

**Welcome to the Webinar:**

***Data Quality, Validation and  
Variation Analysis  
under Solvency II***

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## Dr. Clemens Frey



- Partner at PwC since 2013
- Actuary DAV, CERA
- Head of Actuarial Services, Risk and Analytics
- Experienced in (Re-)Insurance Business, Strategy Consulting and Audit
- Focus on Consulting and Audit of Insurance Companies
  - Regulation and Risk Management, esp. SII
  - Accounting, esp. IFRS17
  - Transformation of Actuarial Teams and Processes
  - Application of Data Analytics and Machine Learning
- Active in Committees and Working Parties of DAV, AAE and IAA, esp. in *Regulation and Accounting* and in *General Insurance Committees*

1. Introduction – Quality Management under SII
2. Validation and Variation Analysis – An Important Part of the Story
3. Data Quality Management – Practical Approaches
4. Example: Data Quality as Part of ORSA
5. Summary & Questions

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## ***Content of Delegated Acts***



### ***DVO with extensive content on data quality management:***

- **Data shall be consistent with the valuation process (Art. 19)**
- **Documentation of the data collection (Art. 19)**
- **Data limitations / approximations (Art. 20, 21)**
- **Annual validation of the data (Art. 264)**
- **Directory of data (Art. 265)**
- **Monitoring of data limitations by the Actuarial Function (Art. 272)**

## Delegated Acts – Data for Technical Provisions

**Art.  
19  
DA**

### Data used in the calculation of technical provisions

| Ref.  | Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.(c) | the data are <b>consistent</b> with the assumptions underlying the actuarial and <b>statistical</b> techniques that are applied to them in the calculation of the technical provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3.(d) | the data <b>appropriately reflect the risks</b> to which the insurance or reinsurance undertaking is exposed with regard to its insurance and reinsurance obligations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3.(e) | the data were collected, processed and applied in a transparent and structured manner, based on a <b>documented process</b> that comprises all of the following: <ul style="list-style-type: none"> <li>I. the definition of <b>criteria for the quality of data and an assessment of the quality of data</b>, including specific qualitative and quantitative standards for different data sets;</li> <li><b>II. the use of and setting of assumptions</b> made in the collection, processing and application of data;</li> <li><b>III. the process for carrying out data updates</b>, including the frequency of updates and the circumstances that trigger additional updates</li> </ul> |
| 3.(f) | Insurance or reinsurance undertakings shall ensure that their data are <b>used consistently over time</b> in the calculation of the technical provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## *Delegated Acts – Limitations of Data*

### **Art. 20 DA**

**Where data does not comply with Article 19, insurance and reinsurance undertakings shall document appropriately the limitations of the data** including a description of whether and how such limitations will be remedied and of the functions within the system of governance of the insurance or reinsurance undertaking responsible for that process. The data, before adjustments to remedy limitations are made to it, shall be recorded and stored appropriately.

## Delegated Acts – Use of Approximations

### Art. 21 DA

Where insurance and reinsurance undertakings have insufficient data of appropriate quality to apply a reliable actuarial method, they may **use appropriate approximations** to calculate the best estimate provided that all of the following requirements are met:

- (a) the insufficiency of data is **not due to inadequate internal processes and procedures** of collecting, storing or validating data used for the valuation of technical provisions;
- (b) the insufficiency of data **cannot be remedied by the use of external data**;
- (c) it would **not be practicable for the undertaking to adjust the data to remedy the insufficiency**.

## Delegated Acts – Validation

### Art. 264 DA

Insurance and reinsurance undertakings shall **validate** the calculation of technical provisions, in particular by comparison against experience as referred to in Article 83 of Directive 2009/138/EC, **at least once a year** and where there are indications that the data, assumptions or methods used in the calculation or the level of the technical provisions are no longer appropriate.

The validation shall cover the following:

- (a) the appropriateness, completeness and accuracy of data used in the calculation of technical provisions as set out in **Article 19** of this Regulation;
- (b) the appropriateness of any grouping of policies in accordance with Article 34 of this Regulation;
- (c) the remedies to limitations of the data referred to in **Article 20** of this Regulation;

## Delegated Acts – Data directory

### Art. 265 DA

1. Insurance and reinsurance undertakings shall **document** the following processes:
  - (a) The **collection of data and analysis of its quality** and other information that relates to the calculation of technical provisions;
2. For the purposes of point (a) of paragraph 1, the documentation shall include:
  - (a) a **directory of the data used in the calculation of the technical provisions, specifying their source, characteristics and usage;**
  - (b) the specification for the collection, processing and application of data referred to in Article 19(3)(e);
  - (c) where data are not used consistently over time in the calculation of technical provisions, a description of the **inconsistent use** and its justification.

## Delegated Acts – Actuarial Function

**Art.  
272  
DA**

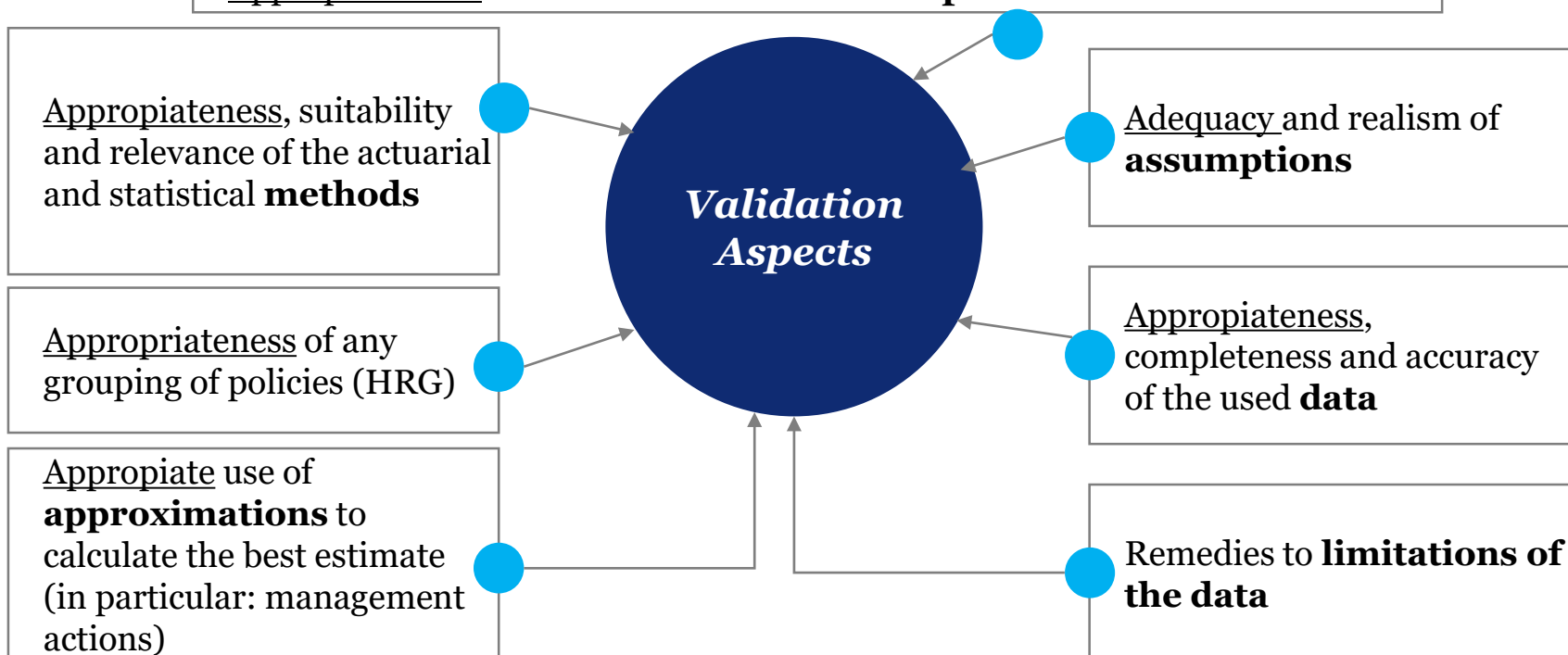
1. In coordinating the calculation of the technical provisions, the actuarial function shall include all of the following tasks:  
(c) ensure that any **limitations of data** used to calculate technical provisions are properly dealt with.

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## Requirements according to Art. 264 DVO

**The calculation of technical provisions shall be reviewed at least once a year and eventually the appropriateness of data, assumptions or methods used shall also be reviewed**

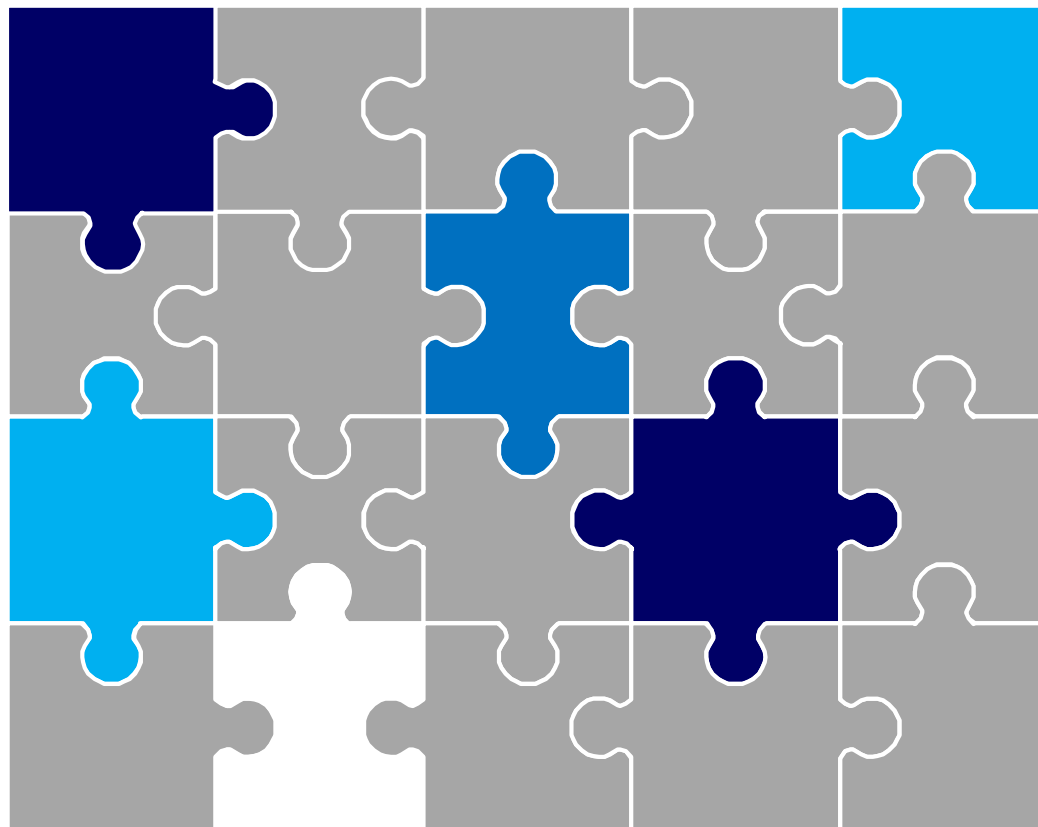
Appropriateness of the **level** of the **technical provisions**



## ***Validation Focuses on the Appropriateness of Actuarial Methods, Assumptions and Calculations***

### ***Validation Examples***

- Appropriateness of economic scenario generator, incl. An appropriate number of scenarios
- Appropriateness of the valuation methods for best estimates (e.g. BSM, INBV, Chain-Ladder,...)
- Sensitivity analysis
- Deduction of key assumptions (e.g. future costs, biometric tables)
- **Analysis of transition from prior period**



## Background of Variation Analysis

### Initial situation

- Goal: Explanation of the variation of Excess of Assets over Liabilities with the main sources of movement (**QRTs S.29.02 to S.29.04**)
- Focus „Logical validation of the change in equity capital on the basis of essential SII *balance sheet items/valuation*“
- Five main sources affecting the variation of the Excess of Assets over Liabilities between the prior and the last reporting periods
  1. The variation related to investments and financial liabilities (S.29.02);
  2. The variation related to technical provisions (S.29.03 und S.29.04);
  3. The variation of ‘pure’ capital items, which is not directly influenced by the business carried on (e.g., variations in ordinary shares numbers and values); detailed analysis (S.23.03)
  4. Other main variations linked to tax and dividend distribution, namely: Variation in Deferred Tax position — Income Tax of the reporting period — Dividend distribution
  5. Other variations not explained elsewhere (Remark: Delta-Position!)

### Challenges in the Variation Analysis

**Understanding of the realised gains in the current period (economic P&L)**

**Identification and understanding of future drivers of profit (e.g. future insurance development)**

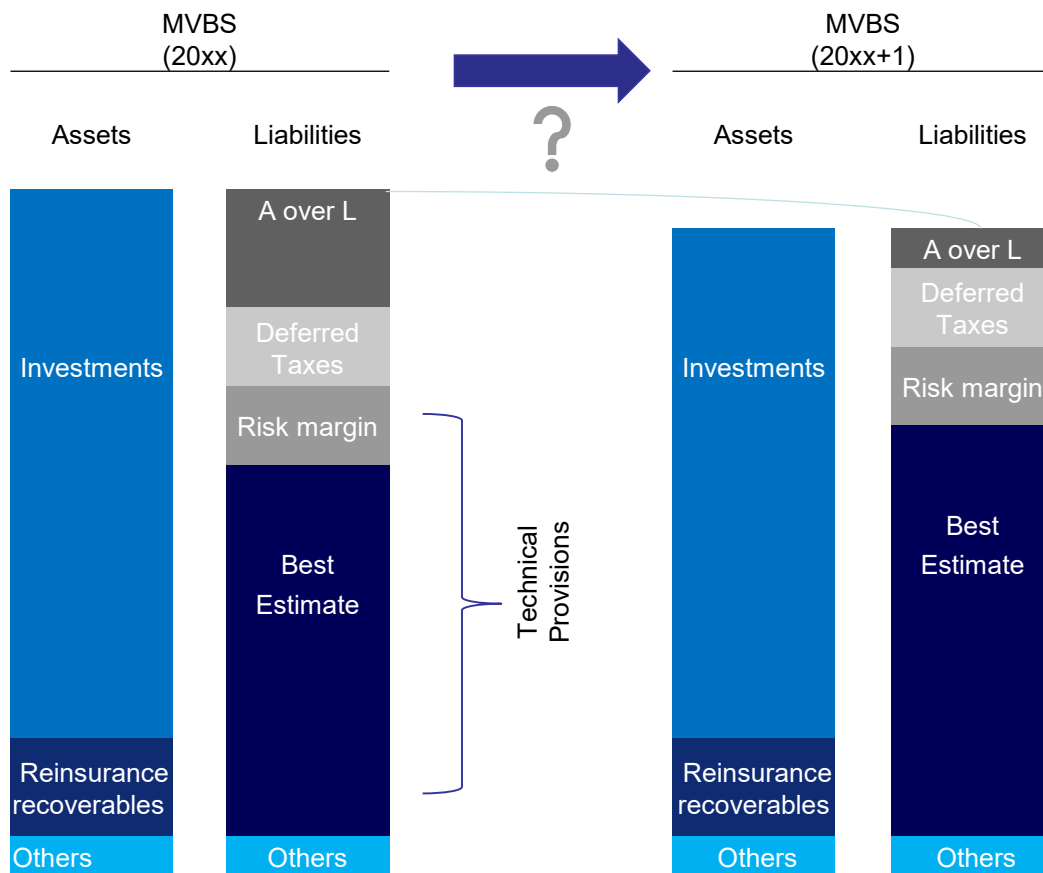
**Use of variation analysis beyond regulation purposes (e.g. for validation, business planning and controlling)**

## Background of Variation Analysis

QRTs target the plausibility of the change of the equity capital

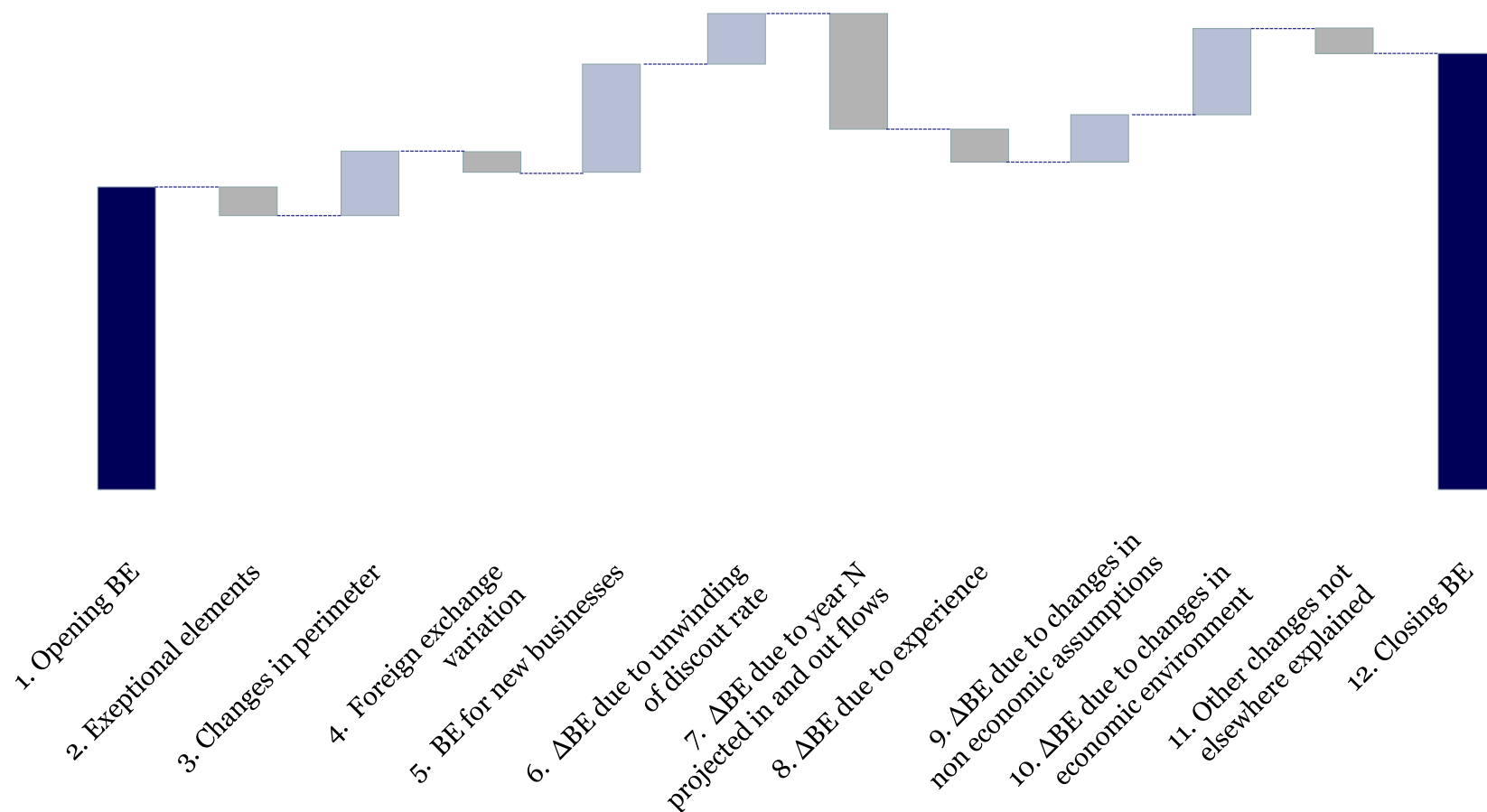
### Some Key Issues

- Focus on delta-analysis
- Investments: focus on realized gains and valuation changes (i.e. only parts of the change)
- Technical Provisions: focus on gross best estimate and Unit Linked contracts, excl. risk margin
- Simplified comparison of current payments and projections
- Simplified "Combined Ratios" to estimate new business



## Example of Variation Analysis

*Transition of gross best estimate acc. to underwriting years*



## *Is Variation Analysis the Key Factor in Validation?*



### Our Conclusion

- Variation analysis is a valuable and helpful tool for the validation process
- It is effective esp.
  - in combination with other validation activities
  - when it is also part of the audit process and
  - is done and analyzed on time.

### Strategic Questions

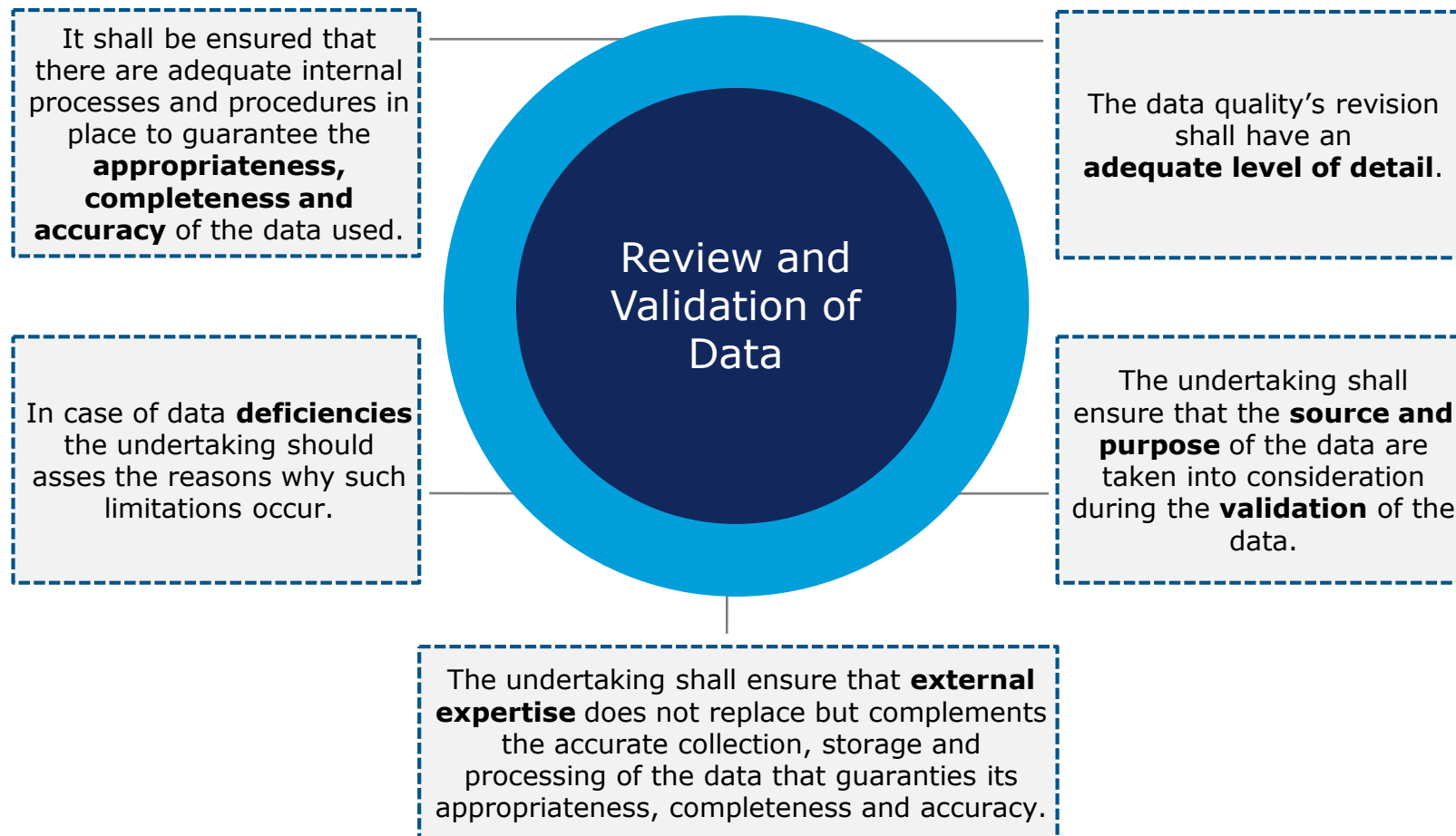
- Use as part of corporate planning and controlling?
- Quality of analyses: used for other reporting or analyses for internal purposes?
- Level of re-use of validation and variation analysis in other contexts, e.g. in product controlling or pricing?

### Potential Action Points

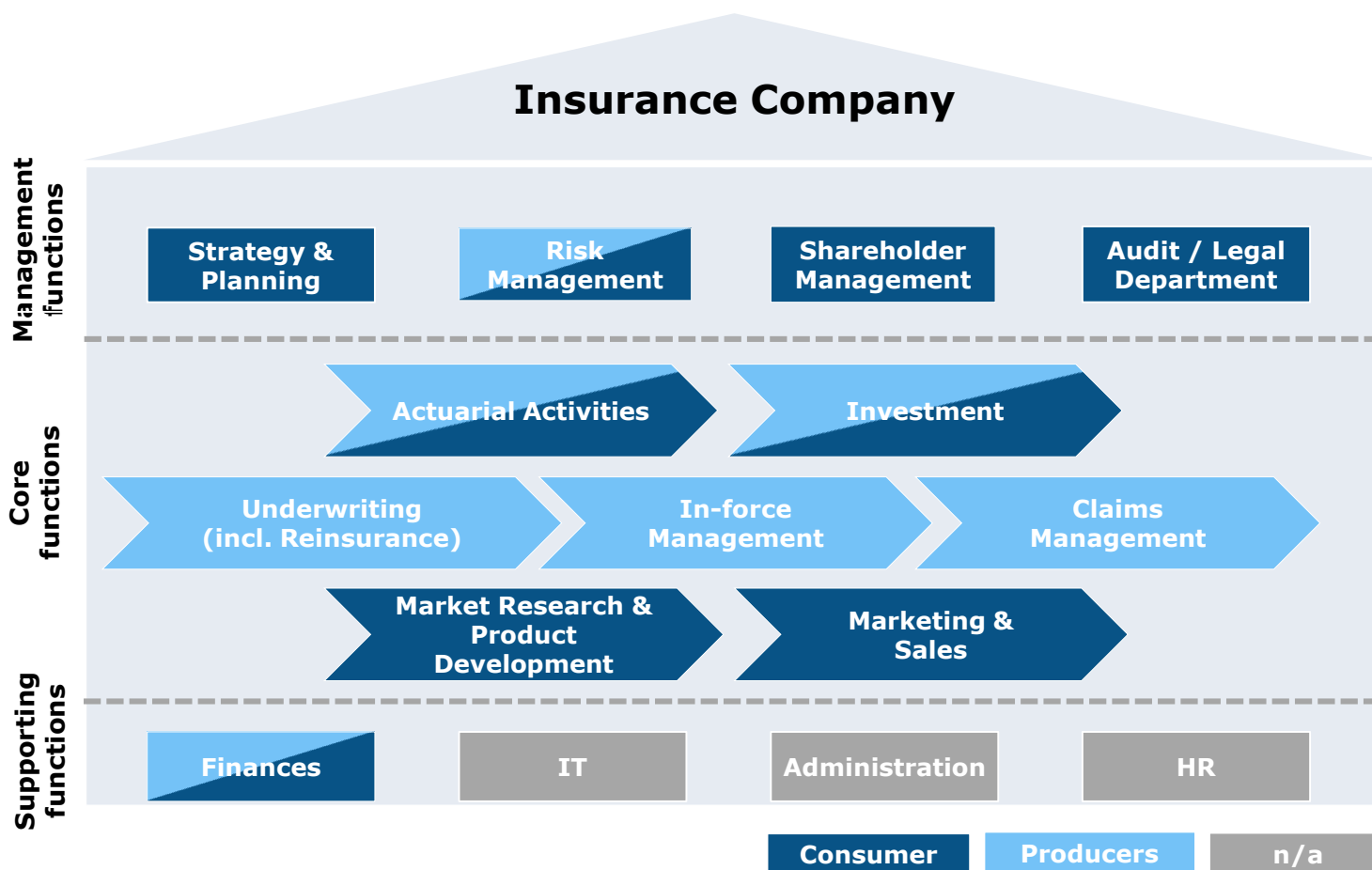
- Assessment of current validation scope perimeter
- Integration of VA into the ICS for financial closing
- Extended scope and interpretation
- Delivery of VA also in light of SII “fast close”
- Re-use of SII insights for other than compliance-related tasks

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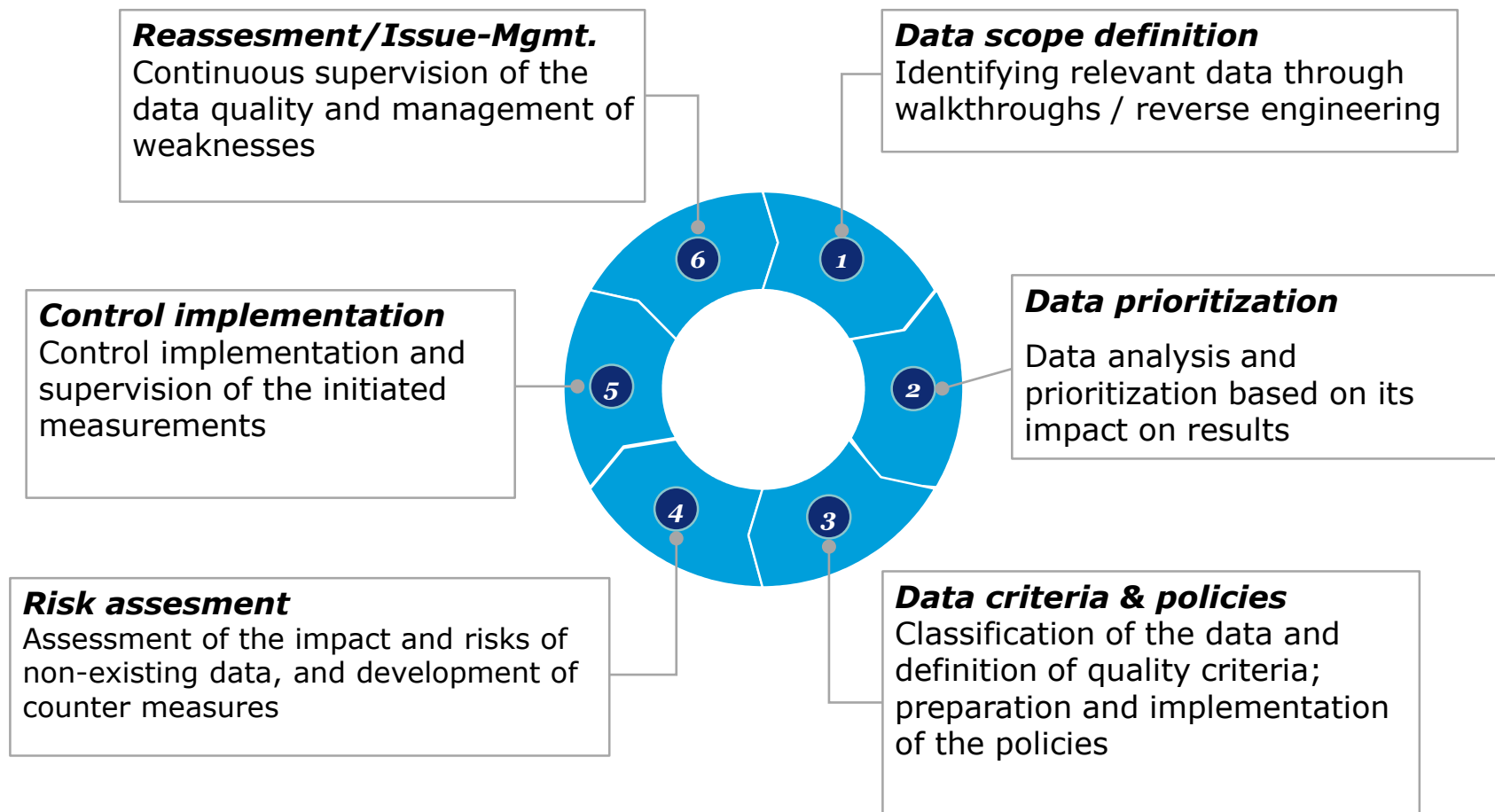
## Objectives of Data Quality Management



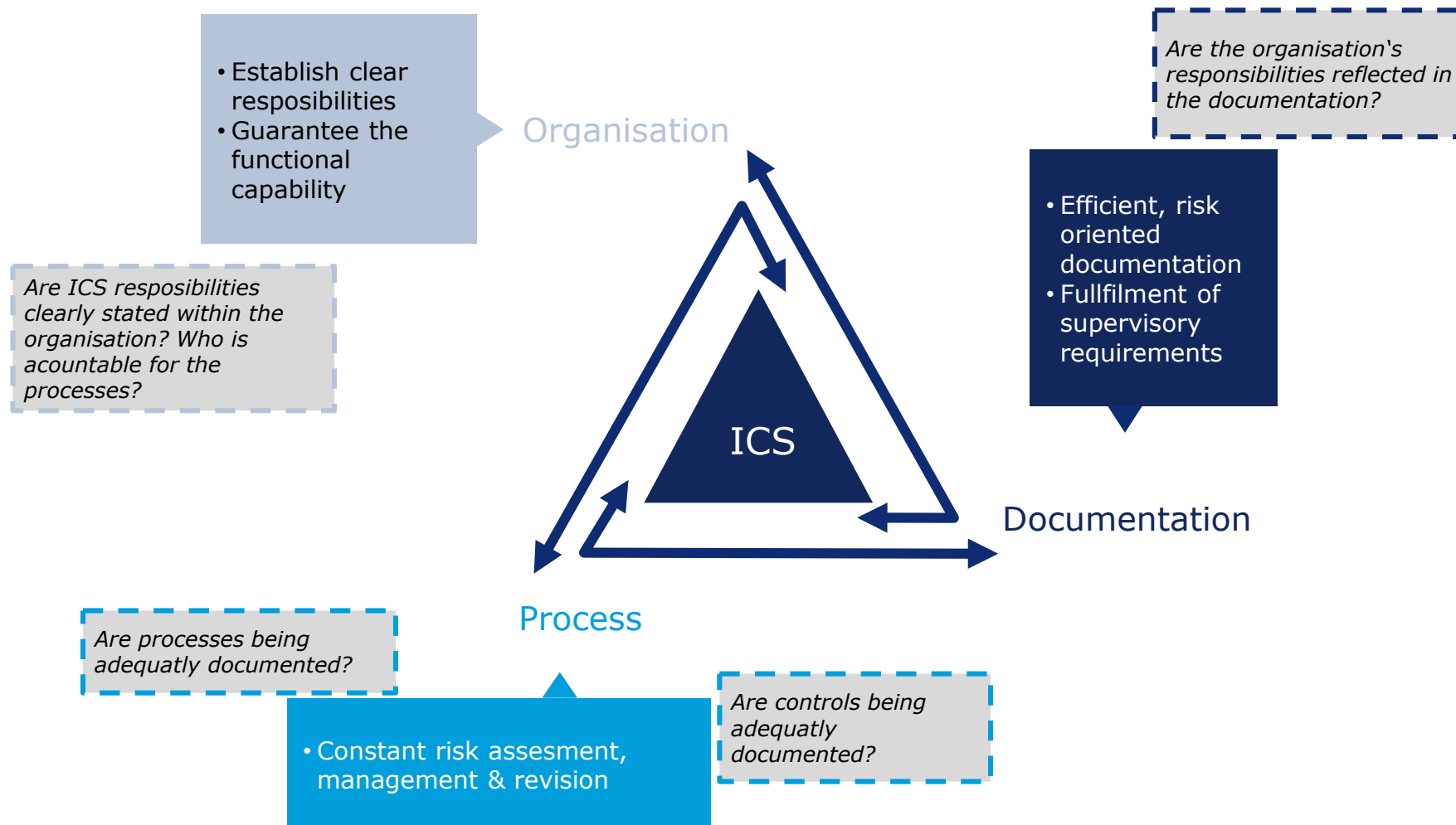
## „Production“ and „Consumption“



## Practical Implementation – The Monitoring Cycle



## Practical Implementation – Internal Control System



## Practical Implementation – Challenges and Difficulties

**Difficulties** in the  
identification and  
documentation of the  
data

In-depth **use** of  
**spreadsheets**:  
Compliance with end user  
calculation standard is  
often insufficient

**Difficulties** in  
defining data  
ownership

*“Given the high importance of data in internal  
modelling, undertakings and supervisory  
authorities should strive for the highest data  
quality standards to be applied.”*

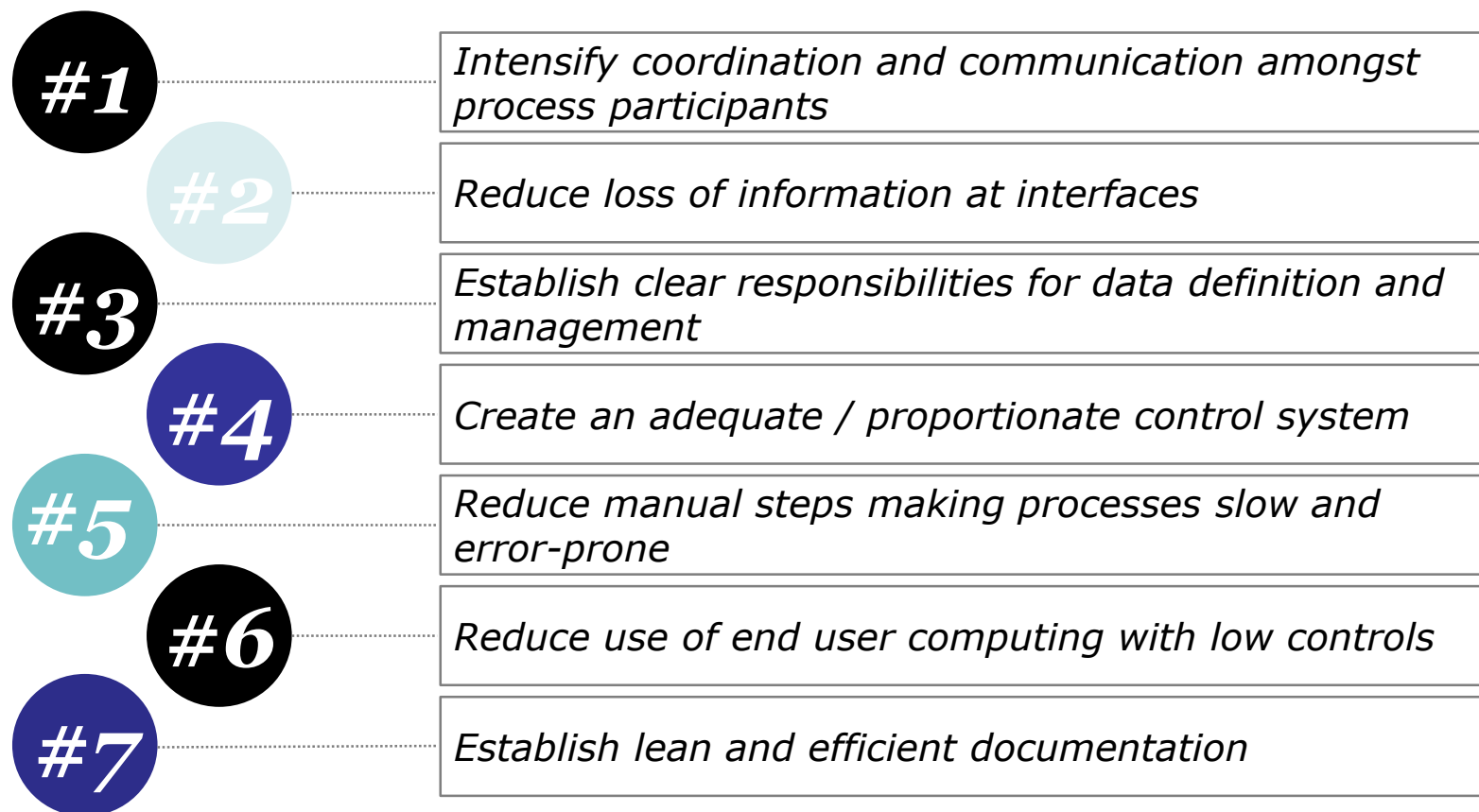
*EIOPA Advice for Level 2 Implementing Measures on Solvency II:  
Tests and Standards for Internal Model Approval*

**Underestimation** of  
the needed time to  
complete the  
**implementation** of  
the data’s regulatory  
framework

**Complex IT-Systems**  
User requirements,  
adequate design, tests  
and appropriate controls  
are not clearly defined

Uncertainty  
regarding the  
differentiation  
between **data**  
**directory** & **data**  
**dictionary**

## Practical Implementation – Success Factors

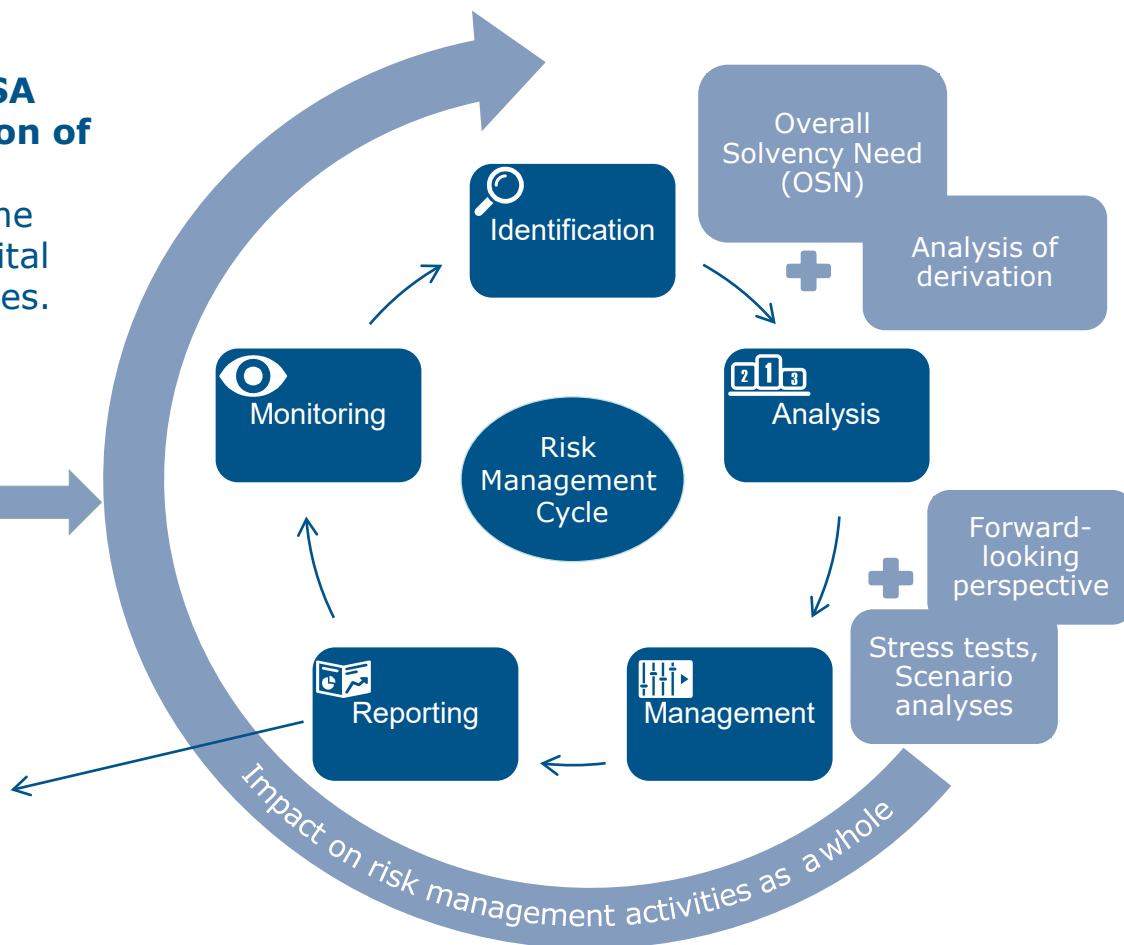
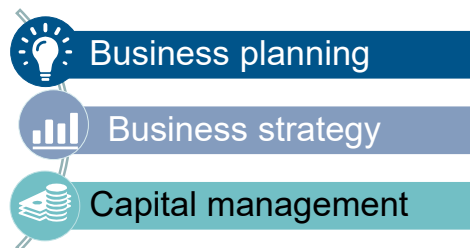


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## Risk management cycle including ORSA requirements

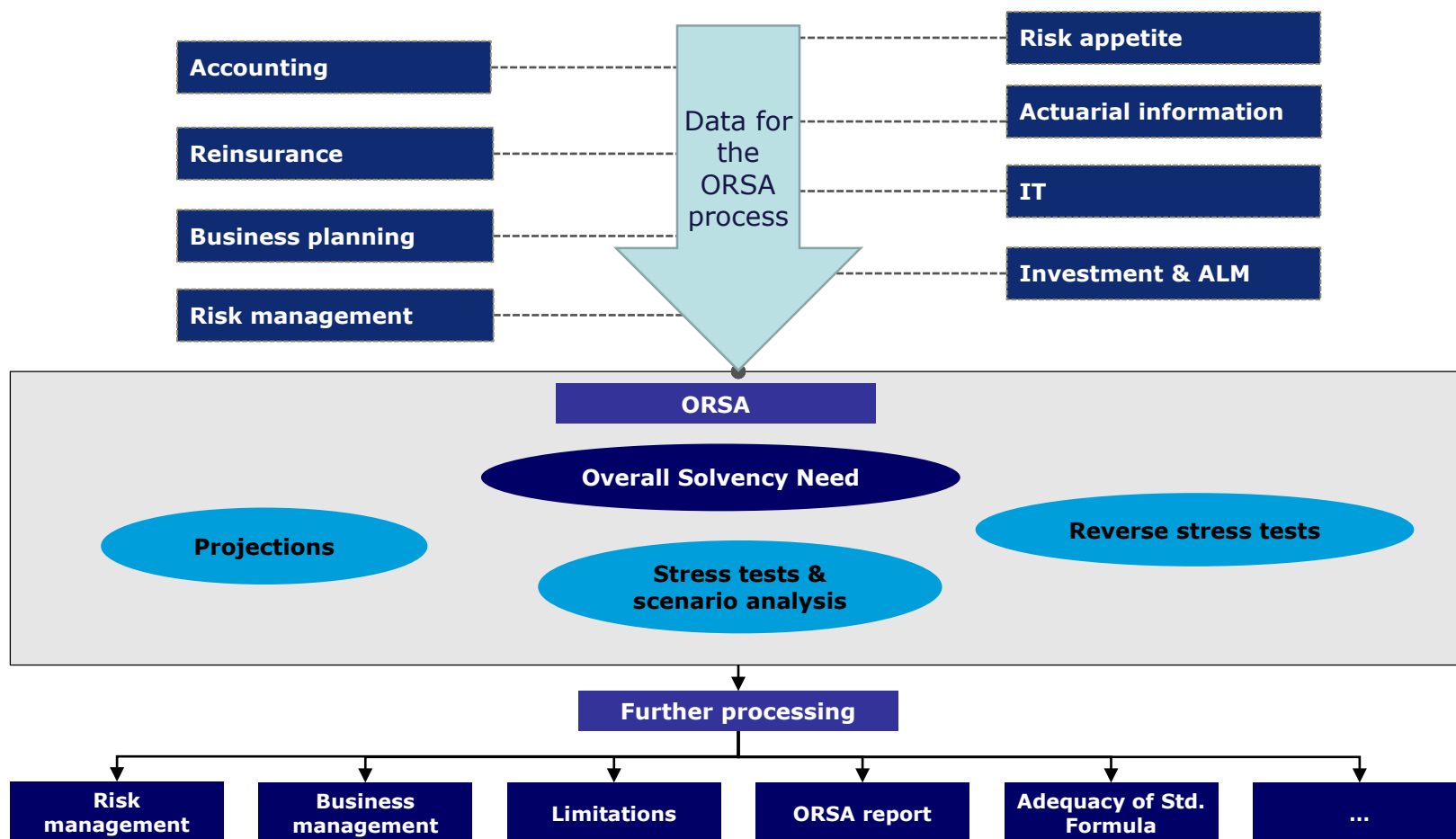
**The implementation of ORSA does not aim for the creation of a parallel process...**

... on the contrary it targets the integration with the classic capital and risk management processes.



**There are additional requirements for the reporting and documentation of ORSA**

## ORSA depends on diverse data sources

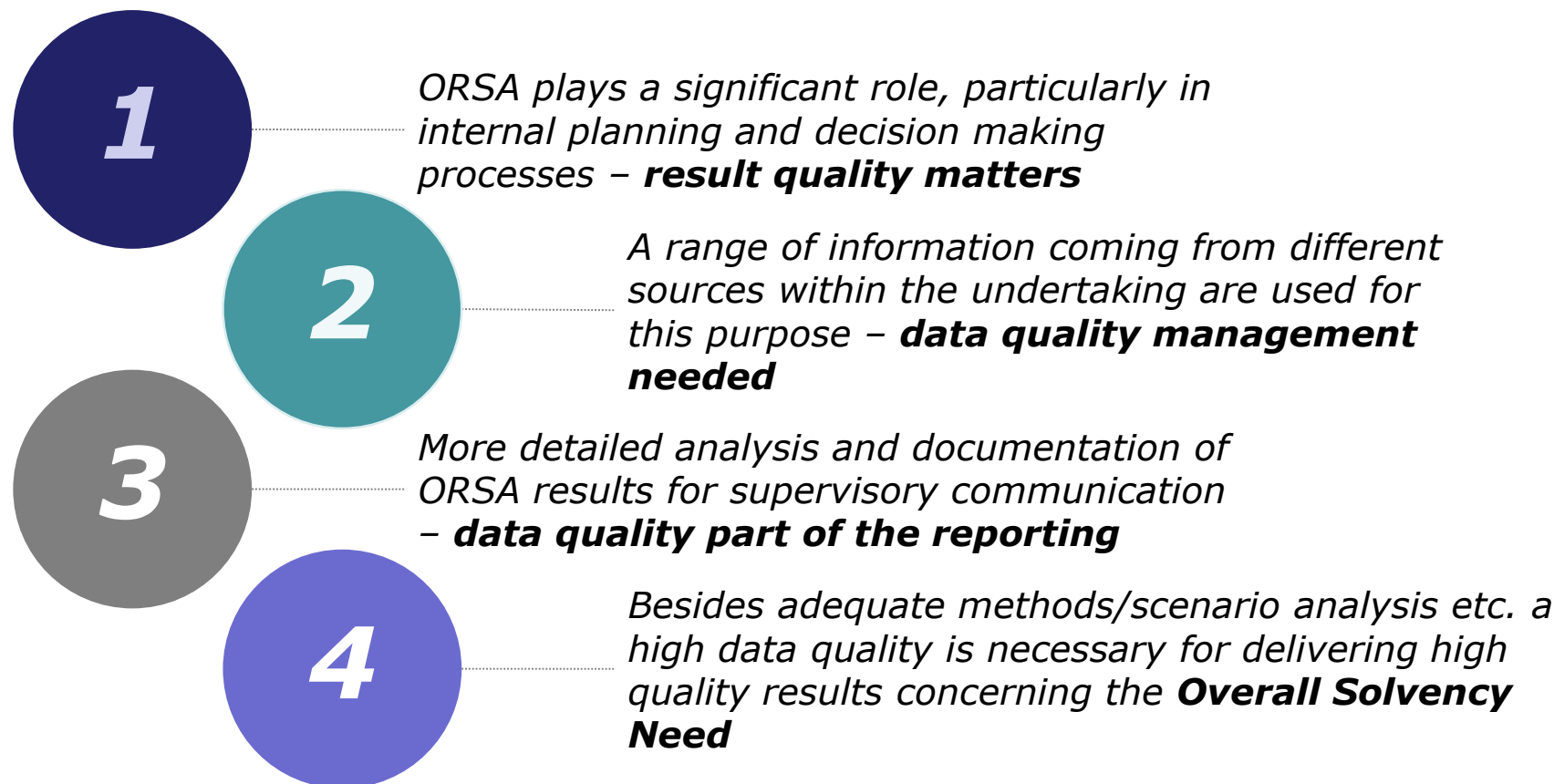


## ***External View: Room for improvement in ORSA***

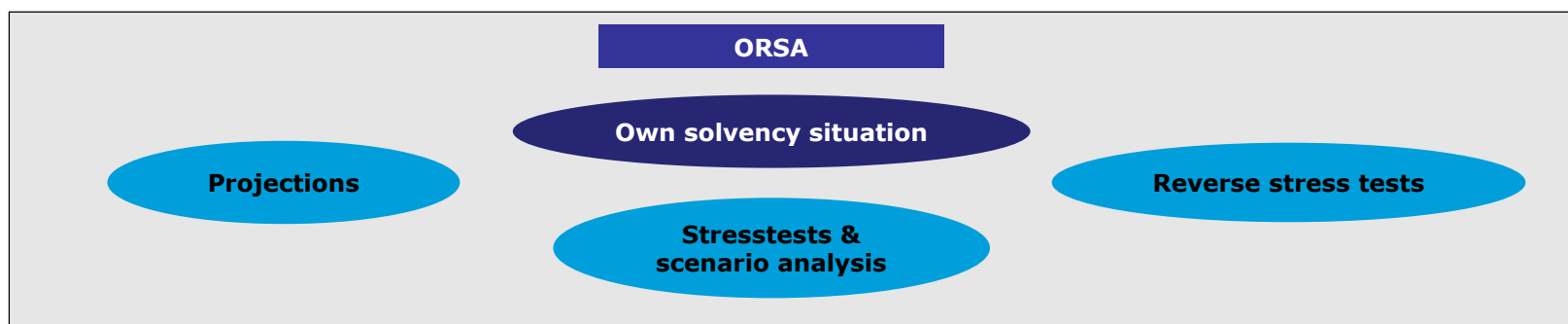
(EIOPA 06/2017)

- Elaboration of ORSA process, including policy and **data used in the assessment**
- Greater involvement of ASMBs
- Widen the scope of **risk assessments**, to include consideration of business model and strategic management actions
- **Reduce overreliance** on Standard Formula
- Improve **quality** of stress-testing and inverse stress-testing

## Why data quality matters in ORSA



## How to identify the requirements?



**Reverse-engineer** data (quality) needs from the models across the diverse sources of data for the ORSA process, and collect these in the data quality policy and a data directory



**Maintain data quality in the course of ORSA** calculations, and have data quality officers delivering on the requirements within the data quality policy



**Report and document** the applied approaches to data quality management, the processes and the controls as part of the Internal Controls System

## ORSA – Activities across data sources

Risik management

ORSA

### Data:

- Identified risks
- Risk assesment

## Significant inputs according to ORSA

Risik management

ORSA

### Data:

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### Possible quality issues:

- Material risks were not identified or were incorrectly rated

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Risik management

ORSA

### Data:

- Identified risks
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### Possible quality issues:

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### Potential for improvement:

- Revision of the risk assesment process
- Comprehensive documentation of the risk assesment process and consideration of the overall solvency needs

## Significant inputs according to ORSA



### Data:

- Type of reinsurance policy
- Terms
- (Branch-) Coverage
- Reinstatements
- Excess and limits

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- (Branch-) Coverage
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### Possible quality issues:

- Different terms for different branches
- Exclusion of risks
- Common coverage limit for different branches
- Unavailable historical claim data

## Significant inputs according to ORSA

Reinsurance

ORSA

### Data:

- Type of reinsurance policy
- Terms
- (Branch-) Coverage
- Reinstatements
- Excess and limits

### Possible quality issues:

- Different terms for different branches
- Exclusion of risks
- Common coverage limit for different branches
- Unavailable historical claim data

### Potential for improvement:

- Involvement of the reinsurance department for clarifying the details
- Analyze the needed granularity

## Significant inputs according to ORSA

Actuarial reserving

ORSA

### Data:

- Loss triangles
- Paid triangles  
(for the calculation of the reserve's best estimate)
- Large losses
- Catastrophe's impact on the development triangles

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- Need to combine different segments to create a stable data basis for the calculation of the best estimate.
- Redistribution of the estimated reserves in the different segments.

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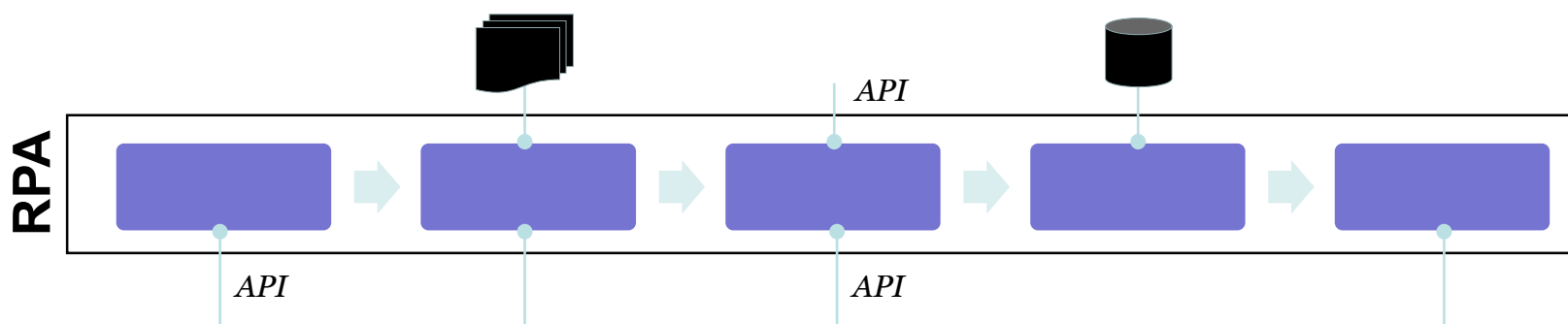
### Potential for improvement:

- In case of growing business: questioning appropriateness of segmentation
- Choice of suitable granularity
- Introduction of individual loss analyses
- Monitoring the long-term claims development
- Considering the market development
- Recourse to relevant market data

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## *Future industrialization of processes increases efficiency and quality*

- BPO (Business Process Outsourcing)
- BPM (Business Process Management)
- DMS (Document management systems)
- RPA (Robotic Process Automation)





Quality management should be an integral part of any actuarial modeling activity

Validation and data quality management are required by Solvency II, at least as part of Pillar 1

ORSA as well – because of its complexity and relevance – deserves active quality management

We have shown various means of practical quality management – including variation analysis, internal controls, and examples within ORSA

Looking forward the transformation of actuarial activities towards much more automated processes and industrialization of actuarial work will also foster quality management and help mitigate risks from manual work

*Thanks for your patience.*

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