a signal for the Insurance Solvency II project.
- The Solvency II Directive has been approved in 2009 and will become effective on 31 October 2012.

# Setting the Scene

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## Rating agency requirements

- Rating agencies, like many companies have largely anticipated this phenomenon and, for example, Standard and Poor's promoted in 2005 ERM as a critical component of its rating methodology.
- S&P now issues a separate ERM rating – 2008 score distribution:
  - Weak: 9%
  - Adequate: 60%
  - Adequate with strong risk controls: 6%
  - Adequate +: 13%
  - Strong: 11%
  - Excellent: 1%
- AM Best has issued similar ERM related rating requirements (but do not consider ERM as a formal rating criterion)

## A profession in the making?

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### **PRMIA**

- Professional Risk Managers' International Association
  - Mission: Promotion of risk management standards & certificates
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### **GARP**

- Global Association of Risk Professionals
  - Mission: International network & certificates
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### **CERA**

- Chartered Enterprise Risk Analysts
  - Mission: Certificates on an actuarial basis
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### **IAA Initiative**

- General agreement with CERA on certificates building on IAA core syllabus
  - Signed by major actuarial associations, including
    - DAV (Germany)
    - Institute of Actuaries, Faculty of Actuaries (UK)
    - Society of Actuaries (UAS)
    - Canadian Institute of Actuaries
    - Institute des Actuaire (France)
    - Institute of Actuaries of Japan
  - Mutual recognition of qualification
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### **DAV's decision**

- Introduction of an additional qualification on ERM
- building on DAV education

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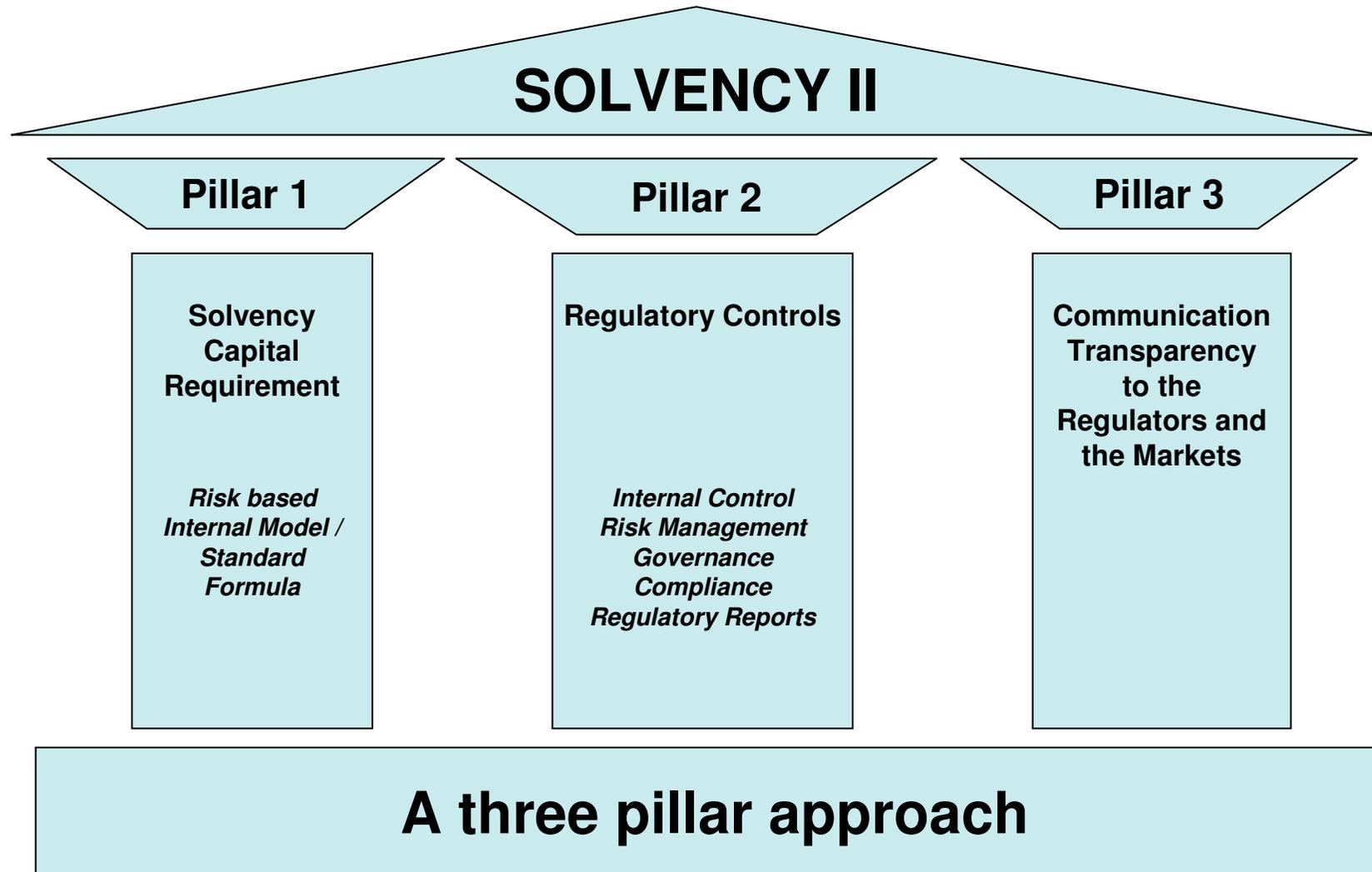
Strategic risk management

Risk and return

Emerging risks

# Setting the Scene

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# Cornerstones of the Solvency II project

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## Main Risks and Regulatory requirements

*This EU project is organised through 3 sets of regulatory requirements (pillars):*

**Pillar 1:** Calculation of the Solvency Capital Requirements (SCR):

- Standard Formula.
- Risk based Internal Model (after approval).

**Pillar 2:**

- Internal Control requirements, qualitative Risk Management, Governance.
- Additional Capital in case of non compliance.

**Pillar 3:**

- Transparency requirements
- Obligations regarding the level of information provided to the regulators and to the markets.

# Cornerstones of Pillar 1 requirements

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## The Solvency II Directive

- The Solvency II Directive was adopted by the European Parliament, Council and Commission in Spring 2009.
- This sets out the general framework and the path to the implementation of Solvency II.
- Solvency II will become effective on October 31 2012.

Some key points which have been intensively discussed before the adoption:

- Inclusion of Group Support (Control at the Group Level) not adopted and postponed.
- Modification of the rules to regarding capital requirements for equities.
- Since then, the regulators engaged in an intensive consultation process with the industry and other stakeholders:
  - Best Estimates
  - Governance
  - Principle of proportionality (internal control)
  - Operational risk and legal risk
  - Counterparty risk
  - Approval of internal models
  - Securitisation's vehicles
  - ....

# MaRisk VA – a blueprint for Pillar 2 requirements?

## Contents of MaRisk (Bafin, January 2009)

1. Zielsetzung des Rundschreibens
2. Anwendungsbereich
3. Verhältnis des Rundschreibens zu sonstigen Regelungen
4. Grundsatz der Proportionalität
5. Risiken
6. Gesamtverantwortung der Geschäftsleitung
7. Elemente eines angemessenen Risikomanagements
  - 7.1 Risikostrategie
  - 7.2 Organisatorische Rahmenbedingungen
    - 7.2.1 Aufbauorganisation
    - 7.2.2 Ablauforganisation
      - 7.2.2.1 Neue Geschäftsfelder sowie Kapitalmarkt-, Versicherungs- und Rückversicherungsprodukte
      - 7.2.2.2 Betriebliche Anreizsysteme und Ressourcen
      - 7.2.2.3 Organisationsentwicklung
  - 7.3 Internes Steuerungs- und Kontrollsystem
    - 7.3.1 Risikotragfähigkeitskonzept und Limitierung
    - 7.3.2 Risikokontrollprozess
      - 7.3.2.1 Risikoidentifikation
      - 7.3.2.2 Risikoanalyse und –bewertung
      - 7.3.2.3 Risikosteuerung
      - 7.3.2.4 Risikoüberwachung
    - 7.3.3 Unternehmensinterne Kommunikation und Risikokultur
    - 7.3.4 Risikoberichterstattung
    - 7.3.5 Qualitätssicherung internes Steuerungs- und Kontrollsystem
  - 7.4 Interne Revision
  - 7.5 Interne Kontrollen
8. Funktionsausgliederungen und Dienstleistungen im Sinne des § 64a Abs. 4 VAG
9. Notfallplanung
10. Information und Dokumentation

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Risk and return

Emerging risks

# Enterprise Risk Management

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## *The COSO<sup>(1)</sup> Definition*

<b>What?</b>	A Process
<b>Who?</b>	Effected by an entity's Board of Directors, Management and Other Personnel
<b>Where?</b>	Applied in Strategy setting and across the enterprise's Operations
<b>How?</b>	Designed to identify potential events that may affect the entity
<b>Why?</b>	Manage Risk to be within its risk appetite and provide reasonable assurance regarding the achievement of entity objectives

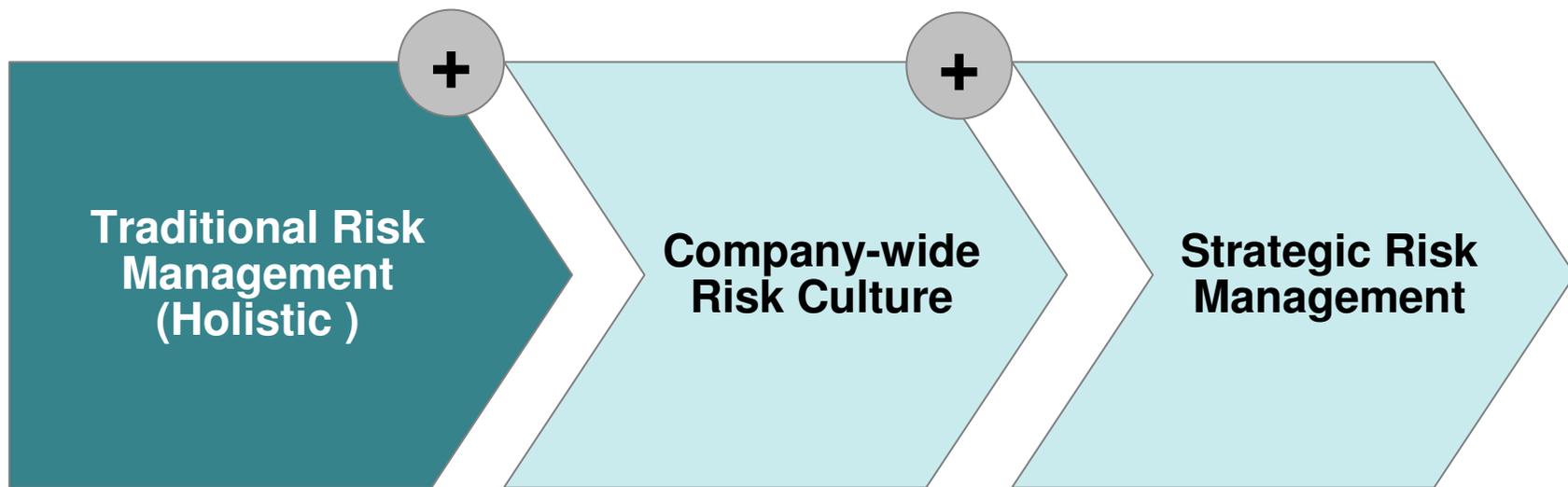
(1) COSO Committee Of Sponsoring Organizations

Source: The Committee of Sponsoring Organisations "Enterprise Risk Management-Integrated Framework" published in 2004

# Enterprise Risk Management

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*ERM is...*



# Enterprise Risk Management

## Traditional Risk Management

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### Traditional Risk Management (Holistic )

- Risk Identification
  - Consolidation of impacts across the whole Company from a single cause
- Risk Assessment
  - Risk Map (Consolidated view from Company level)
  - Internal model at Company Level
- Diversification
  - Uses Company Internal model to determine net effect of diversification
- Hedging
  - Uses the holistic risk assessment tools as inputs to hedging strategy

# Enterprise Risk Management

## Company-wide Risk Culture (1/2)

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### Focus on employees

- A coherent **Risk Management Framework** links the risks, processes and people to ensure attainment of Strategic, Operational and Compliance objectives
- Clearly defined and communicated **risk appetite and tolerances**.
- **Incentives /disincentives** for Management and staff to optimise risk and returns.
- **Common approach to risks and returns** and common **risk language** across the whole company.

# Enterprise Risk Management

## Company-wide Risk Culture (2/2)

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### Embedded Governance

- **Risk-based Governance** (including Internal Control).
- Clear **accountability** for decisions

### Risk-return information

- Clear and agile **Internal Risk & Return reporting**.
- Transparent and comprehensive **External Communication on risks and returns**.

# Enterprise Risk Management

## Strategic Risk Management

### Key elements of strategic risk management

- Risk-return positioning
  - Decide positioning across risk universe spectrum
- Risk-return optimisation
  - Risk-return criteria used to make
    - strategic decisions on
      - M&As
      - Asset Allocation
      - Hedging
      - LOBs
      - Geographical regions
      - New Ventures
      - Product Developments, etc.
    - operational decisions (through e.g. pricing and budgeting/monitoring of capital consumption).
- Emerging Risks
  - Risk identification over significantly extended time horizons

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# Risk Enquiries – Principles

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## Principles

- Semi-annual interview process; covers all parts of the SCOR group
- Face-to-face meetings with managers and selected specialists
- Three-dimensional risk-assessment:
  - Loss Potential (relevance)
  - Probability (significance)
  - Level of Risk Handling
- Classification of risks according to SCORClasS (SCOR Risk Classification System) into
  - Asset Risk
  - Liability Risks
  - Operational Risks
  - Strategic Risks
- Thresholds for A-, B- and C-risks derived from company's risk bearing capacity, recalculated annually
- Allows for collection of information independent from standardized reporting

# Risk Enquiries – Objectives

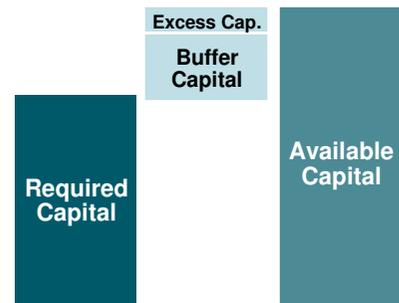
## Objectives

- Identification, description and assessment of relevant risks
- Statement on relative position of risks, based on quantitative risk assessment
- Full documentation of risk exposure e.g. for boards, supervisory authorities, auditors, other stakeholders
- Enables trend analysis and risk tracking over several years
- Determination and implementation of risk mitigating actions and their ownership
- Monitoring of actions and documentation of lessons learned
- Fostering of risk culture

# Risk Enquiries – Buffers and thresholds

## Risk threshold calculation

Risk thresholds are calculated based on “buffers”. The first buffer, SCOR’s Buffer Capital is chosen as 1:10 years quantile of the profit distribution.

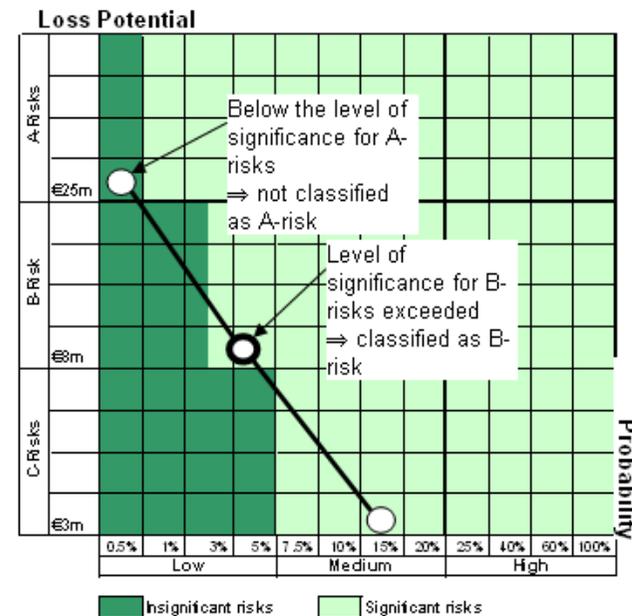


Risk with a potential impact of the Buffer Capital or higher might trigger serious crisis or even ruin, hence upper limit to what is bearable. Further “buffers” are calculated for major impact and relevance.

For deriving risk thresholds from these “buffers”, accumulation factors are applied, to take into account that several risks can occur per year.

## Thresholds

Threshold for relevance	cut-off for loss potential
Threshold for significance	cut-off for probability



# Risk Enquiries – 3d Risk Assessment

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## 1<sup>st</sup> dimension: Loss Potential

The loss potential indicates the possible loss amount when a risk materialises.

A risk is an event entailing negative deviations from planned figures and refer to economic value or franchise value

## 2<sup>nd</sup> dimension: Probability

The probability of occurrence is linked to the loss potential, usually as a function with the probability decreasing towards higher loss potentials.

As much as possible of the distribution of probability is recorded.

A useful risk description is: “The risk will cost more than A with probability a%, more than B with probability b% and more than C with probability c%.”

## 3<sup>rd</sup> dimension: Risk Handling

Each risk is classified as to the current degree of risk handling:

- High (full control up to the desired level),
- Medium (some, but not sufficient measures are taken) or
- Low (indicates unsatisfactory risk handling).

# Risk Enquiries – Risk Classification

The ScorRiskClassificationSystem (**ScorClass**) serves as the basis for the risk identification and establishes a standardized systemizing of risks for SCOR Group.

<b>Asset</b>	
<b>A1</b>	<b>Market</b>
A1.1	Interest rate
A1.2	Exchange rates
A1.3	Equity
A1.4	Real estate
A1.5	Spread risk
<b>A2</b>	<b>Credit</b>
A2.1	Default
A2.2	Mark-to-market
<b>A3</b>	<b>Liquidity</b>
A3.1	Strategic liquidity
A3.2	Operational liquidity
<b>A4</b>	<b>Correlation</b>
<b>A5</b>	<b>Emerging</b>
<b>A6</b>	<b>Others</b>
<b>A7</b>	<b>Opportunities</b>

<b>Operational</b>	
<b>O1</b>	<b>Business continuity</b>
O1.1	Business Disruption & Systems Failures
O1.2	People
<b>O2</b>	<b>Internal compliance</b>
O2.1	Error & Omission, misrepresentation
O2.2	Infringement of rules and guidelines
O2.3	Internal Fraud
O2.4	External Fraud
<b>O3</b>	<b>Regulatory compliance, legal</b>
<b>O4</b>	<b>Employment Practices / Workplace Safety</b>
<b>O5</b>	<b>Organization</b>
O5.1	Execution, Delivery & Process Management
O5.2	Projects
O5.3	Information technology
<b>O6</b>	<b>Outsourcing</b>
<b>O7</b>	<b>Correlation</b>
<b>O8</b>	<b>Emerging</b>
<b>O9</b>	<b>Others</b>
<b>O10</b>	<b>Opportunities</b>

<b>Liability</b>	
<b>L1</b>	<b>Underwriting</b>
L1.1	Economic environment and cycle management
L1.2	Underwriting process
L1.3	Pricing and modeling
L1.4	Expert knowledge
L1.5	Disasters accumulation exposure
L1.5.1	Natural catastrophes
L1.5.2	Man-made catastrophes
L1.6	Wrongly anticipated exposures
L1.7	Reinsurance treaty wording
L1.8	Biometric risks
<b>L2</b>	<b>Retention management</b>
<b>L3</b>	<b>New Venture</b>
<b>L4</b>	<b>Reserving</b>
<b>L5</b>	<b>Claims handling</b>
<b>L6</b>	<b>Tax</b>
<b>L7</b>	<b>Correlation</b>
<b>L8</b>	<b>Emerging</b>
<b>L9</b>	<b>Others</b>
<b>L10</b>	<b>Opportunities</b>

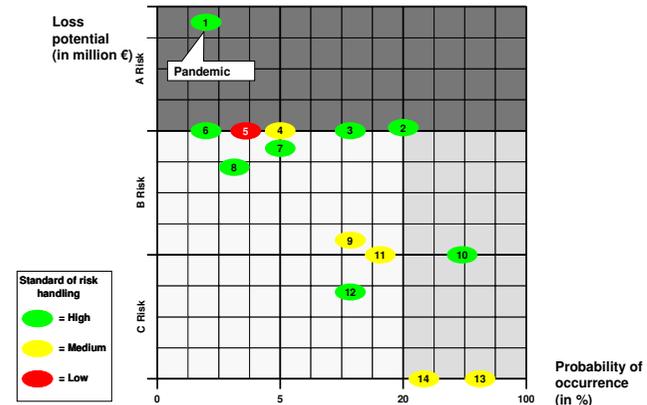
<b>Strategic</b>	
<b>S1</b>	<b>Mergers &amp; Acquisitions</b>
<b>S2</b>	<b>Competition</b>
<b>S3</b>	<b>Business model</b>
<b>S4</b>	<b>ALM mismatch</b>
<b>S5</b>	<b>Reputation</b>
<b>S6</b>	<b>Correlation</b>
<b>S7</b>	<b>Emerging</b>
<b>S8</b>	<b>Others</b>
<b>S9</b>	<b>Opportunities</b>

# Risk Enquiries – Output

## Risk report

- List of A, B and C risks for economic value and for franchise value
- Quantitative Assessment of impact on all group companies
- List of actions (planned, in progress, implemented, plus suggestions)
- Risk owner assigned

## Risk map



## Risk response per risk

- Avoid – e.g. by exclusion clauses in the treaties, such as suicide
- Reduce – e.g. by setting caps per distribution channel
- Limit – e.g. by buying reinsurance
- Transfer – e.g. to a national body in the case of natural catastrophe
- Diversify – e.g. property with disability
- Accept – actively run the risk

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## Measurement bases

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### Statutory accounting

- Usually “prudent”
  - Varies between countries
  - Static – often insensitive to financial market parameters
  - P&C reserves undiscounted
  - Life reserves discounted, but valuation assumptions “locked in”
  - Certain liabilities subject to management (“release of reserves” etc.)
  - Not very useful as a basis for Risk Management
- 

### US GAAP

- More realistic than statutory accounting
  - Adapted to US products
  - Reserves and insurance assets are derived from certain profit release principles
  - Different profit patterns for different products
  - Different rules with respect to assumption updates for different products
  - More stringent rules
  - International use has led to a certain best practice (but not perfectly consistent application between companies)
- 

### IFRS

- No insurance specific accounting standard yet
  - IFRS 4 phase I allows use of national GAAPs for insurance liabilities within IFRS
-

## Measurement bases

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### Embedded Value

- A measure used for Life companies since the early 90s
  - Developed mainly in the UK
  - Originally intended to overcome the prudence of statutory accounting principles
  - Supposed to give management a realistic picture of the development of the business
  - Significant efforts made since late 90s to
    - improve consistency between companies reporting their EVs
    - ...leading to “European Embedded Value Principles” (2004)
    - eliminate inconsistencies between EV and the market valuation of assets
    - ...leading to “Market Consistent Embedded Value Principles” (2008)
  - Objective of consistency between companies has not been fully achieved
  - During the financial crisis, “market-consistency” turned out to be a more difficult concept than initially assumed
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## Measurement bases

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### Embedded Value

- EV is nevertheless considered the preferred measurement basis for Life (re)insurance business by many companies and analysts, as it
  - reflects the long-term nature of the business properly
  - can be applied to all (life) business world-wide
  - best estimate basis
  - (usually) market-consistent
    - so asset and liability cash flows are measured consistently
  - Options and Guarantees are (usually) valued on a market-consistent basis
    - benefits of hedging are reflected properly
  - Analysis of change in EV from one year to the other provides insight into
    - the development of the business on a realistic, economic basis
    - focus on value creation (separate analysis on new business written during the past period)
  - Standard sensitivities give insight into exposure of business to different risks
    - economic risks – interest rates, volatilities, equity prices etc.
    - non-economic risks – claims levels, expense levels etc.

## Measurement bases

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- P&C reserving**
- P&C liabilities typically have a
    - shorter duration than for Life (often 1 year)
    - longer tail, as final claim is often only determined much later than the end of the cover period
  - Importance of IBNR reserves
  - Realistic analysis of P&C reserves intends to identify the level of prudence in the reserves
  - Trend to much more disclosure on reserve adequacy
    - Triangles by Line of Business
    - Level of prudence in overall reserves
  - “Best estimate” established principle, similar meaning as in Life
  - Discounting is not typical yet
  - Financial options & guarantees do not play a significant role
  - Claims distribution relatively more important
-

## Measurement bases

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### Unified approaches

- Some companies have developed hybrid bases in order to value Life, P&C and assets consistently
  - Best known: Swiss Re's "Economic Value Management" concept
    - Public disclosures started in 2008
    - A simplified EV analysis for Life, P&C and assets
    - Market consistent
    - Used for pricing, capital allocation, valuation
- 

### Solvency II

- Intends to value all assets and liabilities on a realistic, market-consistent basis (as specified in the Solvency II Directive)
  - Will prescribe an "economic balance sheet" to all companies regulated in the EU
  - Approach similar to what has been developed for Swiss Solvency Test
  - Current version is specified in the technical specifications of the "4th Quantitative Impact Study" of the Solvency II standard model (QIS4)
  - Specifications has been drawn up before the financial crisis
  - Some modifications are currently under discussion
  - Similar to an "MCEV" (but some differences in details)
  - Frequently seen as the main driver of economic valuation for insurance companies
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## The Solvency II economic balance sheet

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- Assets and Liabilities are valued on a market-consistent basis
- Risk margin added to liabilities to cover liability risks after year one upon a hypothetical transfer to a third party
- Detailed guidance given on how to reconcile IFRS balance sheets to economic balance sheet
- Approach largely comparable to SST (but not identical)
- Contribution to required capital for most risks is computed by evaluating stress scenarios on Net Asset Value (excluding the risk margin)
- Excess of Assets over Liabilities is a Tier 1 item of Basic Own Funds
- Subordinated liabilities can be Tier 1 under certain conditions (e.g. Non-cumulative perpetual preference shares)
- Weaker forms of subordinate capital are Tier 2 or Tier 3
- Ancillary own funds: Certain unpaid or uncalled funds/commitments
- Various restrictions by tier apply to covering the required capital by own funds

## Measurement bases (cont'd)

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- IFRS 4 phase II**
- The intended unified IFRS insurance standard
  - Under development for about 10 years (!)
  - “Discussion paper” published in 2007: Many similarities with
    - MCEV
    - Solvency II
    - Common initiative with FASB to align IFRS and US GAAP
- 

- Will it all converge?**
- EEV/MCEV
  - Solvency II
  - IFRS
  - US GAAP
  - Internal economic measurement approaches
  - ... or will insurance business continue to be looked at on different bases?
-

## Movements in EVs during the crisis

	2007	2008	Change in %
SCOR	1,638	1,702	+ 4%
Hannover Re	1,715	1,652	- 4%
Munich Re Reinsurance	6,662	6,116	- 8%
CNP	12,070	10,440	- 14%
Generali	23,041	19,817	- 14%
VIG	3,108	2,638	- 15%
ZFS	15,935	12,818	- 20%
UNIQA	2,900	2,247	- 22%
AXA	38,490	27,209	- 29%
Old Mutual	9,229	6,372	- 31%
Munich Re Primary	5,406	3,509	- 35%
Allianz	21,927	12,545	- 43%

(in €m)



The impact on the SII available capital is likely to be in the same range!

# Impact of Financial Crisis on Life (Re-)insurance

Reinsurers have a different risk profile than primary Life insurers

<b>SCOR</b>			<b>Primary insurers</b>
Change in SCOR's EEV 2008			Change in EEV of primary insurers <sup>1)</sup>
Absolute	Relative		Relative
+ € 237m	+14%	Mortality/Morbidity -5%	Ca. +1% to +2%
+ € 49m	+3%	Lapse rates -10%	Ca. +1% to +3%
- € 16m	-1%	Interest rates -100 bps	Ca. -10% to -80%
- € 13m	-1%	Equity and property capital values -10%	Ca. -5% to -10%

- Significantly higher biometrical risk
- Lapse risk similar to primary insurers
- Much lower investment risk exposure

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## Standard model and internal models under Solvency II

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- The Solvency II Directive specifies the framework to be used for both the standard model and (optionally) internal models
- The current version of the standard model is the one used in the “Fourth Quantitative Impact Study” (QIS4) run in 2008 (as per 31 December 2007) across the EU
- The respective “Technical Specifications” (286 pages) sets out
  - the valuation of assets and liabilities
  - the computation of the Required Capital (“Solvency Capital Requirement”, SCR)
- The structure of the final standard model is expected to be close to QIS4, but many of the parameters are still subject to calibration
- For this purpose, an extensive EU-wide consultation process is currently under way

## Standard model and internal models under Solvency II

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- Internal models need to be approved by the respective national supervisors, who coordinate their work within the “Committee of European Insurance and Occupational Pensions Supervisors” (CEIOPS)
- Companies seeking approval of an internal model are encouraged to model risks based on their own views
- They can also chose to use partial internal models
- They are free to use any risk measure for internal purposes
- For supervisory reporting purposes, the results of internal models need to be reconciled to the framework given by the Directive (e.g. 1-year time horizon, 99.5% VaR)
- The derivation of the available capital will (in all likelihood) have to follow the standard model
- The results of standard model will have to be reported for at least 2 years after the approval of an internal model

## The road to the specification of the standard model

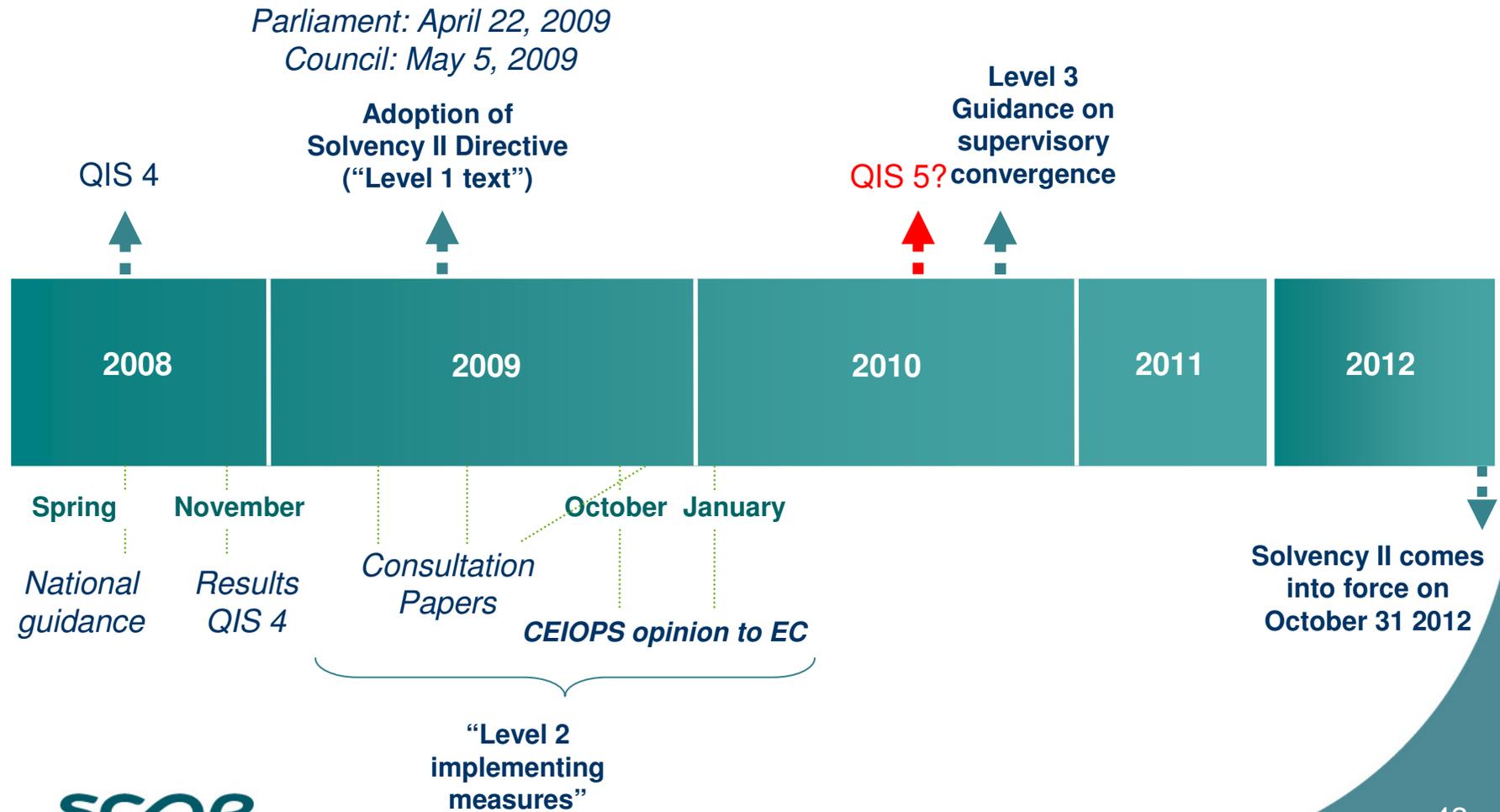
2005	“QIS1” = “Quantitative Impact Study 1” First field test on the Solvency II standard formula in the EU Voluntary participation
2006	“QIS2”
2007	“QIS3”
2008	“QIS4” Wide participation in most EU countries
2009	No EU-wide field test in 2009, but some regulators have encouraged companies to update results as per 31.12.2008 Publication of numerous Consultation Papers (CPs) by CEIOPS, some of which may have a significant impact on the final standard model
2010	A “QIS5” is planned for 2010, on the basis of the result of the consultation process
2012+	Submission of results of standard model to regulators expected to be compulsory for at least 2 years after the approval of an internal model, i.e. at least until 2014

## Level II consultation papers

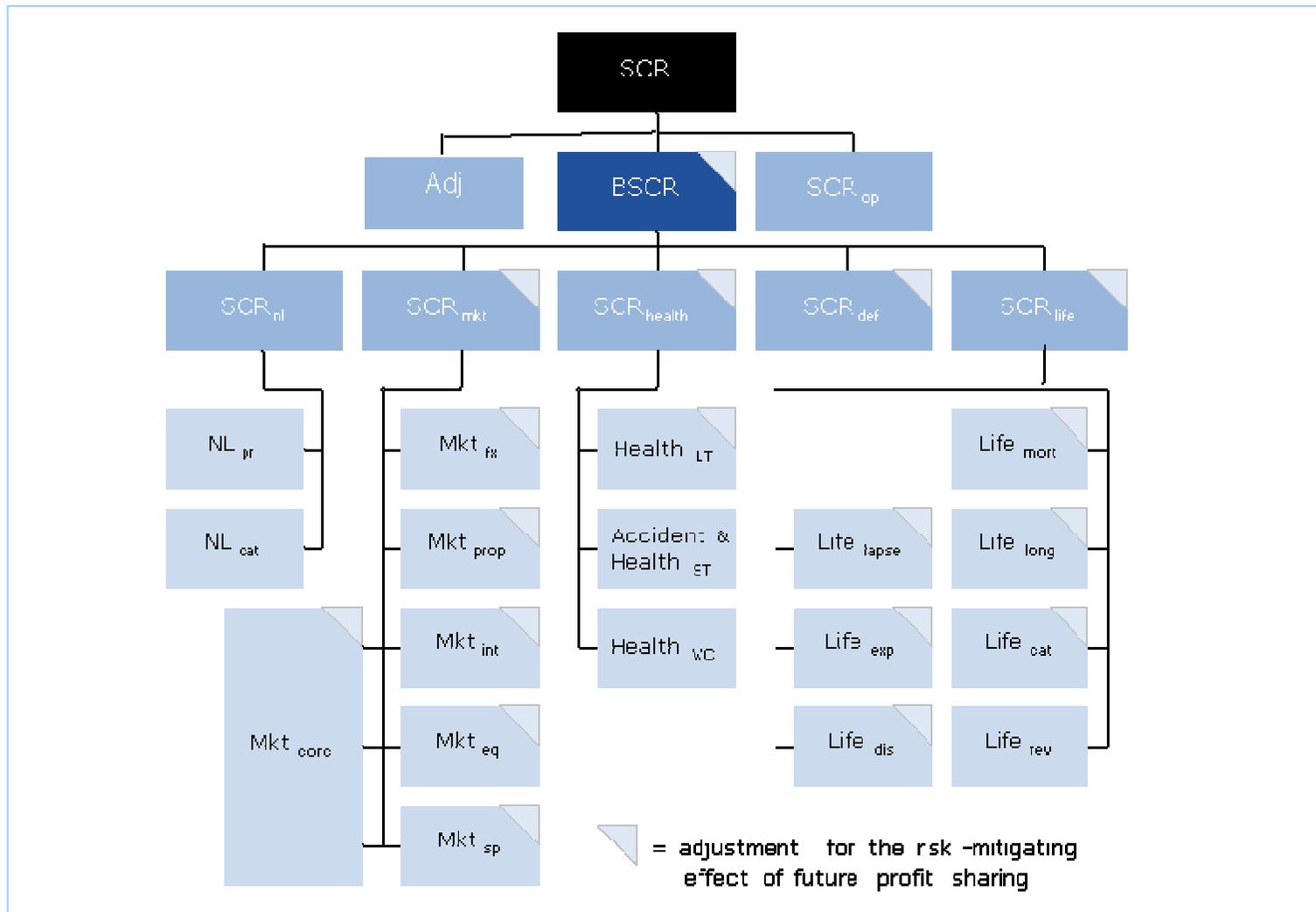
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- “Level I” = Solvency II Directive
- “Level II implementing measures”: Consultation with stakeholders in 2009/10 plus feedback to European Commission
  - *March 2009: Consultation Papers 26-38 (Closed)*
  - *July 2009: Consultation Papers 39-62 (Closed)*
  - *November 2009: Consultation Papers 63-76 (Open)*
- CPs give technical and procedural details on areas previously left unspecified, or propose changes to existing specifications regarding both the standard model and internal models
- More than 2000 pages in total
- Technically very detailed
- Some of the proposed changes might have a serious impact on the standard model, including changes to
  - *the definition of the risk free rate*
  - *diversification allowance on Non-life risks*
  - *specification of certain Life scenarios*
  - *level of Cost of Capital rate*
  - *operational risk measurement, etc.*

# Solvency II / Pillar I: Status and remaining main steps



# Modules of the Solvency Capital Requirement (QIS4)



# Why an internal model?

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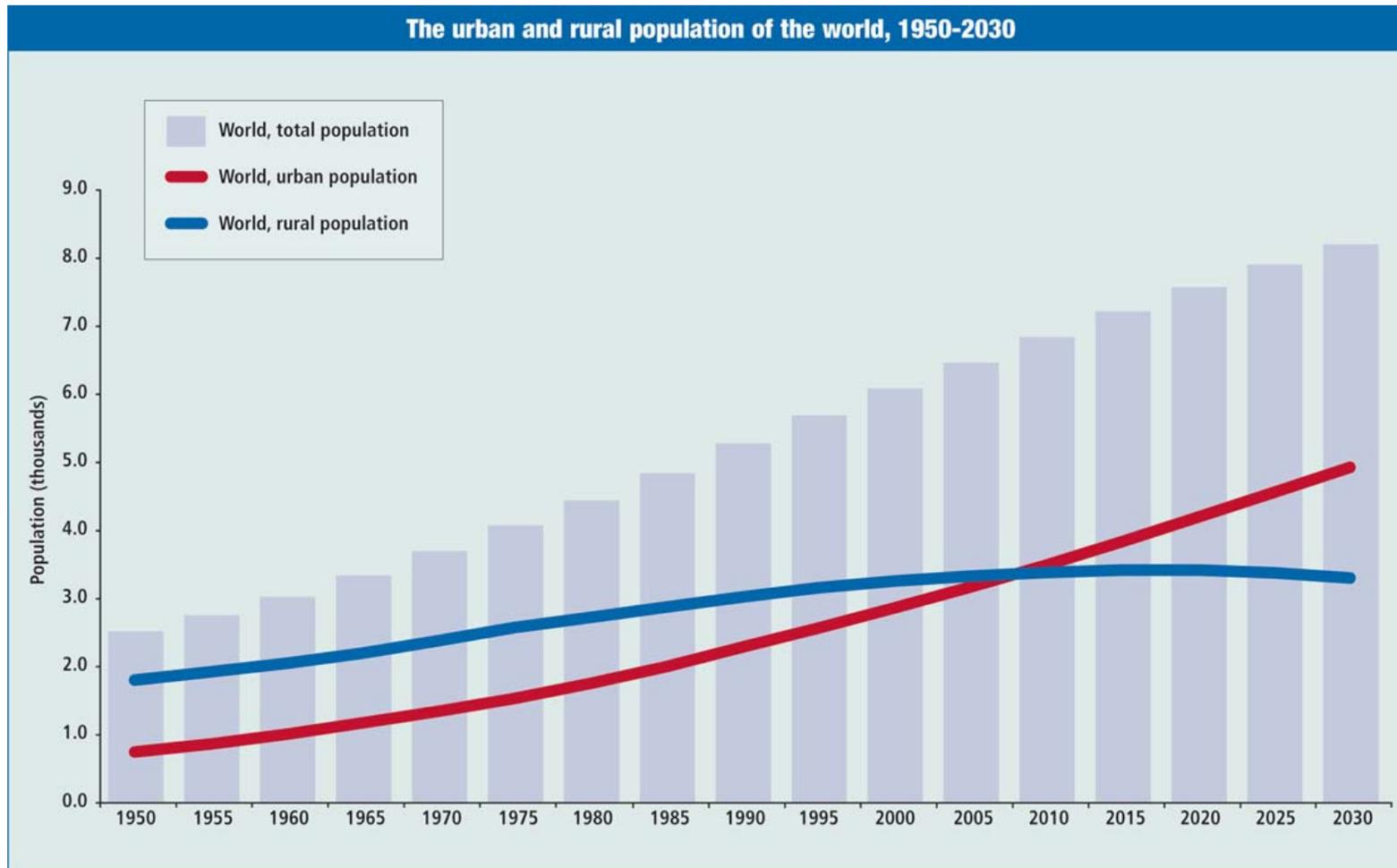
- Internal models are becoming unavoidable instruments for the industry because:
  - Peak risks are growing
  - Shareholders are becoming more demanding & more attentive stakeholders:
    - policyholders are concerned with financial stability,
    - regulators revisit insurance (SST, Solvency II)
    - investors are better informed (Return on Equity ROE, new accounting rules)
  - The integration of world financial markets requires a more efficient use of capital
  - Insurers already have technically mature methods for risk analysis and capital allocation

# Peak risks are growing

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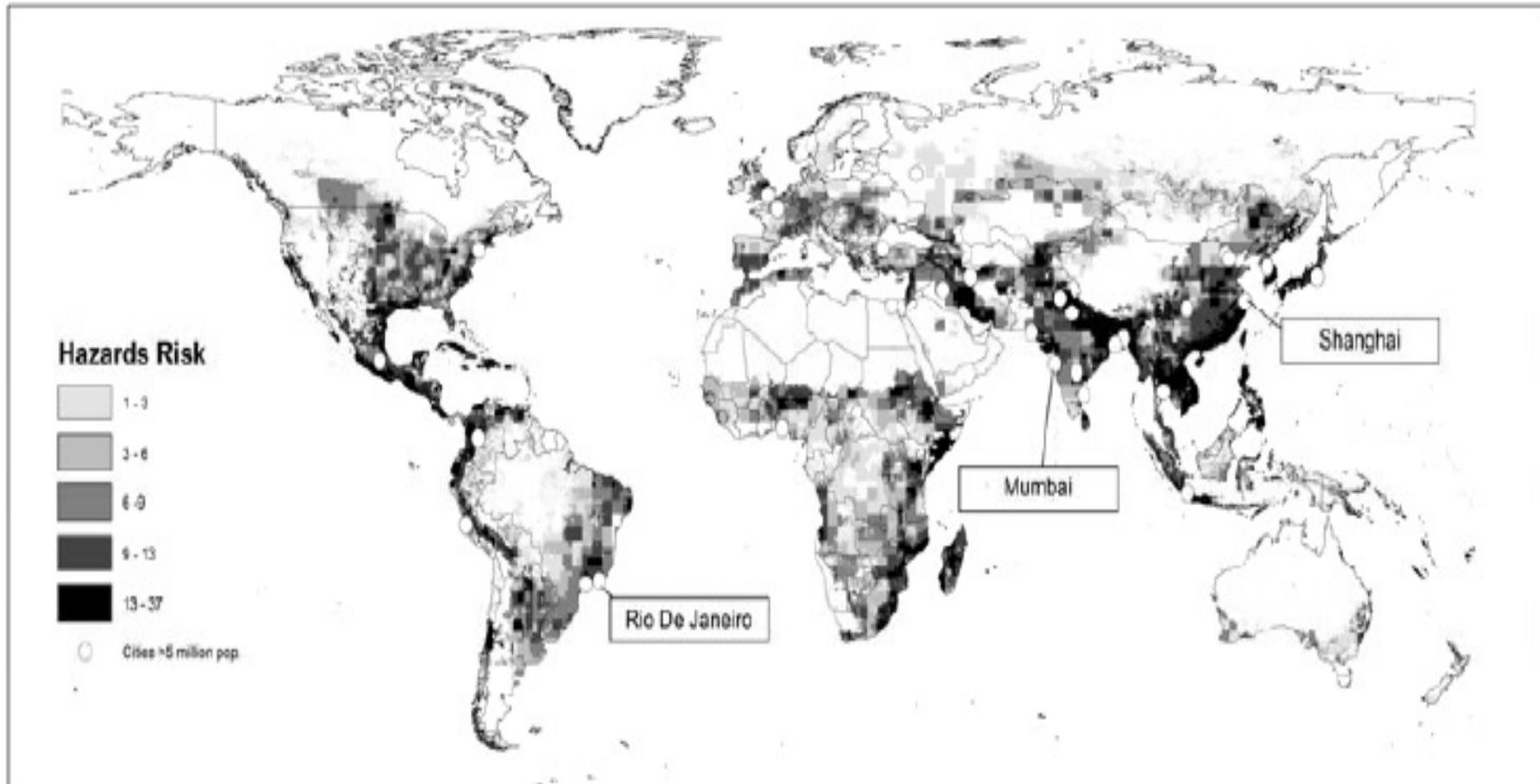
- Peak risks are growing due to:
  - *Demographic changes*: concentration of populations in hazardous areas, movement of populations favours the spread of disease (AIDS, SARS, etc.)
  - *Social & political changes*: better living standards, more demanding people (e.g. liability), evolution of legal systems, terrorism, political instabilities in oil rich regions, etc.
  - *New technologies* could bring new risks: nanotechnology, cell phones, new drugs (VIOXX) etc.
  - *New financial products* (especially in life insurance and credit)

# Growing populations concentrated in urban areas



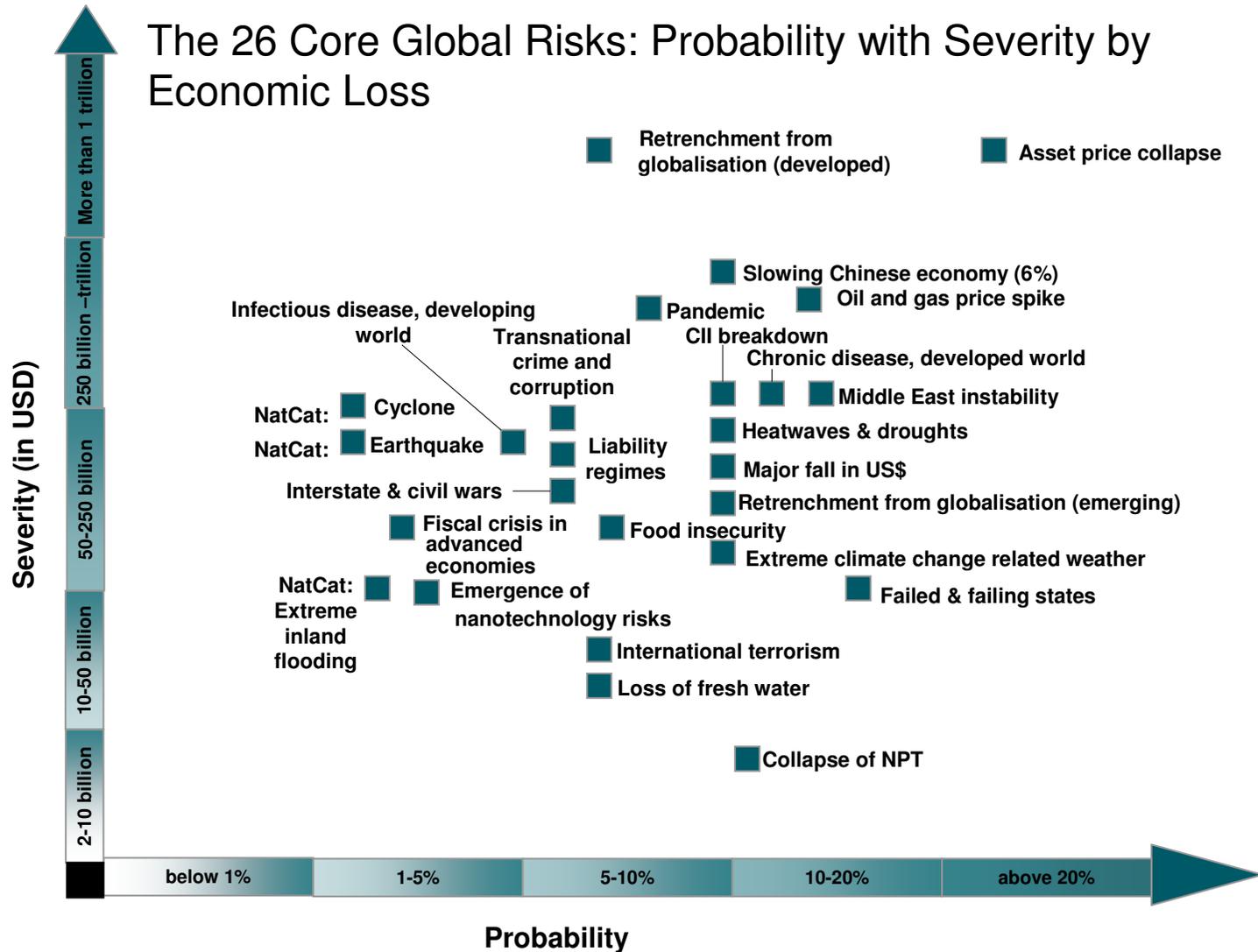
Source : "World population prospects", United Nations, 2005

# Urban populations concentrated in riskiest areas

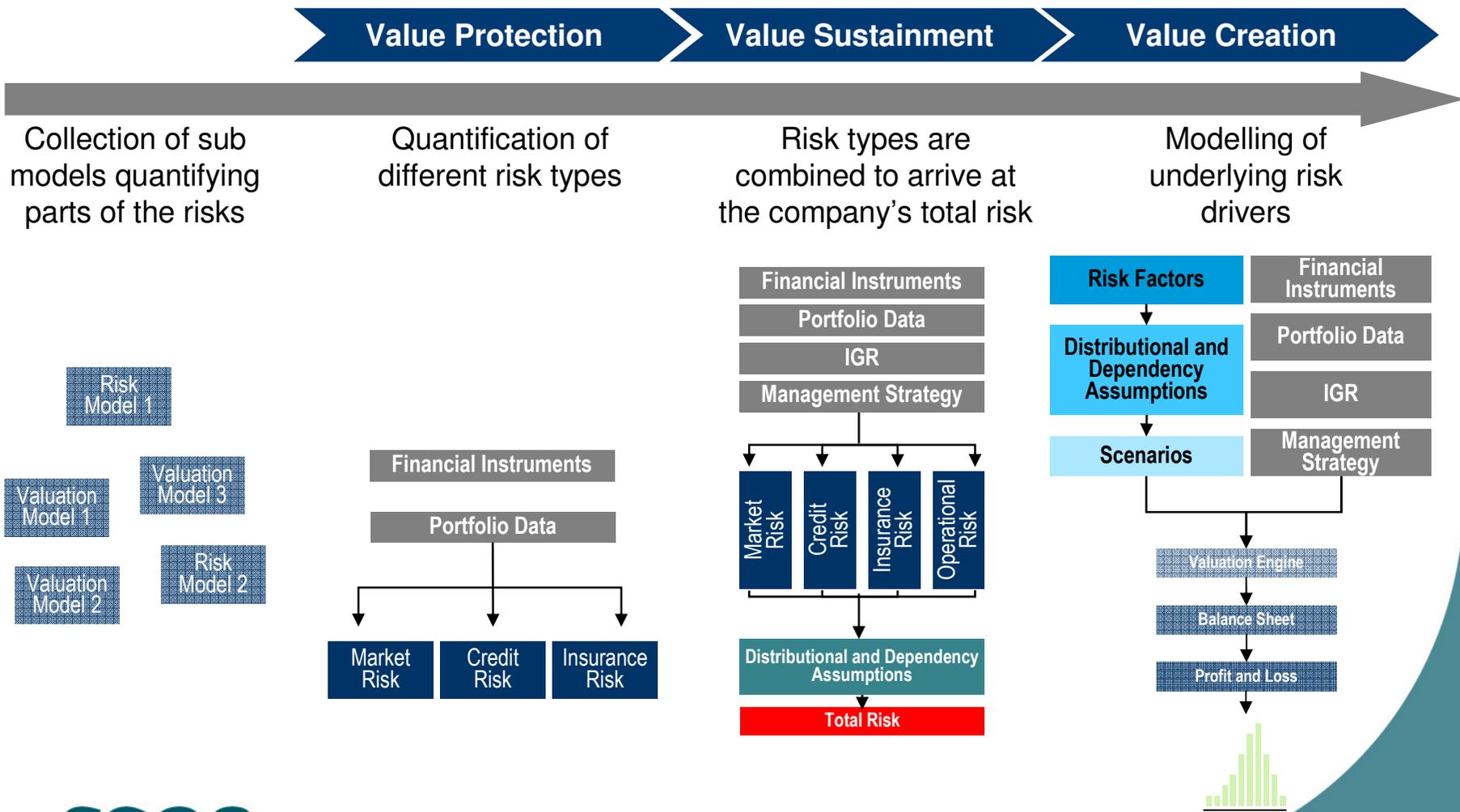


Source: Sherbinin, Shiller & Pulsipher (2007)

# New risks are multiplying with varying levels of severity and probability



# Internal models: evolution



# Requirements on the internal model

---

- Internal models should provide a way to assess the *need for capital* to cover the risk assumed
- They should provide a *unified way of communicating about risks* within the company and with outside stakeholders (Solvency requirements, rating agencies, investors)
- They should set the framework for taking *strategic decisions*, balancing risk and return: “Flight Simulator”
- They should allow the *optimisation* of both the asset and liability portfolios by modelling the diversification benefits
- They should make it possible to *measure the economic performance* of the various lines of business

# A more comprehensive treatment of risk

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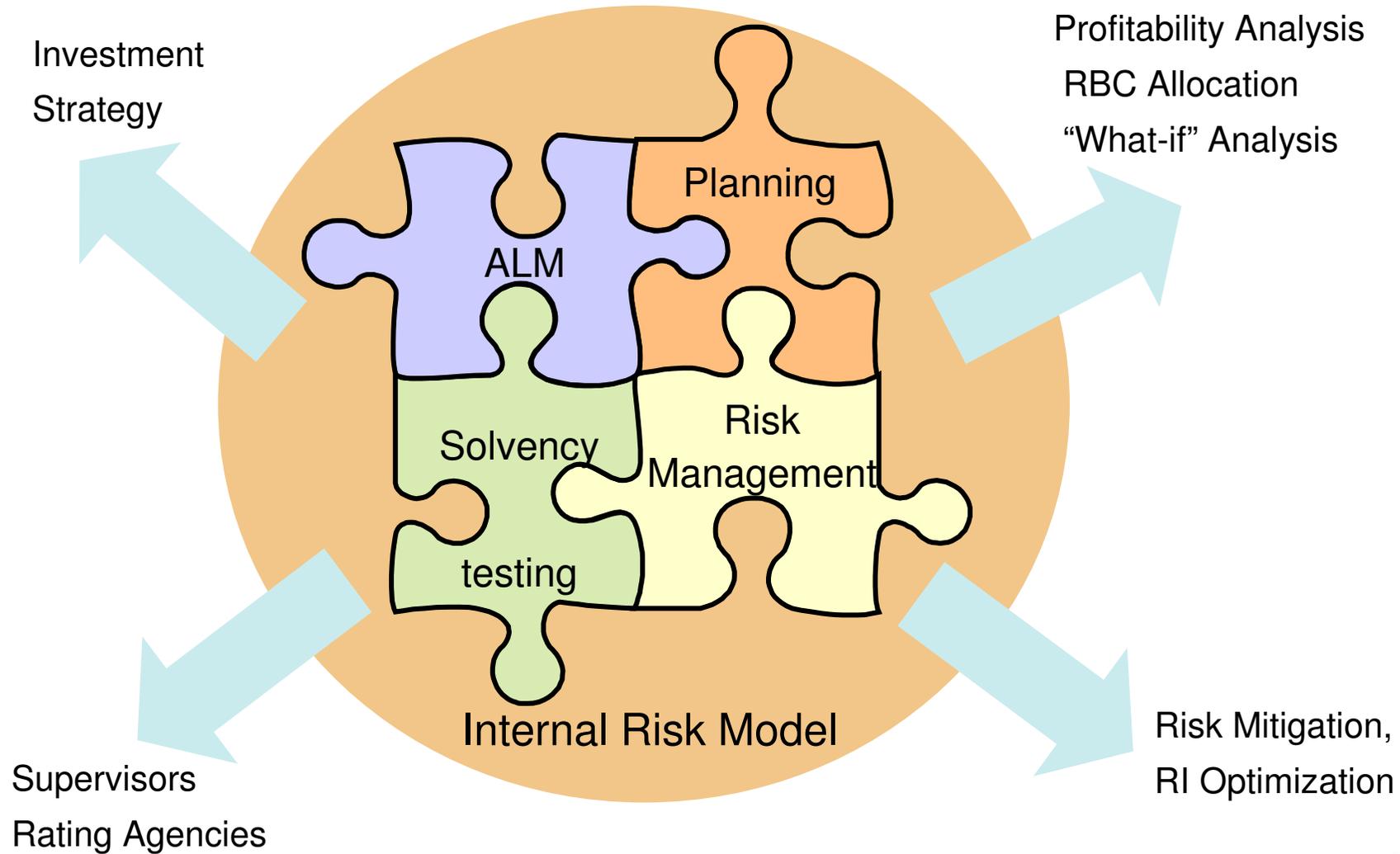
- All risks are taken into account
  - ✓ *P & C underwriting risks*
  - ✓ *Life & Health underwriting risks*
  - ✓ *Market risks*
  - ✓ *Credit risks*
  - ✓ *Operational risks*
- All dependencies are taken into account
  - ✓ *Within the liabilities P & C and Life & Health*
  - ✓ *Between P & C and Life & Health*
  - ✓ *Between invested assets*
  - ✓ *Between assets and liabilities*
- Diversification benefits are taken into account
  - ✓ *(incl. Group diversification)*

# A more consistent treatment of risk

---

- An integrated approach to risk
  - Use of advanced stochastic methodologies
    - Risk measure: Value-at-Risk (VaR), tail-Value-at-Risk (tVar)
    - Monte-Carlo simulations
    - Non-linear dependence measures: copulas
  - Use of homogeneous parameters
    - Same interval of confidence for all risks
    - Consistent risk measures allowing for capital allocation
  - Use of consistent data from the various business units
- A rational approach to risk
  - All available information is included
  - All options are taken into account
  - An approach tailored to the firms specificities

# Internal risk models: applications and benefits



# Types of Models

---

- Models can be loosely grouped into:
  - **Deterministic models:** A number of factors are estimated and applied to volume measures (e.g. premium income etc.)
  - **Distribution-based models:** Probability distributions for different risks are determined and aggregated
  - **Scenario-based models:** A (frequently large) number of scenarios is generated to value the company in various States around the world
- Most models are a mix of all three approaches
- Deterministic models present the danger that the underlying factors have to be regularly updated to take into account changing risk exposures
- Distribution and scenario-based models can be equivalent. Distribution-based models can be computationally efficient, whereas scenario-based models can be more intuitive and flexible

# Risk measure and capital allocation

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- In fact there is a whole debate over the risk measure that should be used for computing the capital
- For shareholders, the relevant measure is the Value-at-Risk, VaR, since once the company is bankrupted their money is gone anyway
- For regulators and policyholders, they would like to see the risk measure as the tail-Value-at-Risk, tVaR, since they want to minimize the risk of not being paid
- In terms of managing the company, tVaR, is a coherent risk measure facilitating the allocation of capital to the various risks involved, which makes it the preferred risk measure
- In practice tVaR and VaR are comparable at different thresholds:  $tVaR(1\%) \sim VaR(0.4\%)$  for the whole portfolio

# Examples of risk evaluation

- ▶ Typical gross natural catastrophe exposures VaR and tVaR (in EUR millions).

Measure	Hurricane	Earthquake	Total
Expected	62	16	<b>78</b>
Std. Dev.	84	60	<b>104</b>
VaR (1%)	418	332	<b>544</b>
VaR (0.4%)	596	478	<b>690</b>
tVaR (1%)	<sup>&gt;</sup> 575	<sup>&lt;</sup> 500	<b>678</b>
tVar (0.4%)	700	598	<b>770</b>

# Capital Model

## Methodology and main architecture

- The P&C and life liabilities are aggregated in many segments called *liability baskets*.
- Different variables per liability basket: loss distributions, premiums, costs, patterns; dependency structure and its parameters.
- Net reserve data is handled in parallel, but retro of new business is modelled separately.
- Economic balance sheet is used as a starting point.

### Life Liability model

- All aggregated life net liabilities
- Based on embedded value database
- Life scenario distributions partly linked to the economy

### P&C Liability Model

- All aggregated Non-Life gross liabilities
- Net reserve model
- Import from actuarial modelling database
- Hierarchical dependency tree

### Invested Assets Model

- Investments directly depending on ESG
- Credit risk of corporate bonds
- Modelling of structured notes
- All investment dependences through ESG

### Import from the ESG

- Economic Scenario Generator (ESG)
- Dependence among economic variables preserved
- ESG Database as data source

### Internal Model

- Frequency/severity/cat scenarios
- New-business retrocession
- Life liability model import and computation
- Cash flows
- Bringing assets and liabilities together

### Final Reporting

- Discounting of results
- Output tables with statistics
- Tax and costs
- Final RBC results

# Capital Model

The development of the model and the analysis of its output provide **fundamental insights into the nature of SCOR's risk portfolio.**

The resulting total Risk-Based Capital computed with the model amounts to € 3.3 bn, to be compared to available capital of € 4.49 bn.

Risk-Based Capital, SCOR Group <i>In EUR millions</i>	RBC Diversified	Share of RBC excl. op. risk
Non-Life new business (UW year 2008), net	800	26 %
Non-Life reserves (incl. unnamed in 2007), net	1 200	38 %
Life (incl. Life credit risk, market value margin)	700	22 %
Market risk	400	13 %
Credit (excl. Life credit exposure)	15	1 %
Operational risk	210	-
<b>Total RBC after diversification</b>	<b>3 325</b>	<b>100 %</b>
Total RBC stand alone	6170	
Diversification effect	46 %	

# Main technical risks of SCOR Global Life's portfolio

Risk type	Mitigating measures
Claims trends	<ul style="list-style-type: none"> <li>→ Premium review options</li> <li>→ Profit share structures</li> <li>→ Claims management/audits</li> <li>→ Claims definitions in original products</li> </ul>
Lapse	<ul style="list-style-type: none"> <li>→ Claw back clauses</li> <li>→ Profit commissions</li> <li>→ Original product design</li> </ul>
Interest rate, equity, spread & volatility risk	<ul style="list-style-type: none"> <li>→ Carve out technical risks – investment risks retained by primary insurers</li> <li>→ Specific hedges for individual products with specific ALM risks</li> <li>→ Group ALM</li> </ul>
Inflation	<ul style="list-style-type: none"> <li>→ Life liabilities largely uncorrelated</li> <li>→ Group ALM</li> </ul>
Extreme mortality (pandemics)	<ul style="list-style-type: none"> <li>→ Mortality swap</li> </ul>
Claims volatility	<ul style="list-style-type: none"> <li>→ Accumulation control &amp; retro per risk with low retention</li> </ul>
Local catastrophes (material accidents, large terror attacks, natural catastrophes etc.)	<ul style="list-style-type: none"> <li>→ Cat retrocession and other special covers</li> </ul>
 Default risk	<ul style="list-style-type: none"> <li>→ Treaty wording</li> <li>→ Counterparty credit monitoring</li> </ul>

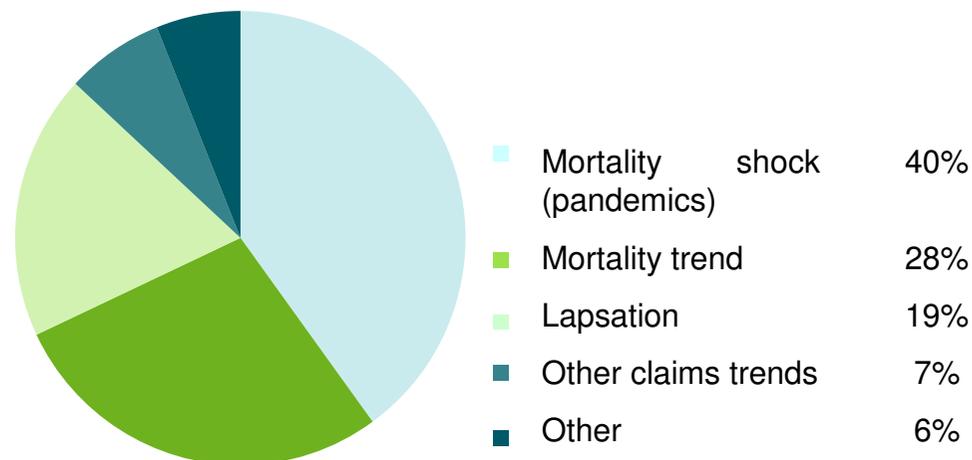
# Modeling Life Reinsurance Risks

## Risk modelling and allocation of capital

Internal capital model addresses the original risks and mitigating measures quantitatively, using a combination of

- Scenarios
- Sensitivities
- Simulations (particularly for economic risks)

## Approximate composition of Life liability risks



- Retained risks concentrates on adverse claims trends, pandemics and adverse lapse experience
- Pricing ensures that
  - capital allocated to cover these risks is rewarded appropriately
  - Value of new business is created

*Total in-force 2009, after diversification within Life liabilities, before diversification with other risks*

# Is it possible to statistically test internal models?

---

- RBC is computed for a probability of 1% or 0.5%, which represents a 1/100 or 1/200 years event
- In most of the risks we insure, such an event *has never been observed* or has been observed only once
- This means that the tails of the distributions *have to be inferred* from data from the last 10 to 30 years in the best cases
- The 1/100 years RBC is thus based on a *theoretical estimate* of the shock size
- It is considered more as the *rule of the game* than as realistic risk cover
- It is a *compromise* between pure betting and not doing anything because we cannot statistically estimate it

# Stress testing the models is crucial

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- Bakounine used to say: “Reality is always wider than any doctrine”, in other words a model is only a simplification of reality
- Testing the output of internal models is thus a must to gain confidence in its results and to understand its limitations
- We just saw that it is difficult, or even impossible, to *statistically test* the model. We can only *stress test* it
- There are at least three ways of stress testing the models
  1. Test the sensitivity to parameters (sensitivity analysis)
  2. Test the predictions against real outcomes (historical test)
  3. Test the model against scenarios

# Testing stochastic models with scenarios

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- Scenarios can be seen as thought experiments about possible future world situations
- Scenarios are different from sensitivity analysis where the impact of a (small) change to a single variable is evaluated
- Scenario results can be compared to simulation results in order to assess the probability of the scenarios in question
- By comparing the probability of the scenario given by the internal model to the expected frequency of such a scenario, we can assess whether the internal model is realistic and has really taken into account enough dependencies between risks

# Scenario-based simulation vs. distribution-based simulation

---

## ▪ Scenario-based

### ▪ Pro

▪ Risk is modelled at its source. When more random variables are modelled on the same scenarios, their dependence is recorded automatically:

- E.g. economic scenarios with impact on random variables “asset value  $A$ ” and “value of liabilities  $L$ ”

### ▪ Con

▪ For many risks, the random variable cannot be modelled or it is extremely difficult to calibrate the models.

**SCOR**

## ▪ Distribution-based

### ▪ Con

▪ The source of the risk is forgotten. Appropriate dependencies more difficult/ impossible to incorporate:

- the different scenarios cannot be distinguished anymore. The dependence of another risk (with different outcomes) cannot be recorded properly in this way.

### ▪ Pro

▪ For many risks the random variable may be difficult or impossible to model, but the distribution can be estimated using statistics.

# Protecting the company against model shortcomings

---

- To protect the company against the inevitable shortcomings of the model is to set *exposure limits for each extreme scenario*
- For instance one can decide not to allow any scenario to consume more than 15% of the company's available capital
- One can add a certain *buffer to the capital* that is strictly required from the model
- Another good measure is to *limit exposure to particular risks*. For instance, the company would not allow more than 5% of its available capital to be exposed to terrorism

# Agenda

1	Historical context
2	Solvency II
3	Key components of ERM
3.1	Elements of traditional risk management
	Risk Enquiries
	Quantitative Risk Assessment
	Economic capital models
	Extreme Scenarios
	Process controls
3.2	Risk culture
3.3	Strategic risk management
	Risk and return
	Emerging risks

# Extreme scenarios – Purpose

## Purpose of Extreme Event Scenarios

- Identification and monitoring of key risk drivers
- Reflection on the main risk drivers and the interconnections between them
- Fostering a regular dialogue between the risk experts in the operating entities and the risk management units
- Ensuring that SCOR control its exposures arising from key risk drivers to within the stated risk tolerance limits
- Calibration of the Internal Model; the quantitative assessments will deliver an estimate to which extent the potential impact of an extreme event scenario is reflected in the model.
- Recognise probability distributions and interconnections for major risks to which SCOR is exposed.
- Understand and manage the risks in our business more effectively.

## Dimensions

- Underwriting in Life and Non-Life
- Primary insurance business
- Retrocession
- Assets
- Operational Risks

# Extreme scenarios – Process

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## Process

- Using the results of all the risk identification processes (e.g. Risk Enquiry, Emerging Risks etc.), key risk drivers are identified and then classified regarding their possible severity and frequency of impact.
- Dedicated working groups are installed, bringing together a cross section of experts for each topic on the list of risk drivers, and working on the development of extreme scenarios.

## Working Groups' functions

- Identification and description of the scenarios for specified return periods (e.g. 1 in 10 years, 1 in 100 years etc.), taking into account the SCOR's specificities.
- Estimation of the net total cost for SCOR in all lines of business, assets, and operations which would be affected.
- Co-ordination and extensive information exchange with the internal model team for calibration of the model.
- Reporting of findings to the Group CRO, with recommendations for those scenarios where the estimated exposures approach or exceed group tolerance limits.

# Extreme scenarios – Sample Output

## Description / definition

- **Coastal or inland flooding**, triggered by a variety of events including torrential rain, storm surges, flash floods, river inundations, tsunamis, and dam failures.

## Past events (by lives affected)

- up to 3,7 million – Huang He flood, China, 1931
- up to 900,000 – Huang He flood, China, 1938
- ~ 300,000 – Indian Ocean tsunami, 2004
- 231,000 – Banqiao Dam failure, China, 1975
- 145,000 – Yangtze river flood, China, 1935
- 100,000 – flood North Vietnam, 1971
- 100,000 – Messina tsunami, 1908
- 100,000 – Yangtze river flood, China, 1911
- 30,000 – Yangtze river flood, China, 1954
- 10,000 – flood, Iran, 1954
- 2,142 – North Sea flood, Netherlands, UK, 1953
- up to 12,000 – Manchhu dam burst, India, 1979
- 1,909 – Vajont landslide and flood, Italy, 1963

## Assumptions

- Life: lead time for “ordinary” flood sufficient to evacuate; risk mainly from tsunamis
- Non-Life: North Sea storm surge in combination with river flood (e.g. London)

## Scope & limitations

- Life: lead time for “ordinary” flood sufficient to evacuate; risk mainly from tsunamis
- Non-Life: No limitations

## Severity Assessment

Life	P&C	Assets	Operations	Strategy
<ul style="list-style-type: none"> <li>▪ 1:100 event – ~ € x million</li> <li>▪ 1:250 event – ~ € x million</li> </ul>	<ul style="list-style-type: none"> <li>▪ 1:100 event – ~ € x million</li> <li>▪ 1:250 event – ~ € x million</li> </ul>	<ul style="list-style-type: none"> <li>▪ 1:100 – No impact on assets</li> <li>▪ 1:250 – Impact on equities, corporate bond and real estate expected ~ € x million</li> </ul>	<ul style="list-style-type: none"> <li>▪ No impact on operations (although some business interruptions expected)</li> </ul>	<ul style="list-style-type: none"> <li>▪ No impact on strategy</li> </ul>

## TOTAL

sum of 1:250 events:

€ x million

# Agenda

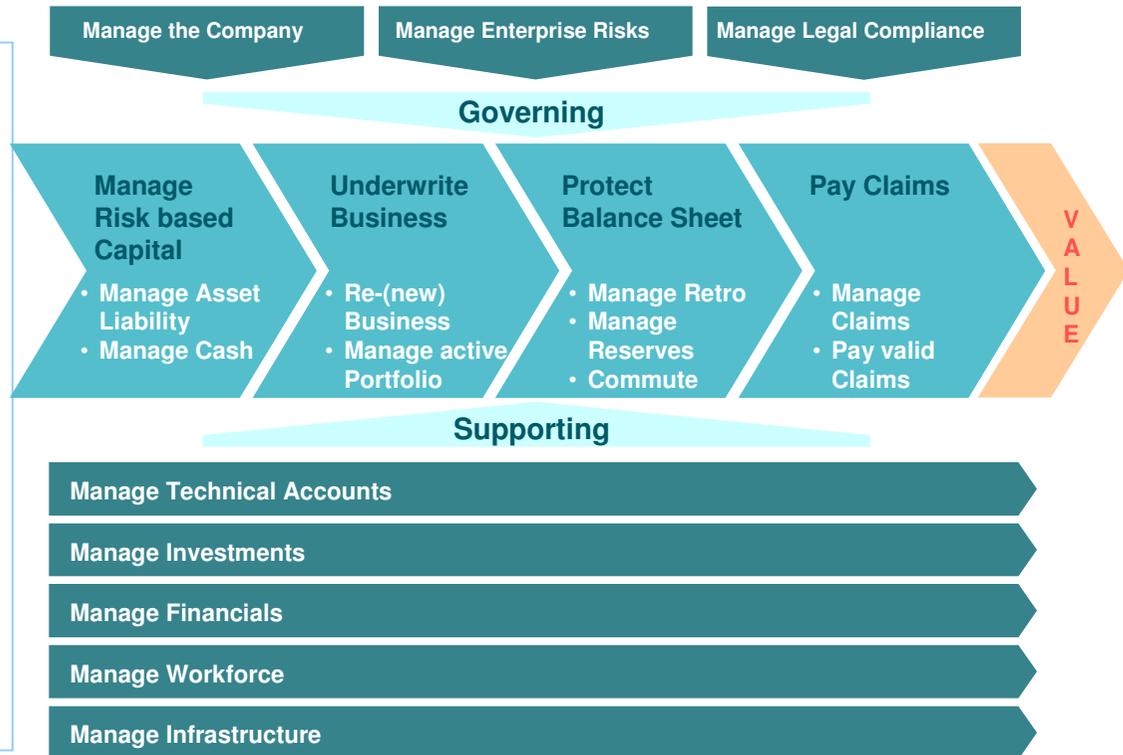
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# Process Risks

## Process Model – Know your Processes

### Know your Processes

- Operational risks emerge from performing our business processes when serving our clients. In today's business environment **processes are highly complex** and often not transparent enough due to historical reasons.
- When intending to identify, assess and mitigate critical risks a **fundamental understanding** of the current business environment and processes is inevitable.



### Approach

#### Step 1

Create a Process Model with a top down approach

#### Step 2

Appoint Process Owners and delegate authority to design the process based on given objective

#### Step 3

Refine Process model together with management and process owners from bottom up

# Process Risks

## Risk Assessment – Know your Risks

### Know your Processes

- When conducting business, managing risks is an inevitable task that must be done.
- Possible processes impacted by the risks need to be assessed.



### Approach

When assessing process risks you consider two main inputs.

- The process flowchart and narratives explaining how the process is performed
- The list of pre-assessed risk for this concrete process as explained previously

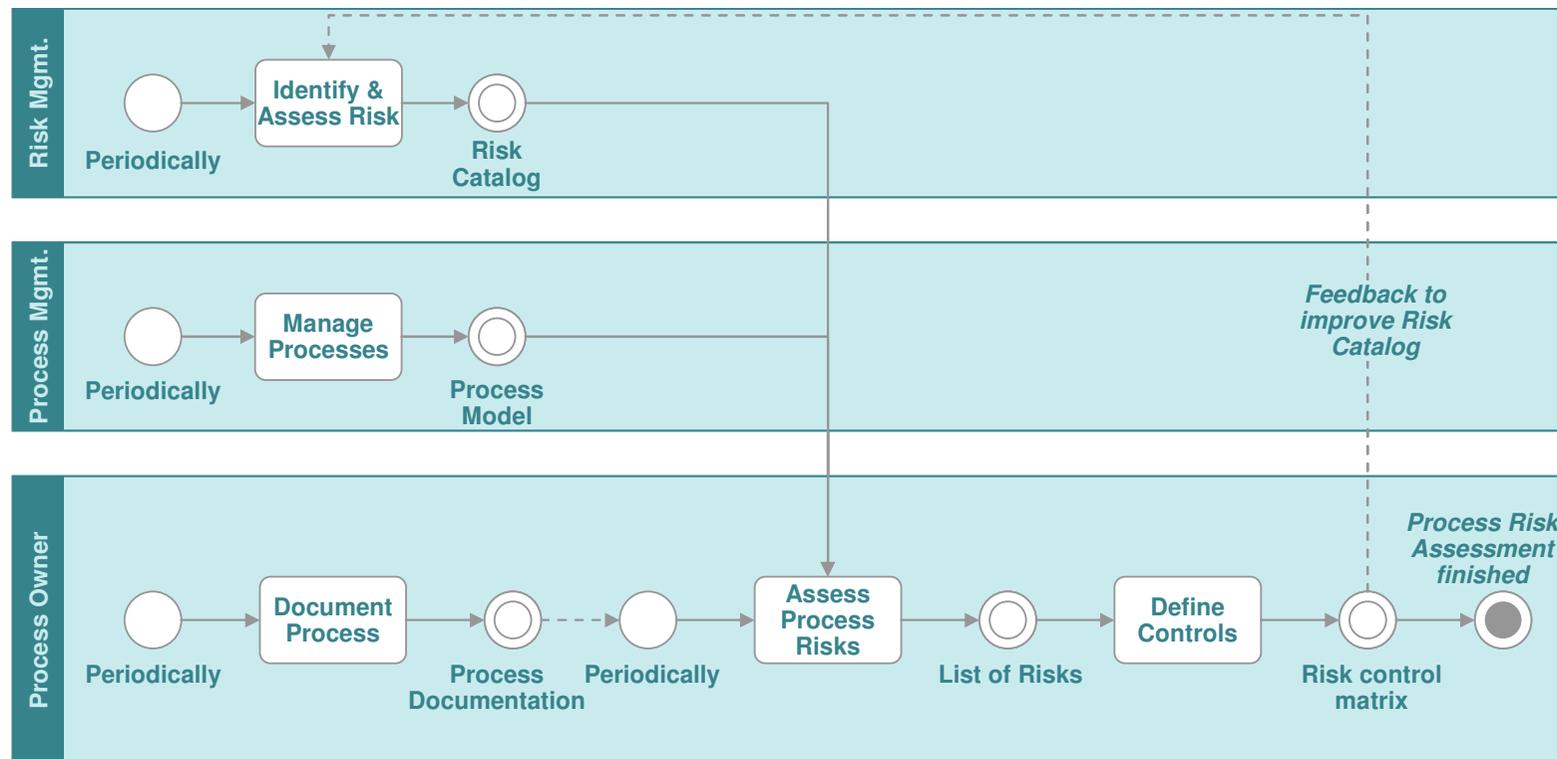
Step 1	Step 2	Step 3	Step 4
The process owner walks through the process and explains how it works	The audience consisting of stakeholders (RM, IA, other process owners and specialists) identifies possible risks resulting in a list of concrete process risks	The process owner defines mitigating controls and required measures to minimize the risks in the process	The process owner ensures that control and measures are implemented and performed

# Process Risks

## Assess Process Risks – Process Flowchart

### Process Flowchart (conceptual)

The process flowchart below shows our standard (BPMN), to document our business processes for ICS purposes.



# Process Risk Assessment - Summary

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## Summary

- Know and manage your processes
  - ⇒ Up-to-date Process Model incl. Ownership, dependencies and main deliverables
- Periodically identify and assess risks (risk management)
  - ⇒ Maintain a Risk Catalog incl. measures and high-level reference to processes
- Periodically assess process risks (process owner) by walking through the process and assessing critical risks. Critical risks can either be immanent process risks or already identified risks from the risk catalog
  - ⇒ Process based risks
- Define process based controls to mitigate the risks
  - ⇒ Risk control matrix (RCM)

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# Motivation

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- Over the past few years, companies have increasingly articulated their strategic willingness (“appetite”) and limitations (“tolerance”) to take on risks more explicitly and formally
- This has been mainly driven by a number of factors, including
  - the general trend to incorporate ERM in strategic decision making
  - regulatory developments, e.g.
    - UK: ICA (ca. 2003)
    - Switzerland: SST (since 2007) and Swiss Quality Assessment (since 2008)
    - Germany: MaRisk (2009)
    - Solvency II
  - the evolution of rating agencies’ evaluation criteria
- Risk appetite and tolerance constitutes the key link between
  - corporate strategy
  - day-to-day risk assumption
- It can help provide assurance to stakeholders that
  - the company has a full understanding of the risks undertaken
  - these risks are appropriately under control

# Risk appetite and tolerance statements

## *Appetite and tolerance – two sides of one coin*

### ▪ **Appetite = actively seek**

- My mother-in-law loves cheesecake...
- Investing in U.S. “sub-prime mortgages” gives a high yield...
- We are moving into cat reinsurance...

### ▪ **Tolerance = expect to withstand without changing course**

- ...but is lactose intolerant.
- ...what happened?
- ...but is the Board ready to pay losses?

### ▪ **Japanese banks tend to have low risk appetite but high risk tolerance**

- Underwriting and trading activities are conservative
- Tolerate large blowups without dismissals or business line shutdowns

### ▪ **US banks are the opposite!**

- Underwriting and trading activities are aggressive
- Inevitable large blowups lead to dismissals and business line shutdowns

*Source:*

*Implementation of Best Practice ERM Infrastructure  
Donald Mango, March 2008*

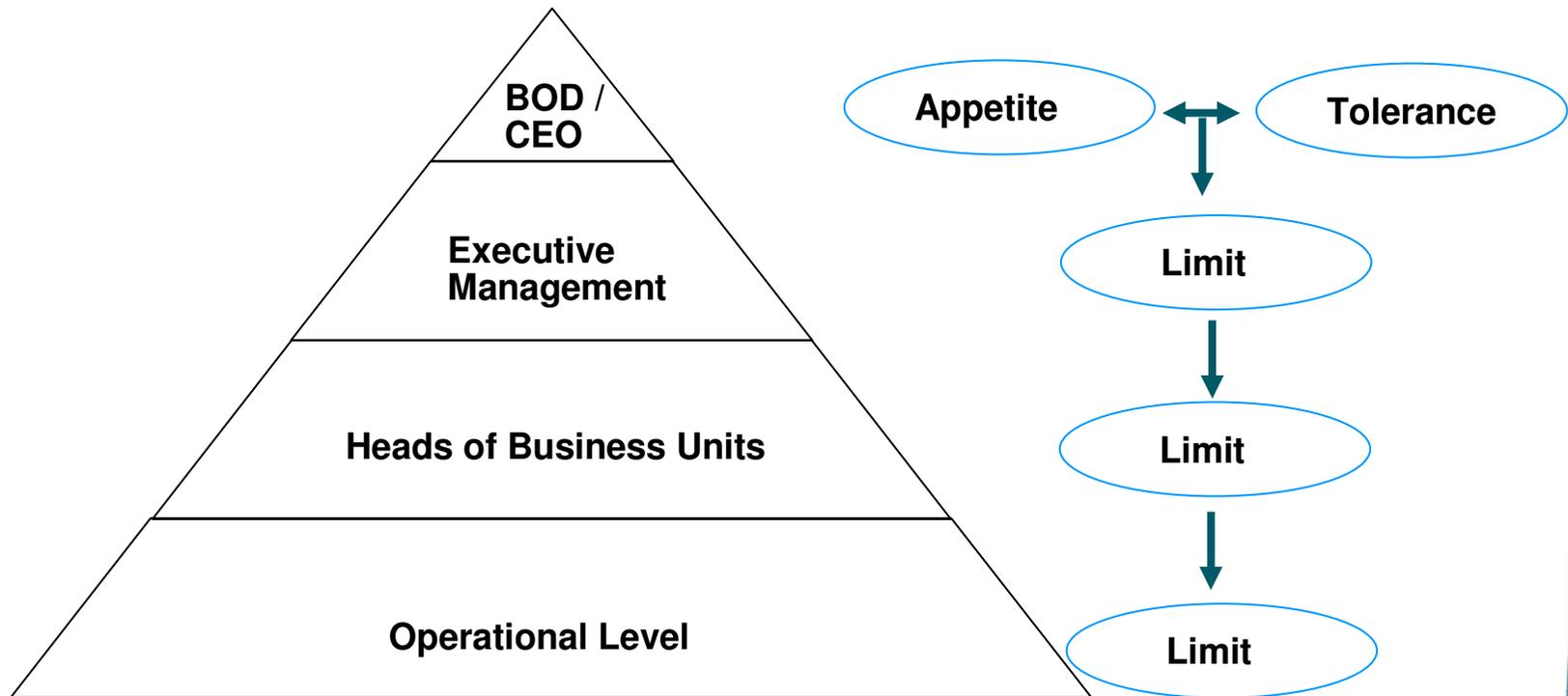
- Stating your appetite is usually easier than stating your tolerance
- Risk tolerance needs to be translated into risk limits for day-to-day operational use

# Features of effective risk appetite and tolerance statements

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- Addressing all key stakeholders
  - clients
  - shareholders
  - regulators
  - rating agencies
  - employees
  - brokers
  - ...
- Understandable, meaningful and helpful to stakeholders
- Set by Board of Directors
  - It is a corporate statement about attitude towards risk taking
  - The board needs to fully understand it and give appropriate directions
  - It should be involved in an active discussion and regular reviews
- It needs to be translatable into comprehensive risk limits which are cascaded down through the organisation
  - This is often achieved using economic capital models

# Translating risk tolerance into limits



- Key components of a limit system:
  - Complete, consistent with risk tolerance
  - Resources and processes for planning, monitoring, reporting, validation, escalation
  - Comprehensive documentation (“limit handbook”)
- There are important other additional constraints for limits (e.g. practical!)

# Examples of risk tolerance formulations

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- Policyholder focused:
  - Target probability that liabilities will be fully paid
  - Average loss to policyholders at a target probability (shortfall)
- Shareholder focused:
  - (Maximum) probability of missing earnings forecast
  - ...of reduction in dividends
  - ...of negative earnings
  - ...of recapitalisation need
- ...plus other stakeholders:
  - (Maximum) probability of rating downgrade
  - ...of regulatory intervention

# The example of SCOR

- Policyholder (client) perspective: *Average loss to clients in 1% worst cases can be fully paid*
  - ⇒ Hold capital at a **99% TailVar** level
- Rating & regulatory perspective: *Target rating and regulatory solvency*
  - ⇒ Hold sufficient capital to cover **rating and regulatory requirements**
- Shareholder perspective: *Avoid recapitalising the company more often than every 10 years*
  - ⇒ Hold additional **buffer** capital

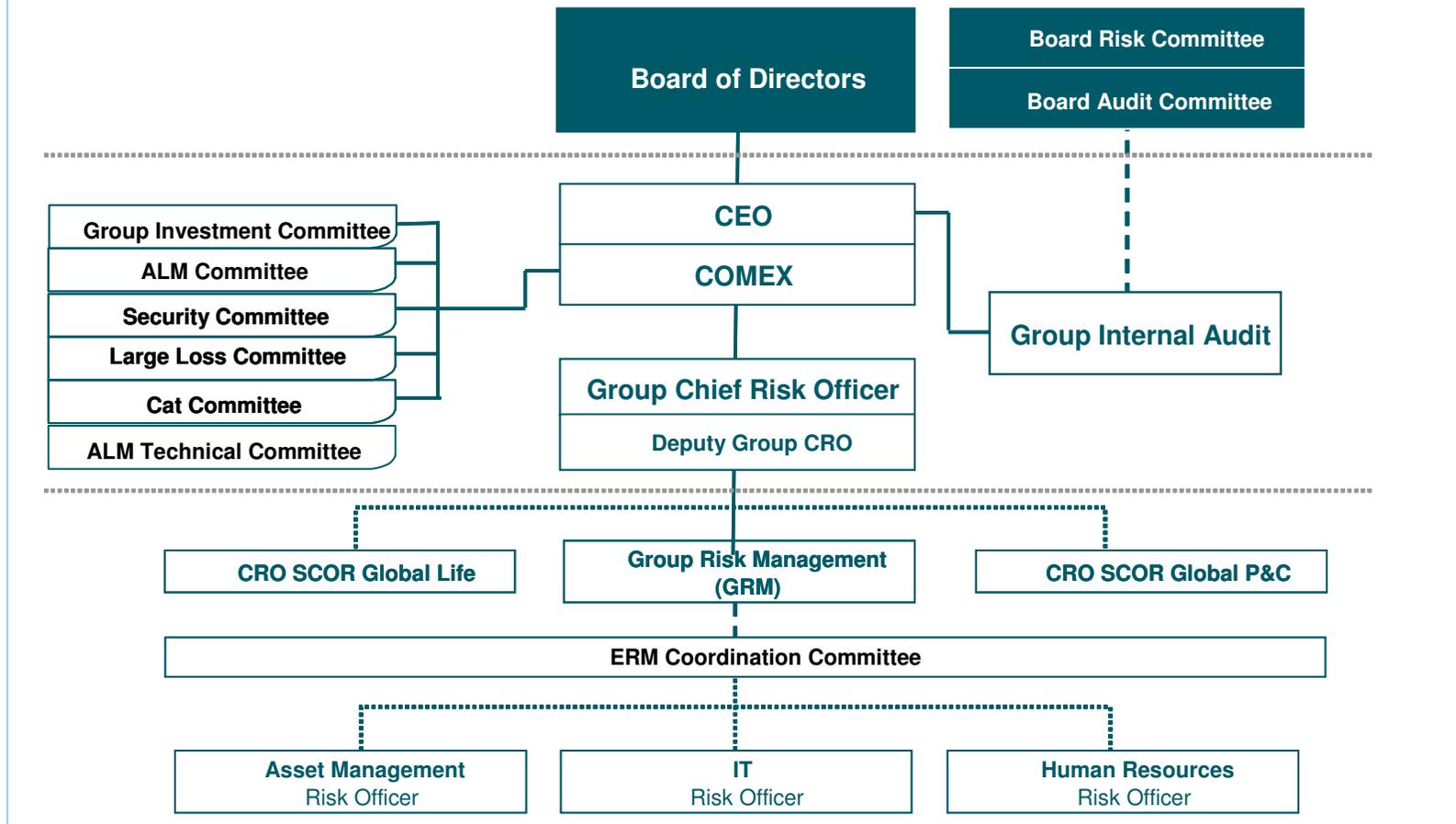
- Total target capital = max (internal, rating, regulatory requirements) + buffer

+

- No risks (LOB, Asset Class) must consume more than 5% of available capital when looking at the 95%TVaR
- No extreme scenario (with a probability of higher or equal to 1:250) must result in a loss larger than 15% of available capital

# Risk-based Governance

SCOR's ERM organisation is at the core of the corporate structure



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1

Historical context

2

Solvency II

3

Key components of ERM

3.1

Elements of traditional risk management

Risk Enquiries

Quantitative Risk Assessment

Economic capital models

Extreme Scenarios

Process controls

3.2

Risk culture

3.3

Strategic risk management

Risk and return

Emerging risks

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# Linking risk appetite and profitability

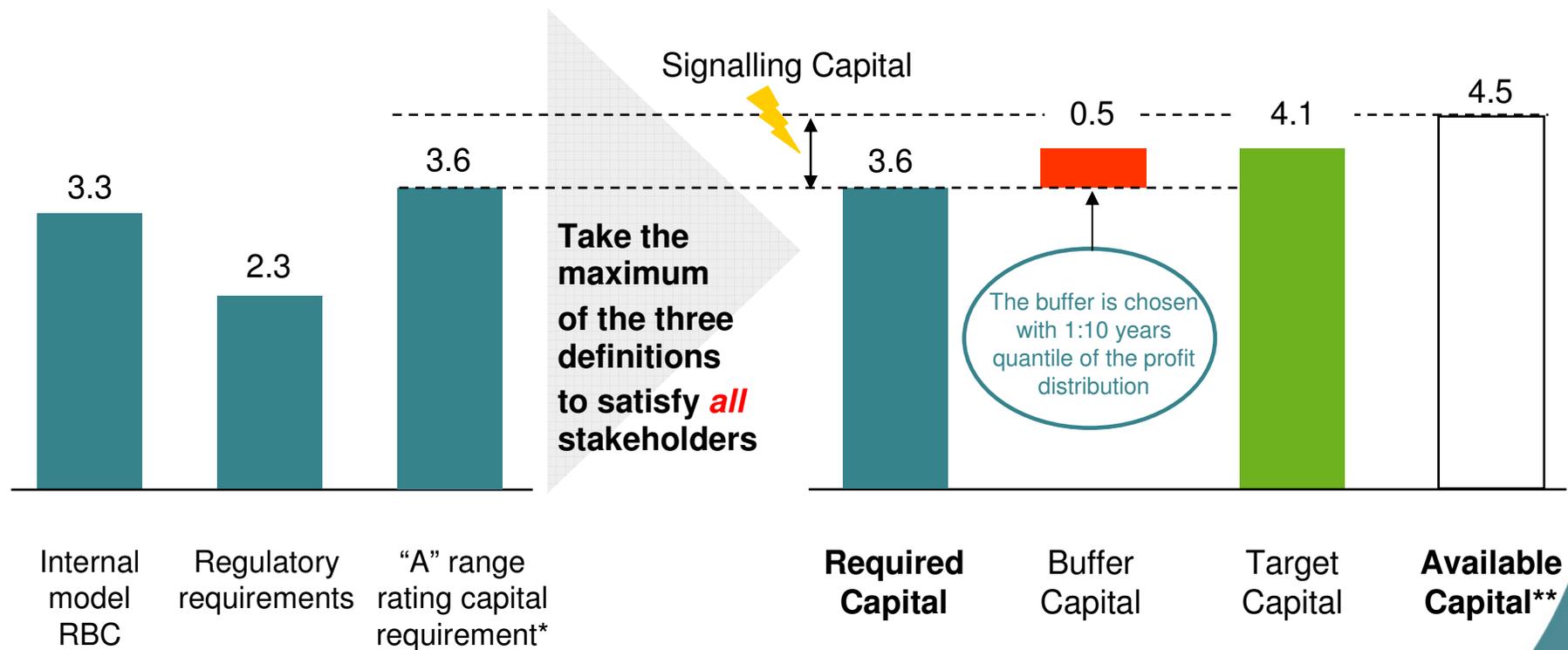
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- Risk appetite articulations are a part of a company's risk reward strategy
- The willingness to take on risks within a defined range leads to constraints on the achievable profitability
  - Large risks are often correlated with high expected (nominal) returns
  - ...but if risk tolerance requires a certain level of capital to be held against those risks, this may limit the achievable return on capital
- Return targets need to be checked for consistency against the risk appetite & tolerance (a 25% ROE can only be associated with very high risks as we have learned recently)

# The internal capital requirement satisfies all stakeholders

## Internal RBC, Required Capital, Buffer and Target Capital

In € billion, based on figures for 2008



# Determining the size of the capital buffer

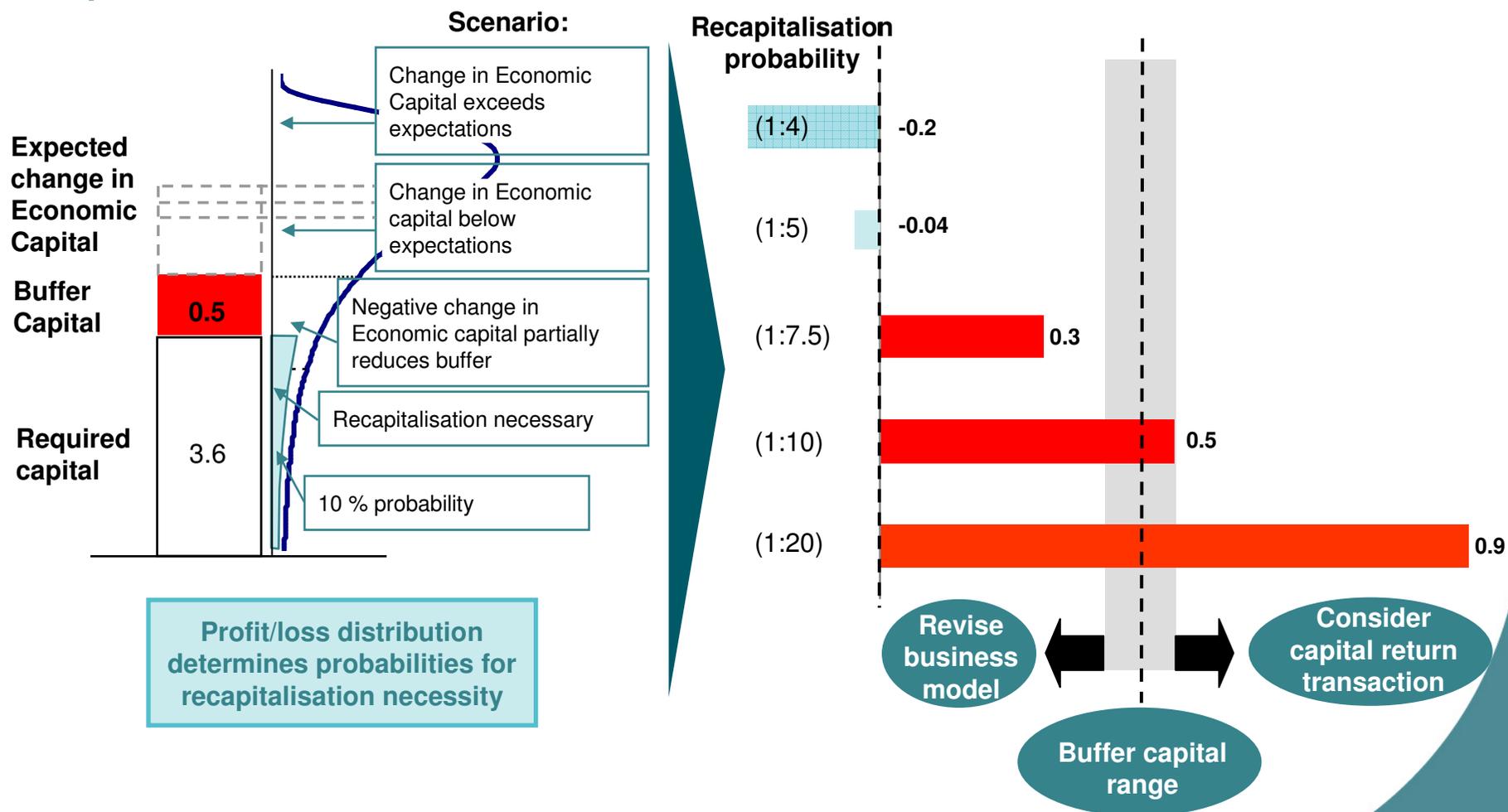
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- A capital buffer is required for two reasons:
  - Need for a safety margin to avoid a too strong dependency on capital market (we do not want to frequently call on the market for capital)
  - Model uncertainty and non-modeled risks
- Internal models give as a result the probability distribution of the shareholders' equity after one year
- To determine the buffer we add to the required capital the quantile of the distribution corresponding to a certain probability of the buffer being exhausted
- In other words, the buffer protects us, with a certain probability, from having to go to the market in order to raise capital
- This threshold will depend on the risk appetite, the communicated target ROE and the access to financial markets of the company

# Derivation of the capital buffer

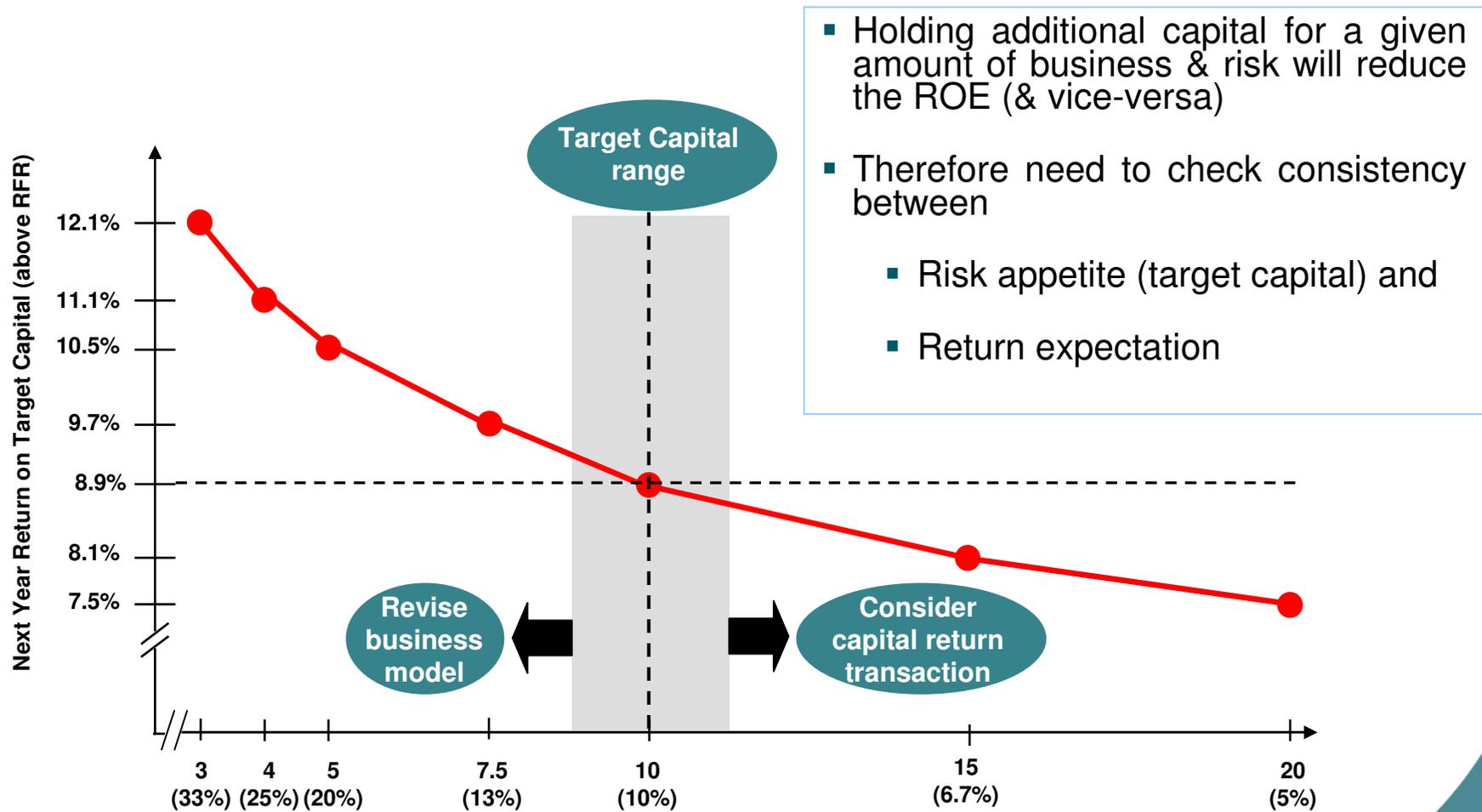
*Buffer Capital limits probability of a capital increase*

In € billion



# Checking the consistency between risk tolerance and risk/reward expectations

*SCOR's profitability target: Achieving an ROE of 900 bps above risk free over the cycle.*



# Agenda

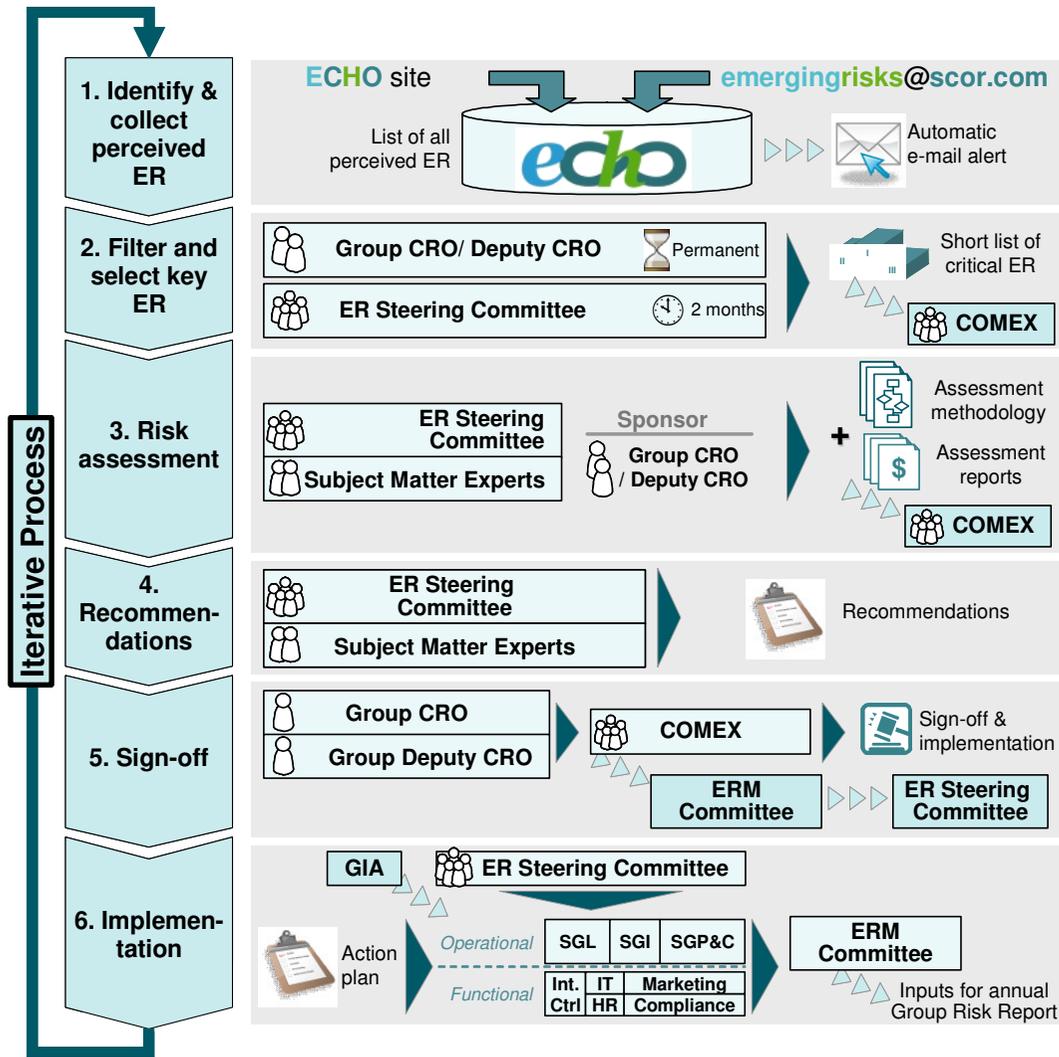
1	Historical context
2	Solvency II
3	Key components of ERM
3.1	Elements of traditional risk management
	Risk Enquiries
	Quantitative Risk Assessment
	Economic capital models
	Extreme Scenarios
	Process controls
3.2	Risk culture
3.3	Strategic risk management
	Risk and return
	Emerging risks

# Emerging Risks – Principles

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- Extreme event scenarios look at the tails of distributions often involving “ordinary” risks in the sense that they are well known in their non-extreme form.
- The emerging risk process complements this approach by tackling “**known unknowns**”. Risks that are difficult to grasp, vague in their potential scope and impact, need to be monitored as well.
- What makes emerging risks dangerous is that they have the **potential to quickly develop into large claims for the insurance**.
- Various sources can supply ideas for emerging risks, be it from a general point of view such as the World Economic Forum in their annual reports, industry-wide expert groups, law or insurance-specific publications.
- SCOR uses the know-how and vigilance of the specialist staff, who can report perceived emerging risks to a dedicated intranet site.
- All posted risks are regularly screened, and if necessary delegated to dedicated working groups.

# Emerging Risks – Process



# Emerging Risks – Overview

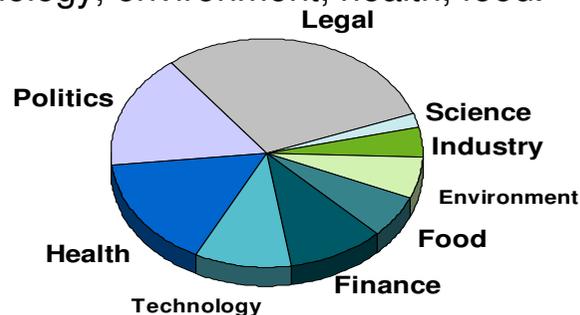
## Purpose

**Avoid unexpected losses and unforeseen developments** in claims due to failure to identify and manage emerging risks (risk avoidance, risk mitigation).

**Take advantage** of potential strategic opportunities.

## Areas covered

On the scope of watched emerging risks, all areas are covered: regulations and case law, industry, finance, politics, science, technology, environment, health, food.



## Emerging risks at SCOR

- Intranet “Share point” installed for “ECHO – Emerging and Changing Risk Observatory”
- Dedicated observers nominated, input open for all other employees via special email-address.
- 60 “perceived” Emerging Risks have been added to the ECHO intranet in 2008 and 2009.
- Emerging Risks Steering Committee meetings have led to the selection of 28 relevant Emerging Risks.
- Assessment report produced for Emerging Risks in relation to Electromagnetic Fields (EMF), including mitigation propositions.
- Potential next topics scheduled for detailed analysis:
  - ⇒ Geopolitical risks (e.g. “failing” states, civil war/riots, war)