Actuarial point of view: Data quality management

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Česká společnost aktuárů
Introduction
Regulatory requirements
Your compliance project
Impact on other projects
How to prepare

Data Quality Management
**Agenda**

- Data Quality Management
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- Regulatory requirements
- Your compliance project
- Impact on other projects
- How to prepare
Introduction

Importance of data quality in Solvency II

Data quality is one of the central themes of Solvency II

- Solvency II has major implications for insurance companies in terms of both risk management and internal control
- Data represent a key budget item under the reform

Principal cost items in Europe

- Communication and internal reporting
- ORSA
- Use test
- Quality of operational risk management
- Systems of governance
- Data quality
- Quality of modelling

Source: PwC Solvency Survey

- Basel II feedback: the systematic underestimation of data-related compliance issues has led to the maintaining of stop-gap solutions (short cuts, proxies, etc.) that prove more costly in the long run.
## Data quality benefits

<table>
<thead>
<tr>
<th>1. Cost</th>
<th>2. Risk, compliance, and security</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify opportunities for cost take out in knowledge workers</td>
<td>• React to regulatory pressure for greater transparency and reporting</td>
</tr>
<tr>
<td>• Reduce head count and time lines for delivery</td>
<td>• Meet increased personal accountability for executives to endorse all aspects of the business</td>
</tr>
<tr>
<td>• Avoid regulatory fines</td>
<td>• Manage online fraud and data security</td>
</tr>
<tr>
<td>• Manage data better to reduce hardware costs</td>
<td>• Avoid data disasters</td>
</tr>
<tr>
<td>• Reduce data redundancy</td>
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</tbody>
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<table>
<thead>
<tr>
<th>3. Value enablement</th>
<th>4. Operational excellence</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Deliver on strategic business objectives</td>
<td>• Reduce errors that lead to cost, risk, and value reduction</td>
</tr>
<tr>
<td>• Be able to answer the most important business questions</td>
<td>• Provide an approach to stop data quality issues from occurring in the first place</td>
</tr>
<tr>
<td>• Business and technology enablement via governed enterprise data assets</td>
<td>• How much data quality issues cost the business — often master data</td>
</tr>
<tr>
<td>• Prioritize activities based upon value</td>
<td></td>
</tr>
<tr>
<td>• Stakeholder/customer satisfaction</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Business and IT alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduce cross team duplication</td>
</tr>
<tr>
<td>• Decrease implementation time</td>
</tr>
<tr>
<td>• Reduce technology complexity</td>
</tr>
<tr>
<td>• Optimize existing technology investments</td>
</tr>
<tr>
<td>• Streamline operational support/services</td>
</tr>
</tbody>
</table>
Introduction

Regulatory requirements

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**Regulatory requirements**

**Data quality related to actuaries**

“The actuarial function shall... …draw conclusions on the appropriateness, accuracy and completeness of the data and assumptions used as well as on the methodologies applied in their (best estimate) calculation.” (Article 262)

“Data needs to be collected, processed and applied in a transparent and structured manner based on:
(i) the definition and assessment of the quality of data;
(ii) assumptions made in the collection, processing and application of data;
(iii) the process for carrying out data updates.” (Article 14, 3e)

“...an estimation error in the calculation of the technical provisions shall be considered material where it could influence the decision-making or the judgement of the users of the calculation result, including the supervisory authorities.” (Article 14, 3)
### Regulatory requirements

#### Data quality imperatives: 3 key themes

1. How far back should historical data go for mass risks like motor liability and for major risks?
2. Do we have consistently detailed information on group portfolios across distribution networks and the corporate size range?
3. Are the financial returns used by the internal model to calculate best estimates consistent across the company for given accounting base?
4. Do expense levels stipulated in the underwriting policy match commission levels as per accounting records?
5. Are options and contractually guaranteed cover effectively taken into account, together with their impact on solvency monitoring and measurement?

- **Completeness**
- **Accuracy**
- **Appropriateness**

Data do not contain biases which make them unfit for purpose

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>6.</td>
<td>Do we have an homogeneous level of details for individual data within group portfolios?</td>
</tr>
<tr>
<td>7.</td>
<td>Which age limits should be applied for monitoring data produced by the system?</td>
</tr>
<tr>
<td>8.</td>
<td>Relevance of birth date 01/01/1900?</td>
</tr>
<tr>
<td>9.</td>
<td>Degree of accuracy of age calculation: within 1 month, 6 months, or year-based?</td>
</tr>
</tbody>
</table>

Reference to the degree of confidence that the organisation places in the data

Databases provide comprehensive, comparable information on all portfolios.
# Dimensions of data quality improvement

Data quality can be measured across quantitative and qualitative dimensions.

<table>
<thead>
<tr>
<th>Measurable dimensions for data quality</th>
<th>Intangible dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimension</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Does the data accurately represent reality or a verifiable source?</td>
</tr>
<tr>
<td><strong>Integrity</strong></td>
<td>Do broken links exist between data that should be related?</td>
</tr>
<tr>
<td><strong>Consistency</strong></td>
<td>Is there a single representation of data?</td>
</tr>
<tr>
<td><strong>Completeness</strong></td>
<td>Is any key information missing?</td>
</tr>
<tr>
<td><strong>Uniqueness</strong></td>
<td>Is the data value unique, i.e. no duplicate values or records?</td>
</tr>
<tr>
<td><strong>Accessibility</strong></td>
<td>Is the data easily accessible, understandable, and used consistently?</td>
</tr>
<tr>
<td><strong>Precision</strong></td>
<td>Is data stored with the precision required by the business?</td>
</tr>
<tr>
<td><strong>Timeliness</strong></td>
<td>Is the information update frequency adequate to meet the business requirements?</td>
</tr>
</tbody>
</table>

Data quality involves more than just addressing historical data quality issues through data profiling and re-engineering. It involves preventing these issues from occurring in the first place. This is where data governance plays a major role.
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Data Quality Management

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Your compliance project
Operational implementation

1. Quality
   Specification of required standards of quality and performance

2. Architecture
   Automation
   Tools parameterization – System Integration – Acceptance tests
   Industrialisation

3. Governance
   Solvency II requirements
Your compliance project

Interaction between the three focuses and their content

1. Quality
   - Objectives & issues
   - Scope & resources
   - Measurement criteria
   - Review principles
   - Scorecards
   - Data model
   - Data dictionary

2. Architecture
   - Sources
   - Flows
   - Master data management
   - Metadata management
   - Migration
   - Storage
   - Accessibility
   - Archiving
   - Cancellation
   - Reprocessing
   - Internal Control
   - Traceability
   - Industrialisation

3. Governance
   - Rights and clearances
   - Authorisation & authentication
   - Private domain
   - Roles and responsibilities
   - Stewardship
   - Standards

Solvency II requirements

Processes
- Reprocessing
- Internal Control
- Traceability
- Industrialisation

Procedures
- Processes
- Sign-off
- Commitment

Ownership
- Roles and responsibilities
- Stewardship
- Standards

Quality Charter

Data model
Your compliance project

1 - Intrinsic (natural, essential) data quality

How to translate the three criteria be in measurable indicators of intrinsic data quality?

How can the policy for data quality be structured around the various indictors?

The approach to intrinsic data quality must permit the definition of the three following components:

- **Scope** of data:
  - internal, external, framework
  - accounting, financial, life/non-life liabilities, assets, etc.
  - Expert judgment

- Quality **measurement indicators**:
  - How can the three criteria of completeness, accuracy and appropriateness be reflected in measurable indicators?
  - Which indicators should be used for which reference frame?

- Management **policy** for data quality:
  - Which processes should be specifically designed for the calculation of indicators?
  - Which reviews should be performed and how frequently?
  - How far back should historical data go?
  - How should supporting evidence be archived?
Your compliance project

Data scope

Companies/organisations
Natural-person partners

Product data

Products
Cover
Pricing
Partnerships
Commission rates

Client data

Contracts
Claims/proceeds
indemnification
Provisions
Annuity payments

Contract data

Group/individual
General clauses
Special conditions
Policy cover

Liability data

Financial income
Net stock market values
Look-through funds

Solvency II
data scope

Asset data

Income
Net book values
Expenses
Options and cover

Expert
judgment

Objectives
Underlying information
Decision-making criteria
Application limits
Back-testing

Assumption
data

Tables (mortality, etc.)
Rate curve
Technical rates
Revaluations
Thresholds, index-based limits
Terminology
Shocks

Internal data

External data

PwC
Your compliance project
Criteria for measuring data quality under the Directive

Data quality

Completeness

Accessibility
System availability
Transaction availability
Rights and clearances

• Reliability of data extraction
• IT controls
• Transaction logs

Interpretability
Syntax
Semantics
Version checking
Aliases
Origin

• Mister, Mr, M
• 01/01/1900; 1 January 00
• Contract details
• Product descriptions

Accuracy

Appropriateness

Utility
Duplication
Actualization rate
Volatility

• De-duplication
• Management of tax issues

Credibility
Standardisation
Consistency
Reliability

• Contract general terms & conditions
• Nat cat contract address
• Negative technical rate

Exigences
Solvabilité

15
Your compliance project

2 – Data architecture

The burden of proof requirement creates a need for very detailed system documentation.

The control environment must be integrated into system design.

- Data architecture
  - Identification of data feed channels
  - Record of data management operations
  - Mapping of processes and flows
  - Implementation of controls over all data management processes
  - Traceability

- The required level of automation will depend on the volume of data to be handled, the frequency of regulatory calculations, and the extent and level of detail of Quality reviews

- The extent of automation will influence the level of industrialisation and, therefore, the selection of tools to be integrated into the Solvency II system

- All aspects of the system must be transparent and accessible to the regulator
Your compliance project
Roll out the approach as per business lines and applications...

Property and casualty
- Personal household
- Corporate
- MTPL, Casco
- Both pillars

Motor
- Data feed channels
- Manual and automated operations
- Internal control system
- Audit trails

Pensions
- Traditional
- Unit linked

Life
- Group life
- Group health

Health
- Documentation

Solvency II system
Your compliance project
... and each data channel from one business application down to the calculation engines and reporting layers
Your compliance project

Our experience shows that needs are wide-ranging and that integration is the appropriate solution.

• Document portal
• Content management
• Scan and indexation

Content and document management

• BPL & BPM tools
• Workflow platforms
• Rules engine

Business Process Management

• Datawarehouse/datamart
• Storage and indexation tools
• ETL tools
• Integration middleware
• Data profiling tools, etc.

Data management

• Cash flow projection
• Statistical analysis
• Reserving
• ALM
• Operational risks

1 Actuarial engine & prospective calculations

2 Reporting & dashboards

• Business reporting tools
• Schedule generator
• Dynamic cubes (OLAP tools)
• ....
The organisation and resources required must be put in place to ensure demonstrable control over the risk data processing chain.

- Governance in respect of data quality encompasses the following areas:
  - **Roles and responsibilities**
    - Who decides?
    - Roles and responsibilities
    - Committee system
  - **Resources**
    - Data quality policy
    - Procedures guide: timing, sign-off
    - Delegation levels, procedures for detecting threshold breaches, remedial action plans and related monitoring
  - **Links with other corporate bodies:**
    - Permanent control
    - Internal control
  - **Integration into the existing organisation**
    - Technical & Financial departments
    - Risk Management and IT departments
Your compliance project
Embedding data governance within your organisation

Data governance steering committee – senior sponsorship

<table>
<thead>
<tr>
<th>Activity organisation</th>
<th>Data organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponsors</td>
<td>Data Governance Leader</td>
</tr>
<tr>
<td>Data Owners</td>
<td>Data Stewards</td>
</tr>
</tbody>
</table>

Producers
Input data into business applications which feed information to the datawarehouse

Stewards
Ensure the completeness, accuracy and appropriateness of data

Consumers
Provide external and internal communication for the attention of management and supervisory authorities

Existing

- Manag. applications
- External sources
- Underwriting

- Datawarehouses
- Datamarts

- Actuarial
- Finance
- Monitoring
- Marketing
- Risk

To be created

Existing

Your compliance project
Embedding data governance within your organisation
A reliable internal control framework to ensure data integrity

- Given the requirements concerning data, an effective internal control system is a pre-requisite
- This means a permanent framework which strengthens the undertaking’s operational environment through control measures that permit effective risk management and prevent deficiencies.
- The control system should provide reasonable assurance that:
  - All strategies, policies and procedures defined are effectively and efficiently implemented within the organisation.
  - Regulatory requirements are complied with.
  - Financial and non-financial data are reliable, i.e. of satisfactory quality and complete.
- The reliability of the control environment must be ensured in respect of:
  - Business processes (e.g. verification of reserve adequacy)
  - IT processes (e.g. data access checks)
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Solvency II and the MCEV and ALM frameworks

**MCEV**
- Risk neutral (RN)
- Life insurance
- Valuation of business
- Insurance liabilities-segmentation based on network/client range

**ALM**
- Risk neutral (RN) and real-world (RW)
- Life and/or Non-Life insurance
- Quantification and identification of A/L risks
- Insurance liabilities-network-based risk segmentation.

**Solvency II**
- Risk neutral (RN)
- All insurance activities
- Quantification of capital requirement
- Insurance liabilities – segmentation based on homogeneous risk groups

Approach left to insurer’s discretion

Stochastic and dynamic approach
Impact on other projects

Solvency II and IFRS 4 Phase 2: anticipating the impact

The proposals contained in the exposure draft will affect all entities which issue contracts that meet the definition of an insurance contract

**Reminder of differences regarding data scope:**

<table>
<thead>
<tr>
<th></th>
<th>IFRS 4 Phase 2</th>
<th>Solvency II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract data</td>
<td>Pooling based on underwriting period and/or expected duration</td>
<td>Pooling based on homogeneous risk groups</td>
</tr>
<tr>
<td>Assumption</td>
<td>Discretionary discount rate</td>
<td>Prescribed discount rate</td>
</tr>
</tbody>
</table>

**What to do**

- In an internal model context, allow for data generation and feed processes which facilitate impact studies on data aggregation methods
- Emphasise model data feed automation.
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### How to prepare

#### Possible approach

Start with priorities derived from Gap Analysis, where appropriate, and prepare the following deliverables, at least:

<table>
<thead>
<tr>
<th>Map, analyse and take remedial action</th>
<th>Data dictionary</th>
<th>• Identification of all data concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mapping of source systems</td>
<td>• Record sources (management applications, core systems, data warehouses, databases relevant for key data)</td>
</tr>
</tbody>
</table>
|                                      | Process and flow mapping | • Model all feed channels  
• Record and document all existing controls |
|                                      | Risk and control matrix | • Mapping of risk  
• Definition of risk/control/process matrices |
|                                      | Data quality policy | • Data governance (roles and responsibilities, procedures), data quality, data security,.... |
Thank you for attention