



INSURANCE SOLUTIONS

Workshop in Israel

# **QIS 4 and pillar I: Overview and Valuation Issues**

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Catherine Cernesson, Dr. Thorsten Wagner

ADVISORY

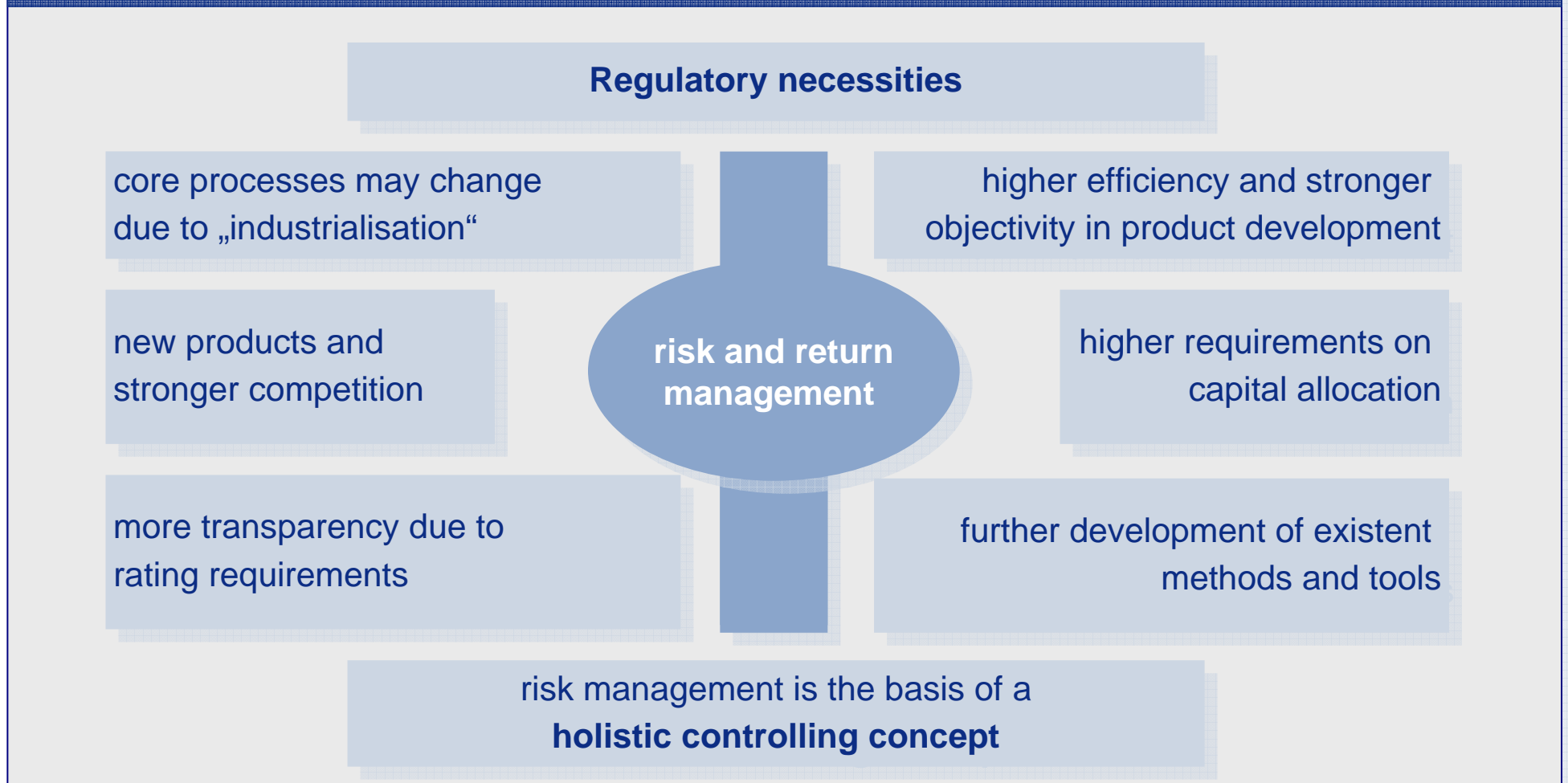
# Agenda

- *Introduction*
- *Solvency II: What's the idea of pillar 1?*
- *How to determine the economic balance sheet?*
- *Standard model QIS 4: Methods*
  - *Overview*
  - *Aggregation method: Basic Solvency Capital Required (BSCR)*
- *Groups*
- *Own funds*

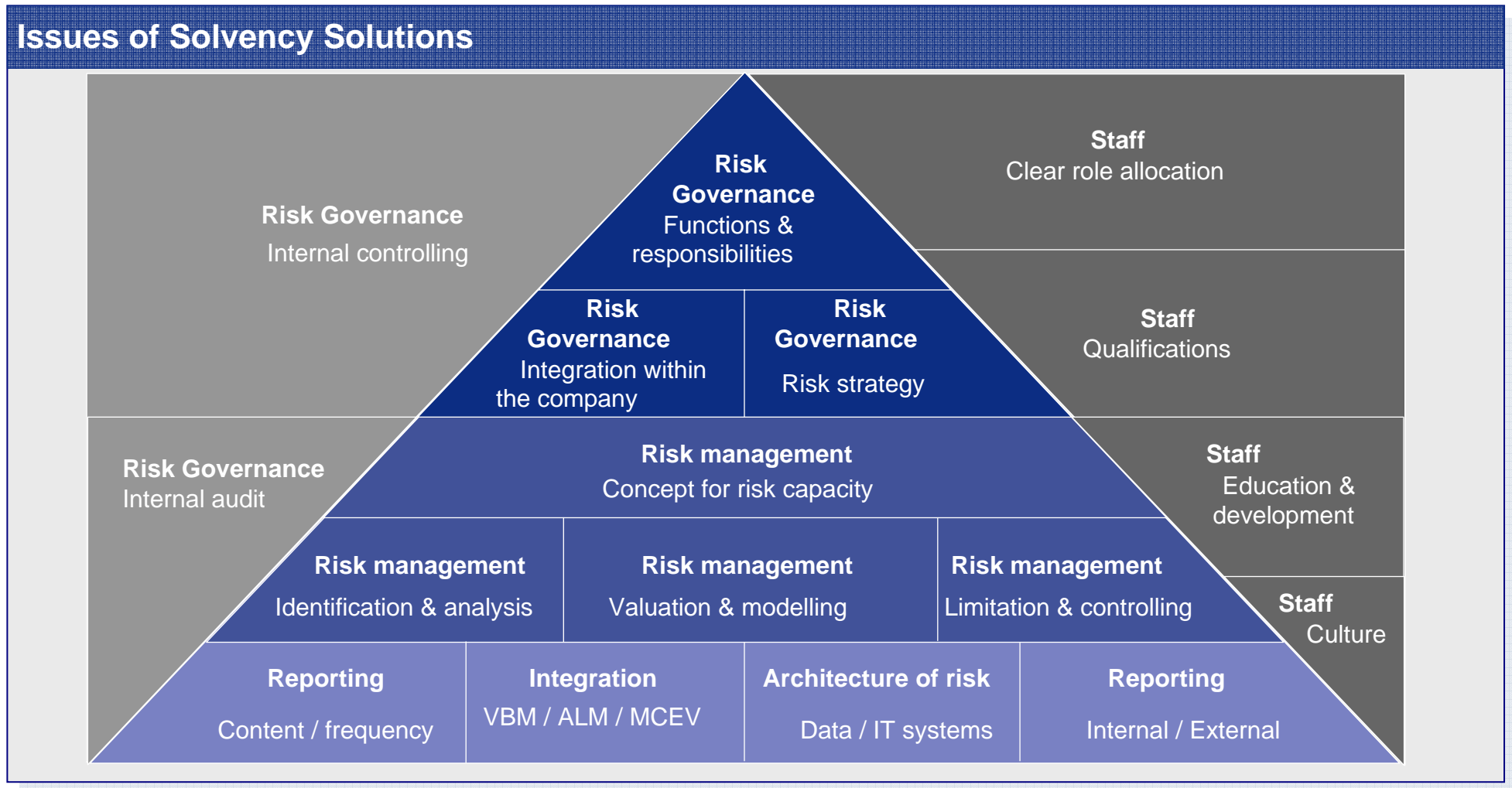
# *Introduction*

# Risk management within the insurance industry changes rapidly

## Major influence on risk management



A comprehensive management of risk, capital and performance is very complex – often only parts of it will be focussed on



# Each aspect includes several single issues

## Example: Modelling of risk

### Regulatory

e.g. will the model pass all required tests?

### Single entities

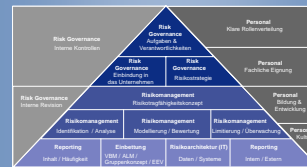
e.g. how will be diversification effects allocated to the entities?

### Single risk components

e.g. which methods will be used for valuation?

### Quantitative methods

e.g. which risk will be measured by which methods?



**Risk management**  
Valuation & modelling

### Economic

e.g. how will be management actions on asset allocation or other governance issues be dealt with by the model?

### Group level

e.g. how will be the risk aggregation method or capital allocated?

### Total risk

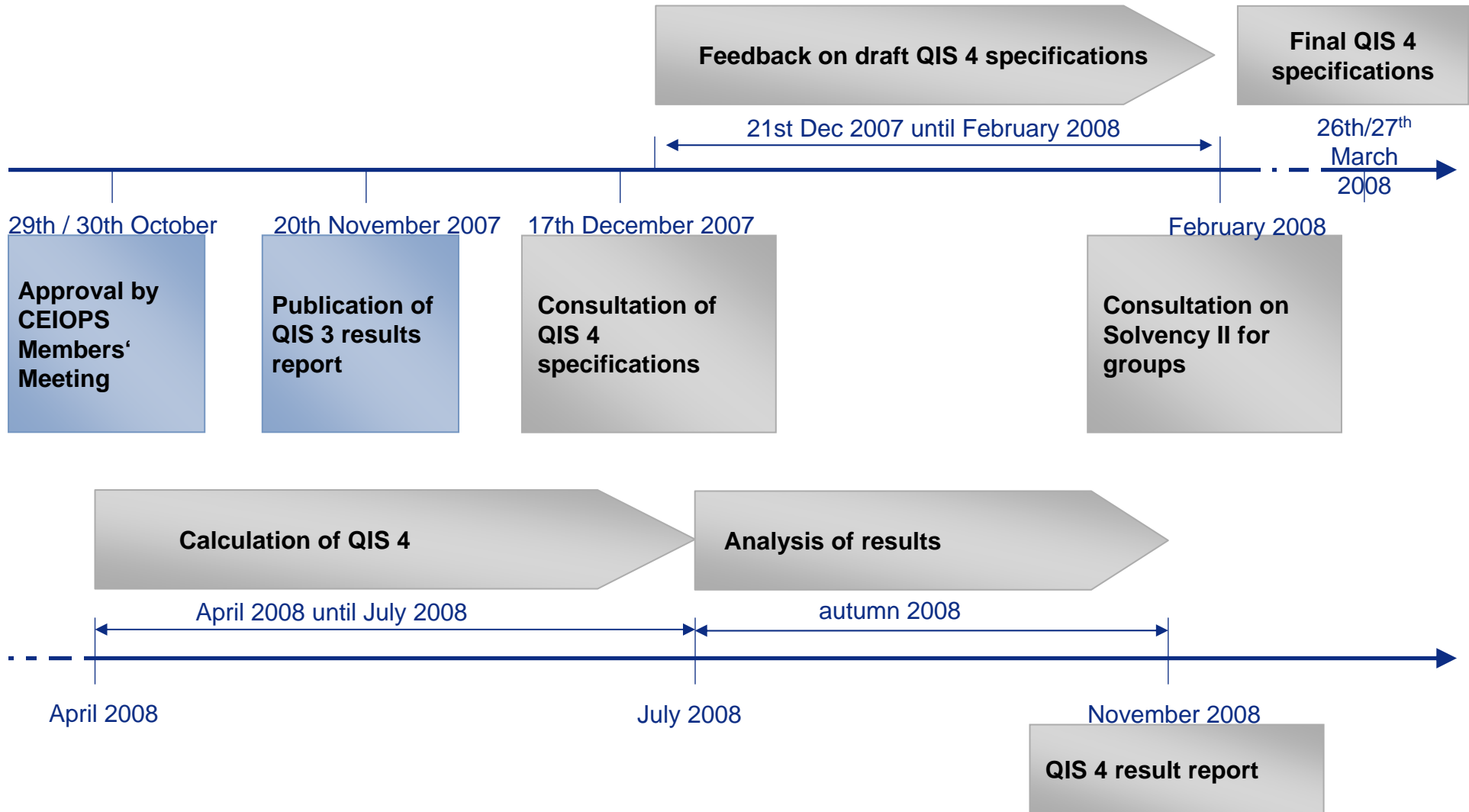
e.g. which types of risks will be valued with which interdependencies?

### Qualitative assessment

e.g. which types of risks will be dealt with only qualitatively?

... that's why each solution is individual!

# QIS 4 standard model: Timing of QIS



# QIS 4 standard model: Contents

## Scope

- Between **April and July 2008**
- On **Group level** as well as for **single entities**
- **Main focus is set on calibration** of the standard model for solvency II (results from internal models only additional information)

## Construction of the standard model

- **Based on building blocks**
- **Allowing for diversification:**
  - within each risk module
  - within the aggregation of risk modules
  - on group level

## Calculation of own funds

- Assets and liabilities valued at **Fair Value**
- Own funds classified into **three classes (“tier”)**:
  - tier 1: Highest quality
  - tier 2: loss absorber to a certain extent
  - tier 3: loss absorber only in special cases

## Essential topics of the standard model

- risk measure SCR (Solvency Capital Required): Value at Risk (**VaR**), with confidence of **99,5%** for a **one year horizon**
- Assets and liabilities valued at **Fair Value**
- Technical provisions are calculated as the sum of a best estimate provision and a risk margin which has to be derived with a **Cost of Capital (CoC)** approach

## *Solvency II: What's the idea of pillar 1?*

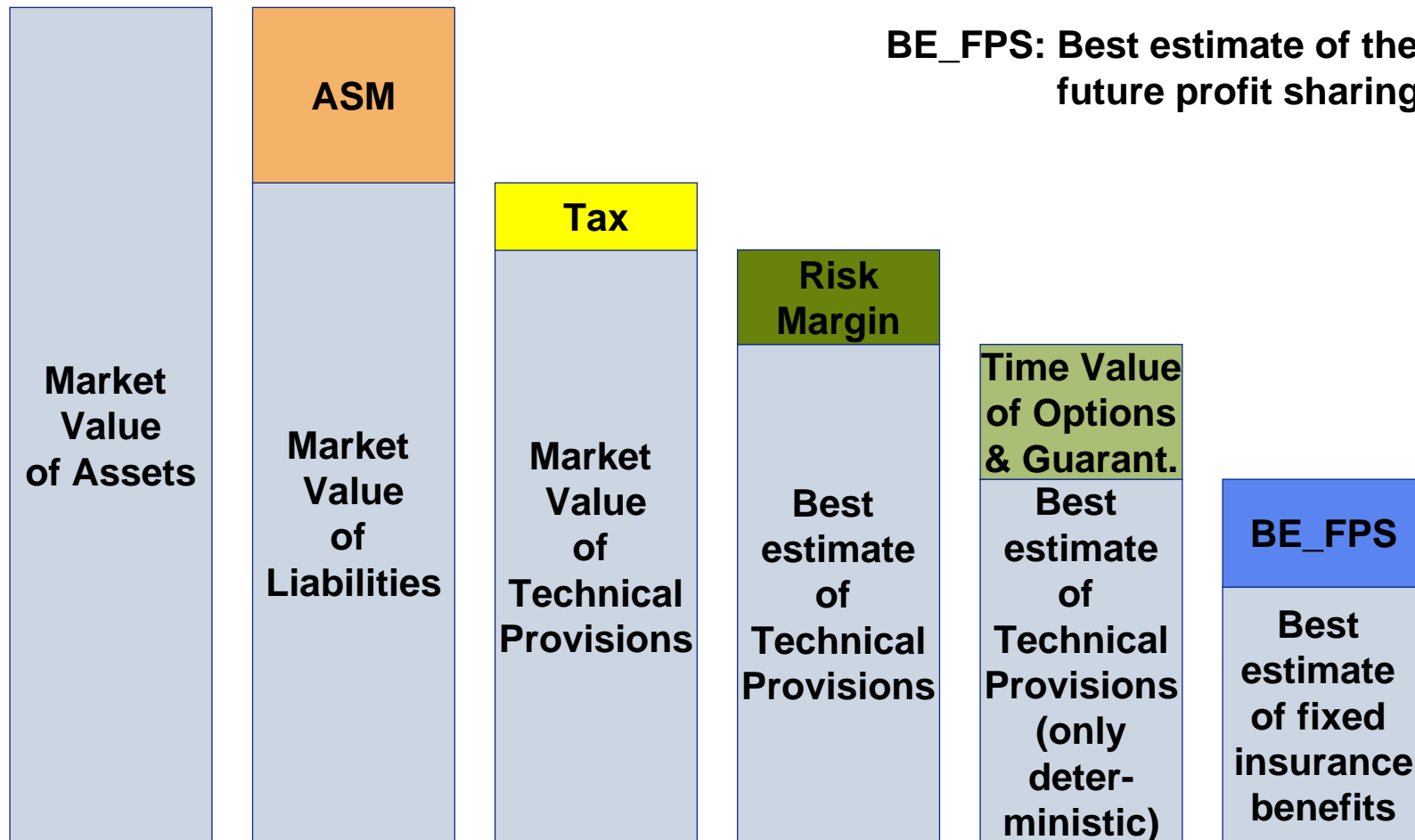
## Solvency II: What's the idea of pillar?

- Solvency requirement as well as Available Solvency Margin (ASM) are determined on the basis of an economic balance sheet approach.
- The ASM (= own funds) is defined as the difference “assets – liabilities” of an economic balance sheet.
- The solvency requirement is called SCR: Solvency Capital Required
  - The SCR is calculated for different sub-risk components.
  - SCR for sub-risk are calculated either on a factor approach (closed formula)
  - or on a scenario approach (shock).
- For those sub-risk for which the SCR is calculated with a scenario approach the SCR is equal to the difference

$$\text{SCR} = \text{ASM}(\text{basis}) - \text{ASM}(\text{shock})$$

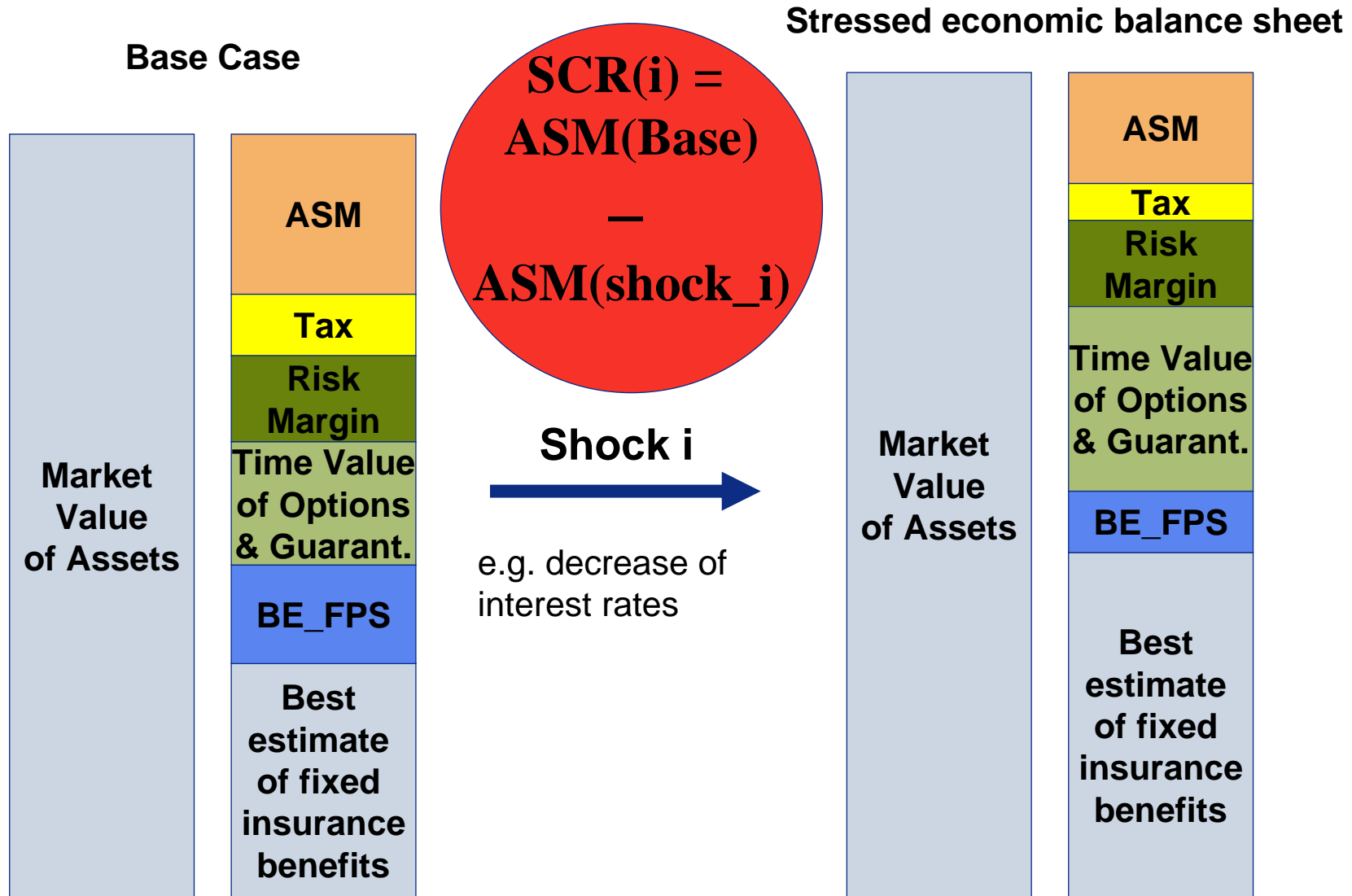
- The aggregation of all sub-risk is done with a prescribed correlation approach.

# Solvency II: What's the idea of pillar? The Economic Balance Sheet



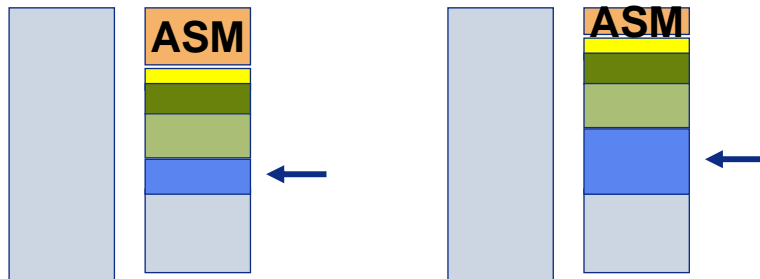
# Solvency II: What's the idea of pillar?

## Calculation of SCR of a sub-risk using a shock scenario



## Solvency II: What's the idea of pillar? Further Details

- **Best estimate of benefits resulting from discretionary future profit sharing may vary between undertakings:**



- **Lower Boundary SCR: Additional calculation, corresponding to the SCR that is the most reduced by applying management risk absorbing decisions that maximise the loss to the policyholder**
- **Minimum Capital Requirement (MCR) which has to be covered by tier 1 capital (highest quality)**
  - based on a factorial approach on premiums, technical provisions, capital at risk
  - applying a relative cap (50%) and floor (20%) on the SCR
  - applying an absolute floor (non-life 1 mio €, life 2 mio €, composite 3mio €)

# *How to determine the economic balance sheet?*

# How to determine the economic balance sheet?

## Valuation approach:

Whenever possible: **Mark to market**

**Mark to model** with use as much as possible observable and market consistent inputs

In some cases **IFRS** figures are considered as allowable proxy

Exceptional use of **national accounting figures** may be possible

- due to **not significant** dimension of the asset / liability
- due to **impracticability** in terms of costs

# How to determine the economic balance sheet?

## Technical Provisions

- Based on “current exit value”.
  - Transfer- or settlement value between knowledgeable parties (“arm’s length”)
- no reflection of creditworthiness

### **Technical Provisions = best estimate + risk margin**

- Best estimate as probability-weighted average of future cash-flows
    - discounted with relevant risk-free swap rate term structure (“time value of money”)
    - use of entity-specific information (expenses, claims, mortality, ...)
  - For Life Insurance Technical Provisions important:
    - no surrender floor
    - Reflection of asymmetric distributions (e.g. guarantees plus profit sharing)
- => Policyholder’s behaviour and management actions (change in rates of profit sharing)**

# How to determine the economic balance sheet?

## Technical Provisions

- Risk margin only for non-hedgeable (re)insurance obligations
  - Cost-of-Capital approach with constant rate of 6%
  - net of re-insurance
  - Cost-of-Capital assumes own funds equal to SCR for operational, underwriting and counterparty default risk
- Simplifications are possible to derive the risk margin, e.g. using SCR at time 0 and a modified duration approach
- Deterministic approaches possible for
  - non-life insurance business (as not considered as “asymmetric”)
  - unit-linked business if not considered “asymmetric”
  - smaller insurance companies

# *Standard model QIS 4: Methods*

## Standard model QIS 4: Methods

Overview

BSCR

SCR<sub>op</sub> operational risk

SCR<sub>nl</sub> non-life underwriting risk

SCR<sub>mkt</sub> market risk

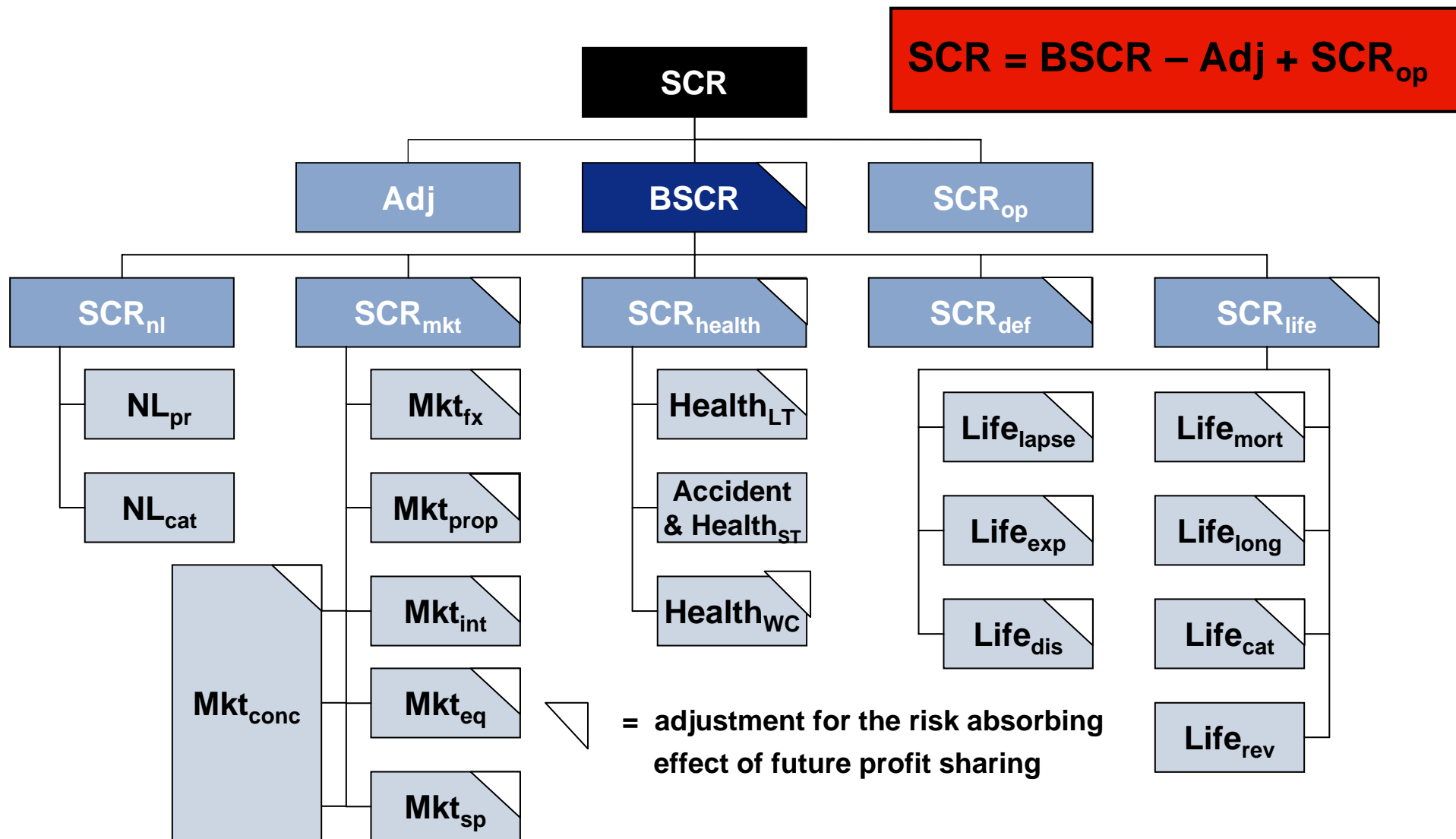
SCR<sub>health</sub> health underwriting risk

SCR<sub>def</sub> counterparty default risk

SCR<sub>life</sub> life underwriting risk

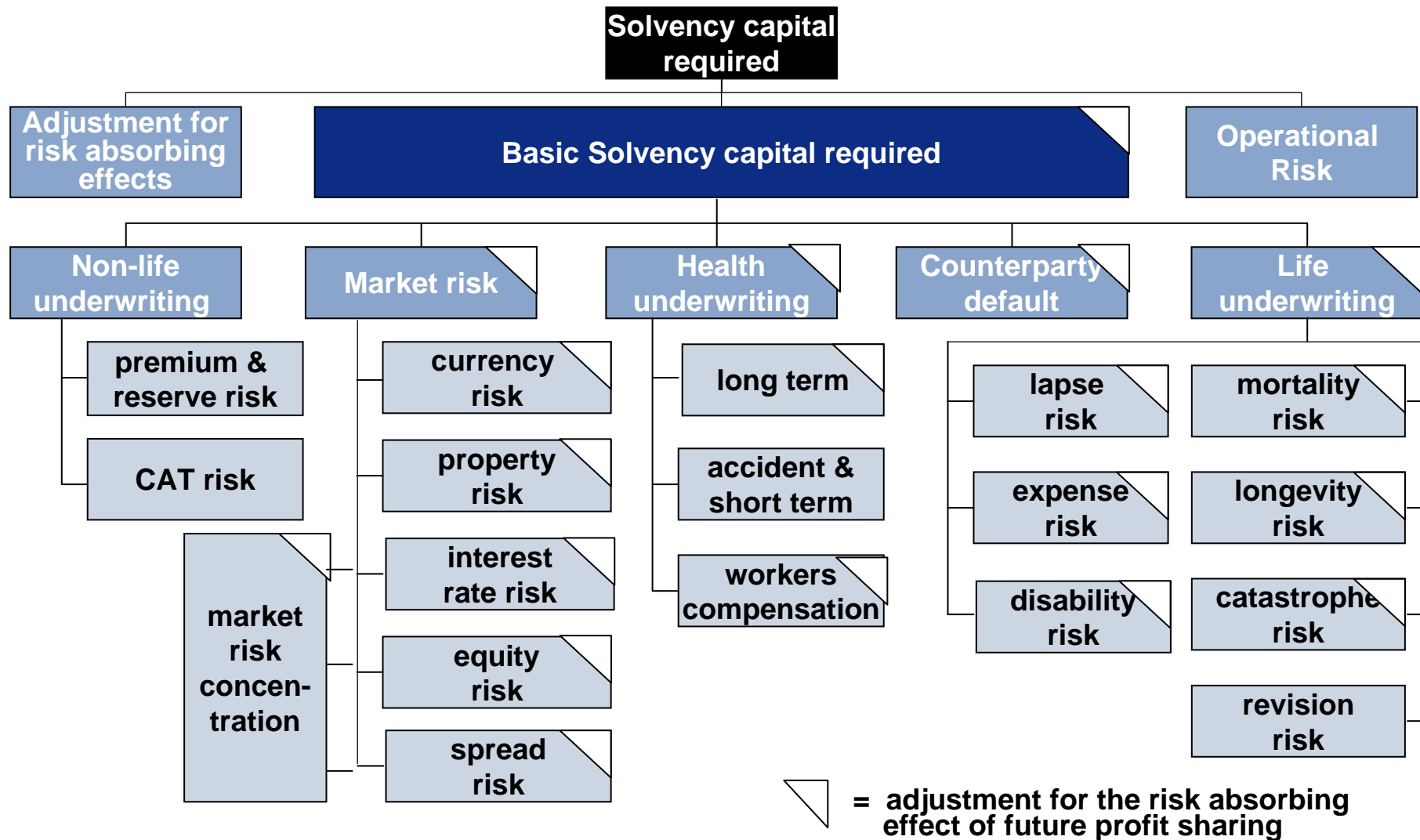
# QIS 4 standard model: methodology

## Overview of risk categories



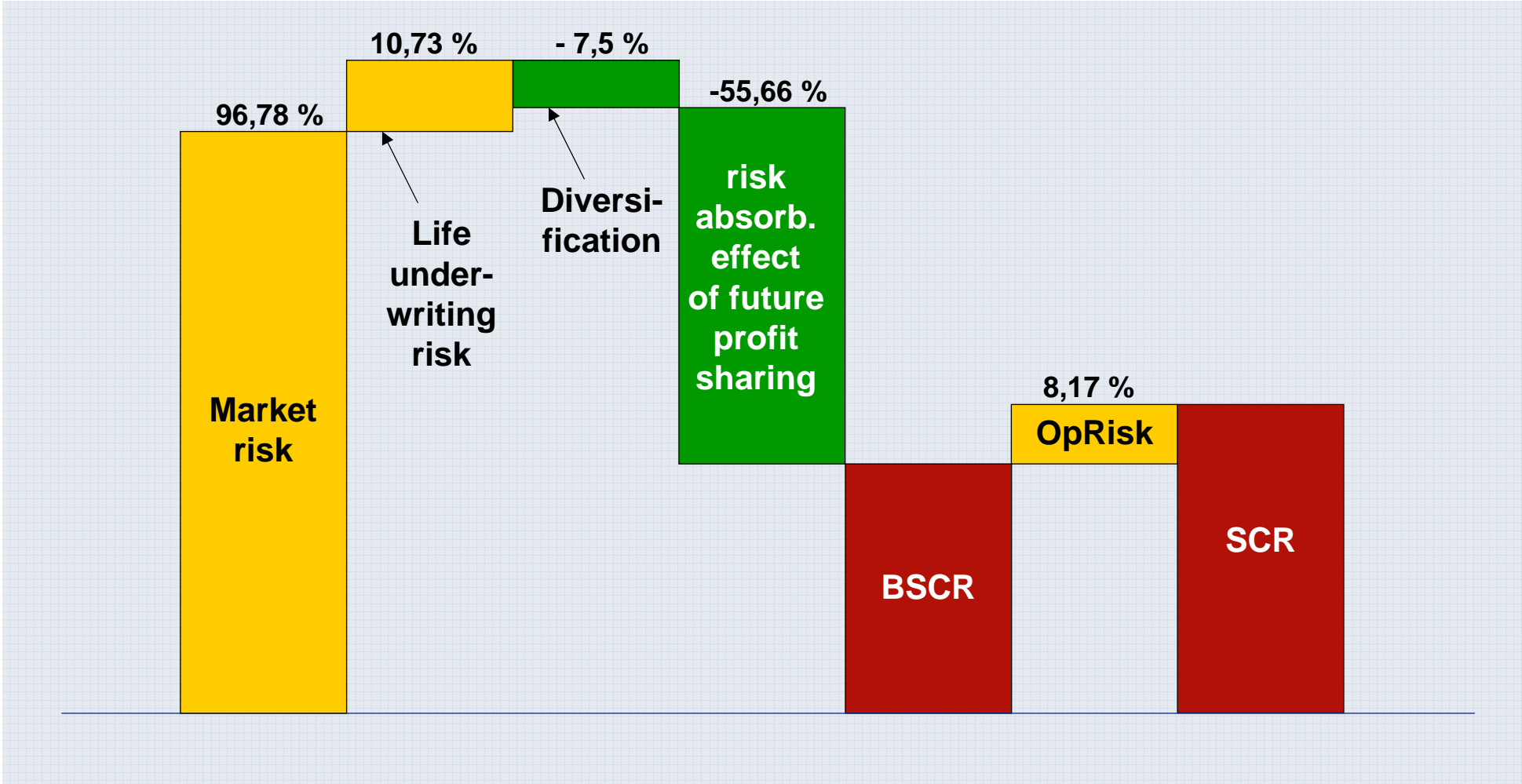
# QIS 4 standard model: methodology

## Overview of risk categories



# QIS 4 standard model: methodology

## Example, how the SCR may look like



## Standard model QIS 4: Methods

Overview

BSCR

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SCR<sub>nl</sub> non-life underwriting risk

SCR<sub>mkt</sub> market risk

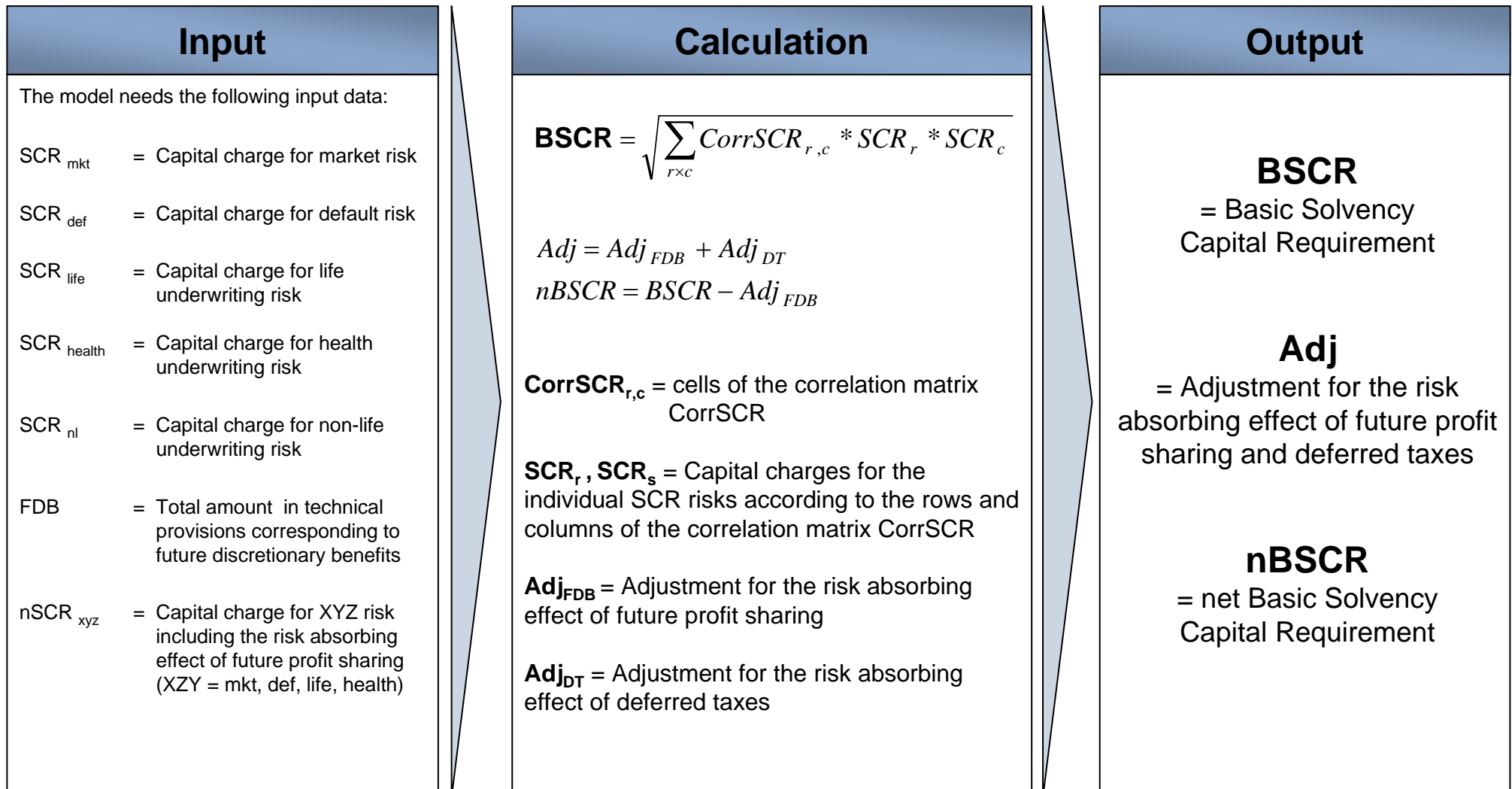
SCR<sub>health</sub> health underwriting risk

SCR<sub>def</sub> counterparty default risk

SCR<sub>life</sub> life underwriting risk

# QIS 4 standard model: methodology

## Basic SCR



## QIS 4 standard model: methodology

### Correlation matrix CorrSCR

The correlation matrix CorrSCR is defined as:

| <b>CorrSCR =</b>                 | <b><math>SCR_{mkt}</math></b> | <b><math>SCR_{def}</math></b> | <b><math>SCR_{life}</math></b> | <b><math>SCR_{health}</math></b> | <b><math>SCR_{nl}</math></b> |
|----------------------------------|-------------------------------|-------------------------------|--------------------------------|----------------------------------|------------------------------|
| <b><math>SCR_{mkt}</math></b>    | 1                             |                               |                                |                                  |                              |
| <b><math>SCR_{def}</math></b>    | 0,25                          | 1                             |                                |                                  |                              |
| <b><math>SCR_{life}</math></b>   | 0,25                          | 0,25                          | 1                              |                                  |                              |
| <b><math>SCR_{health}</math></b> | 0,25                          | 0,25                          | 0,25                           | 1                                |                              |
| <b><math>SCR_{nl}</math></b>     | 0,25                          | 0,5                           | 0                              | 0,25                             | 1                            |

## Standard model QIS 4: Methods

Overview

BSCR

SCR<sub>op</sub> operational risk

SCR<sub>nl</sub> non-life underwriting risk

SCR<sub>mkt</sub> market risk

SCR<sub>health</sub> health underwriting risk

SCR<sub>def</sub> counterparty default risk

SCR<sub>life</sub> life underwriting risk

# QIS 4 standard model: methodology

## SCR<sub>Op</sub>

### Factorial approach for OpRisk valuation based on:

**1. Earned premiums**

**2. Technical Provisions**

➤ Different factors for life, non-life and health

**3. Limitation to 30% of BSCR**

➤ Life insurance business without unit-linked business, but

**4. In addition, 25% of last year's amount of annual administrative expenses on unit-linked business**

# QIS 4 standard model: methodology

## SCR<sub>op</sub>

### Input

The model needs the following input data:

|                  |  |
|------------------|--|
| $TP_{life}$      | = Total of life insurance technical provisions (gross of reinsurance)        |
| $TP_{life-ul}$   | = Total life insurance technical provisions for unit-linked business (gross) |
| $TP_{nl}$        | = Total non-life technical provisions (gross)                                |
| $TP_h$           | = Total health insurance technical provisions (gross)                        |
| $Earn_{life}$    | = Total earned life premium (gross)  |
| $Earn_{life-ul}$ | = Total earned life premium for unit-linked business (gross)                 |
| $Earn_h$         | = Total earned health insurance premium (gross)                              |
| $Earn_{nl}$      | = Total earned non-life insurance premium (gross)                            |
| BSCR             | = Basic SCR  |

### Calculation

Capital charge is calculated as follows:

$$SCR_{op} = \min \{ 0.30 * BSCR ; Op_{lnul} \} + 0.25 * Exp_{ul}$$

with  $Op_{lnul}$  as capital charge for all business other than unit-linked (for which just 25% of last year's expenses have been assessed) determined as:

$$Op_{nlul} = \max \left\{ \begin{array}{l} 0,03 * ( Earn_{life} - Earn_{life-ul} ) + 0,02 * Earn_{nl} + 0,02 * Earn_h ; \\ 0,003 * ( TP_{life} - TP_{life-ul} ) + 0,02 * TP_{nl} + 0,002 * TP_h \end{array} \right\}$$

### Output

## SCR<sub>op</sub>

#### Remark:

The capital charge for operational risk is the sum of:

Capital charge for all business other than unit-linked is restricted to 30% of the Basic SCR.

Capital charge of 25% of the amount of annual expenses (gross) incurred in respect of unit-linked business.

# *Groups*

## QIS 4 standard model: Groups

### Methodology of calculations

Group capital requirement and group own funds according to the following two methods:

- 1. Standard SCR formula and own funds calculation applied to consolidated group position (default method)**
- 2. Sum of solo SCRs and own funds of each group entity, adjusted to eliminate market and counterparty risk charges on intra-group transactions (deduction and aggregation method)**

- This information is essential in assessing the impact of diversification effects.
- Calculations shall be carried out at the level of the ultimate EEA participating (re)insurance undertaking / insurance holding company
- Furthermore, the unadjusted sum of solo SCRs will give additional information (intra-group effects)
- CEIOPS asks also for results calculated with internal models for the purpose of comparison
- Therefore, two additional methods could be adopted:

- 3. Unadjusted sum of solo SCRs**
- 4. Group SCR, calculated using a (partial) internal model**

## QIS 4 standard model: Groups

### Which calculation for which kind of group?

|   | All the groups   | Groups with “with profit” business | Groups with “non-EEA” activities | Groups with “non-EEA” activities and with profit business |
|---|------------------|------------------------------------|----------------------------------|---|
| Worldwide consolidated                      | X <sup>[1]</sup> | X                                  | X                                | X   |
| Non-EEA consolidated variation              |                  |                                    | X <sup>[2]</sup>                 | X   |
| With profit business consolidated variation |                  | X <sup>[3]</sup>                   |                                  | X   |
| Sum of solo SCRs                            | X <sup>[4]</sup> | X                                  | X                                | X   |
| Deduction & aggregation method              | X <sup>[5]</sup> | X                                  | X                                | X   |
| Solvency 1                                  | X <sup>[6]</sup> | X                                  | X                                | X   |
| Group SCR floor                             | X <sup>[7]</sup> | X                                  | X                                | X   |
| Internal model                              | X <sup>[8]</sup> | X                                  | X                                | x   |

#### Explanations:

1. Default method of the directive proposal.
2. Variation of the default method of the directive proposal
3. Variation of the default method of the directive proposal
4. Already calculated with the solo exercise
5. Alternative method of the directive proposal
6. Available independently of QIS 4 exercise
7. Already calculated with the solo exercise
8. Amount of work depends on the stage of the internal model

## QIS 4 standard model: Groups

### Default method: Accounting consolidation

#### Default method:

**The method applies the solo standard SCR formula to the group as if it were a single entity.**

**All worldwide (re)insurance undertakings of the group (including any non-EEA (re)insurance undertaking should be taken into account following a “look-through approach”.**

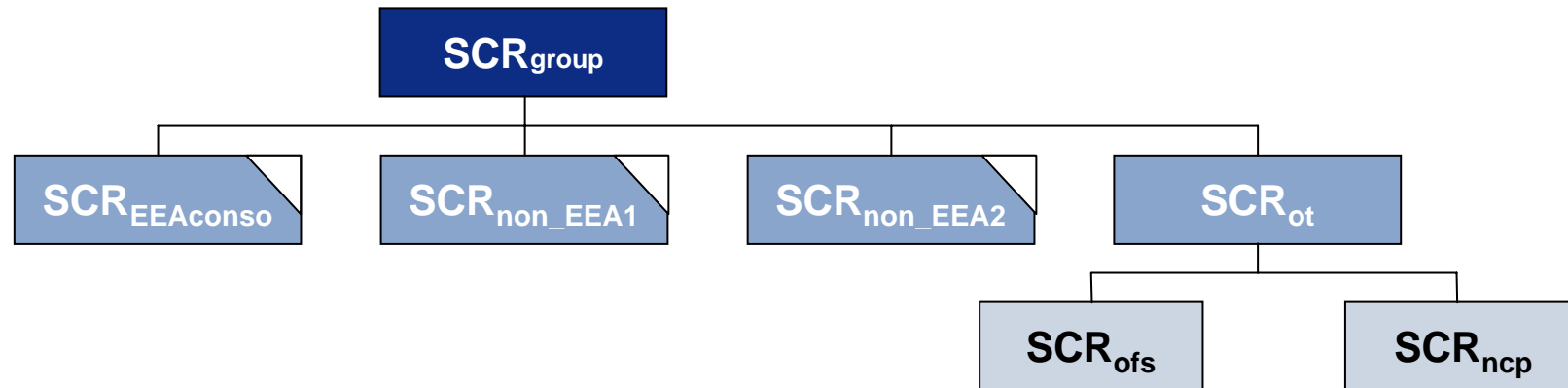
- Capital requirements of other financial sectors will be added without any diversification effect.
- Capital requirements of participations in (re)insurance undertakings with no control relationship will be added without any diversification effect.

$$SCR_{\text{group}} = SCR_{\text{WWconso}} + SCR_{\text{ofs}} + SCR_{\text{ncp}}$$

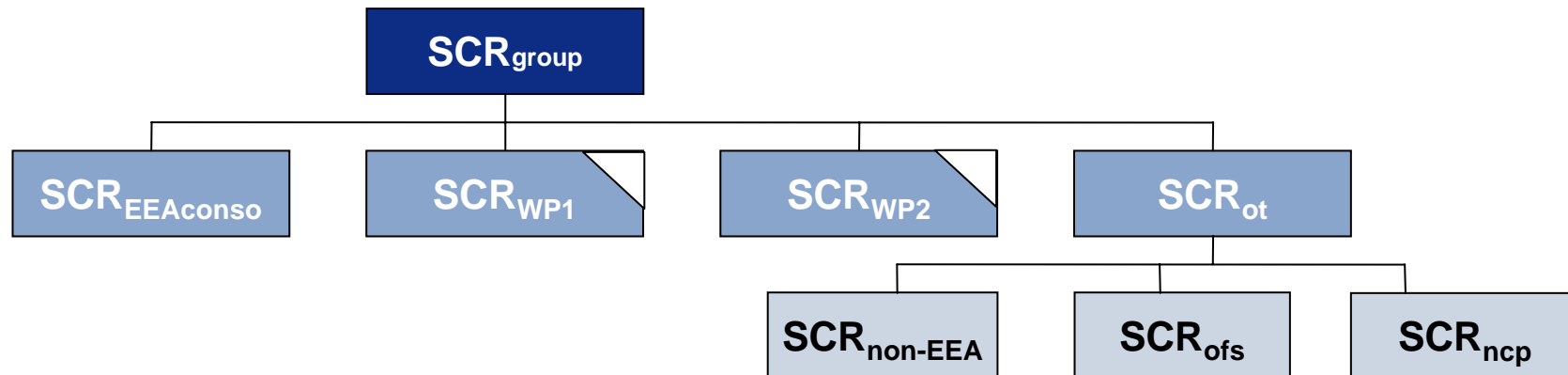
# QIS 4 standard model: Groups

## Variations of the accounting consolidation-based method

- Variation 1: without worldwide diversification benefit



- Variation 2: without diversification benefits arising from with-profit business (only EEA)



= including adjustment for the risk absorbing effect of future profit sharing

## QIS 4 standard model: Groups

### Alternative Method: Deduction and aggregation method

#### Calculation

- Intention: Get some information about diversification effects if comparing with the default method.
- The required capital is calculated as the sum of each individual SCR and adding the capital requirements CR of other entities where a SCR cannot be calculated (e.g. non EEA, other sectors)
- Effort: Distinguish between intra-group effects and diversification => solo-adjusted SCR have to be determined
- The solo-adjusted SCR is calculated as the SCR at each solo entity level with elimination of intra-group transactions.

- This yields:

$$SCR_{\text{group}} = SCR_{\text{solo-adjusted}} + CR_{\text{ot}}$$

- For the solo-adjusted SCR the market and counterparty default risk adjustment has to be calculated as:
- $SCR_{\text{mkt}}$ :  
Intra-group transactions will not be affected by the prescribed shocks in a scenario based approach.
- $SCR_{\text{def}}$ :  
Default risk of intra-group cedants should be taken to be equal to zero.

# *Own funds*

# QIS 4 standard model: Own funds

## Introduction

Definition and classification of own funds:

- **Tier 1: highest creditworthiness**
- **Tier 2: can absorb losses to a certain extent**
- **Tier 3: can absorb losses in certain circumstances**

For covering the SCR all three classes of own funds are suitable.

The MCR can only be covered by tier 1 and non-conditional tier 2 elements.

The classification of own funds into the different tiers are mainly based on principles:

# QIS 4 standard model: Own funds Principles

- 1. subordination of total amount on winding-up**
  - In case of a liquidation the creditor do not receive a payment unless all other liabilities including liabilities from (re)insurance have been complied with.
- 2. full loss-absorbency in going concern**
  - The element is available or callable on demand to absorb losses in a going concern context.
- 3. undated or of sufficient duration (perpetuality)**
  - The element has no prescribed duration or has a sufficient duration compared with the duration of the (re)insurance liabilities.
- 4. free from requirements / incentives to redeem the nominal amount**
  - There are no requirements and no incentives to redeem the nominal amount of the element
- 5. absence of mandatory fixed charges**
  - There no mandatory fixed charges on the element.
- 6. absence of encumbrances**
  - There are no encumbrances on the element.

## QIS 4 standard model: Own funds Tier 1

- **Paid up and called up common equity** (common share capital, initial fund) **with redemption subject to prior supervisory approval.**
- **Reserves available to absorb losses** (retained earnings, share premium account, surplus funds, revaluation reserves)
- **Excess of assets over liabilities, determined in accordance with QIS 4 valuation principles**
- **Subordinated mutual member accounts.**
  
- **Hybrid capital instruments and subordinated liabilities with tier-1 quality, i.e. when based on the principles:**

1. - 2. are fulfilled and 3. - 6. are fulfilled with a considerable amount

## QIS 4 standard model: Own funds Tier 2

- **Hybrid capital instruments and subordinated liabilities with tier-2 quality, i.e. when based on the principles:**
  - 1. - is fulfilled and
  - 3. - 6. - are fulfilled with a considerable amount
- **Special requirements on duration and interest step-up (timing and amount) must be fulfilled.**
- **Cumulative perpetual preference shares.**
- **Unpaid common shares and unpaid initial funds.**
- **Unpaid and callable hybrid capital instruments eligible for inclusion in tier 1.**

## **QIS 4 standard model: Own funds Tier 3**

- **Assets less liabilities and subordinated debt not meeting characteristics of tier 1 or 2 but full subordination on winding up.**
- **Hybrid capital instruments or subordinated liabilities that have a minimum maturity less than 5 years from the issue date.**
- **Unpaid cumulative preference shares.**
- **Unpaid and callable hybrid capital instruments eligible for inclusion in tier 2 or tier 3.**
- **Letters of credit and guarantees not eligible for inclusion in tier 2.**