

**CEIOPS' Advice for
Level 2 Implementing Measures on Solvency II:
Technical Provisions – Article 86 f
Standards for Data Quality**

(former CP 43)

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Table of content

1. Introduction.....	3
2. Extracts from Level 1 Text	5
3. Advice	7
3.1 Explanatory text	7
3.1.1 Criteria to assess the quality of data	7
3.1.2 Data deficiencies	9
3.1.3 Application of the principle of proportionality	11
3.1.4 Requirements on internal processes and procedures	12
3.1.5 Issues of data quality in the context of a provisioning analysis and review ...	14
3.2 CEIOPS' advice	18

1. Introduction

- 1.1. In its letter of 19 July 2007, the European Commission requested CEIOPS to provide final, fully consulted advice on Level 2 implementing measures by October 2009 and recommended CEIOPS to develop Level 3 guidance on certain areas to foster supervisory convergence. On 12 June 2009 the European Commission sent a letter with further guidance regarding the Solvency II project, including the list of implementing measures and timetable until implementation.¹
- 1.2. This Paper aims at providing advice with regard to the standards that should be met with respect to ensuring the appropriateness, completeness and accuracy of the data used in the calculation of technical provisions, and with the specific circumstances in which it would be appropriate to use approximations, as requested in Article 86 (f) of the Solvency II Level 1 text.²
- 1.3. Data used to feed the best estimate calculation can have an essential impact on its outcome. Hence it is necessary to assess the quality of these data for instance, when necessary, by reconciling them with those from the annual accounts or with any other internal statistical database or, by ensuring consistency with any external data used, showing the differences and explaining reasons and consequences of any detected misalignment .
- 1.4. The Level 1 text states in Article 76 that *"The best estimate (of a technical provision) shall be equal to the probability-weighted average of future cash-flows, taking account of the time value of money (expected present value of future cash-flows), using the relevant risk-free interest rate term structure". It further highlights that "the calculation of the best estimate shall be based upon current and credible information (...) and be performed using adequate actuarial methods and statistical techniques"*. Thus, the quality of the data is of crucial importance and it should allow for the application of robust and adequate actuarial methods and statistical techniques. Such methodologies require sufficient data, both from a quantitative and qualitative point of view.
- 1.5. Quality of data is crucial in the scope of valuation of technical provisions, mainly, because:
 - The more complete and correct the data is, the more consistent and accurate final estimates will be;
 - The application of a wider range of methodologies for calculating the best estimate is made possible, improving the chances of application of adequate and robust methods for each case.

¹ See <http://www.ceiops.eu/content/view/5/5/>.

² Latest version from 19 October 2009 available at <http://register.consilium.europa.eu/pdf/en/09/st03/st03643-re01.en09.pdf>

- Validation of methods is more reliable and leads to more credible conclusions, once a reasonable level of quality of data is achieved.
 - Effective comparisons over time and in relation to market data are possible, which leads, for instance, to a better knowledge of the businesses in which the undertaking operates and its performance.
- 1.6. Throughout this paper, the term 'data' is used to refer to all the information which is directly or indirectly needed in order to carry out a valuation of technical provisions, in particular enabling the use of appropriate actuarial and statistical methodologies, in line with the underlying (re)insurance obligations, undertaking's specificities and with the principle of proportionality. In the context of this paper, data comprises numerical, census or classification information but not qualitative information. Assumptions are not regarded as data, but it is noted that the use of data is an important basis in the development of actuarial assumptions.
- 1.7. Whereas this paper is focused on setting out advice in the context of a valuation of technical provisions, it is noted that the issue of data quality is also relevant in other areas of a solvency assessment, for example for the calculation of the Solvency Capital Requirement (SCR) using the standard formula or internal models.³ CEIOPS considers that, to the extent appropriate, a consistent approach to data quality issues needs to be taken across Pillar 1, without however disregarding the different objectives and specificities of each area.

³ See para. 2.2 below.

2. Extracts from Level 1 Text

Legal basis for implementing measures

Article 86 – Implementing measures

The Commission shall adopt implementing measures laying down the following: [...]

- f. the standards to be met with respect to ensuring the appropriateness, completeness and accuracy of the data used in the calculation of technical provisions, and the specific circumstances in which it would be appropriate to use approximations, including case-by-case approaches, to calculate the best estimate [...];*

Other relevant Level 1 text for providing background to the advice

Article 82 - Data quality and application of approximations, including case-by-case approaches, for technical provisions

Member States shall ensure that insurance and reinsurance undertakings have internal processes and procedures in place to ensure the appropriateness, completeness and accuracy of the data used in the calculation of their technical provisions.

Where, in specific circumstances, insurance and reinsurance undertakings have insufficient data of appropriate quality to apply reliable actuarial method to a set or subset of their insurance and reinsurance obligations, or amounts recoverable from reinsurance contracts and special purpose vehicles, appropriate approximations, including case-by-case approaches, may be used in the calculation of the best estimate.

Article 48 lists the responsibilities of the actuarial function, one of which is "to assess the sufficiency and quality of the data used in the calculation of technical provisions".

In Article 76(3), reference is made to the need to value technical provisions consistent with "information provided by the financial markets and generally available data on insurance and reinsurance technical risks (market consistency)".

Similarly, Article 77(2) stipulates that the calculation of the best estimate shall be "based upon up-to-date and credible information (...) and be performed using adequate actuarial and statistical methods".

Article 84 also refers that, upon request of the supervisory authority, insurers shall to be able to demonstrate "the adequacy of the underlying statistical data used" for the application of the estimation methods for technical provisions.

- 2.1 It is noted that the Level 1 text also includes considerations on the issue of data quality in other contexts not immediately relevant to the valuation of technical provisions. In particular, this is the case with regard to:
- The use of undertaking-specific parameters in the SCR standard formula;⁴ and
 - The statistical quality standards and validation standards applicable for the use of internal models.⁵
- 2.2 In order to ensure a consistent approach, the definition of the three criteria used in the assessment of data quality – appropriateness, completeness and accuracy – presented in this paper is, to the extent appropriate, also applicable in an analogous manner to such particular contexts. However, considering that the scope, the level of demand and the objectives are different, the concrete application of the criteria to the particularities of each context is being further developed in other relevant CEIOPS' advice.⁶

⁴ See Articles 104(7) and 110 and the corresponding implementing measure set out in Article 109(1)(j)

⁵ See Articles 121 (3) and 124.

⁶ See former CP 56. CEIOPS-DOC-48/09 on tests and standards for internal model approval, page 80 ff at <http://www.ceiops.eu/index.php?option=content&task=view&id=607>. See also CEIOPS-CP-75/09 L2 draft advice on undertaking-specific parameters at <http://www.ceiops.eu//index.php?option=content&task=view&id=657>.

3. Advice

3.1 Explanatory text

3.1 Considering the call for implementing measure in Article 86 (f) the purpose of this paper is to consider:

- how the main criteria for an assessment of the quality of data – appropriateness, completeness and accuracy - should be interpreted in the context of the valuation of technical provisions;
- which internal processes and procedures would need to be implemented to ensure that the data used in the valuation of technical provisions complies with these quality criteria;
- how the quality of the data used in the calculation of technical provisions could be reviewed and validated and by whom such review should be carried out;
- the circumstances under which data deficiencies could arise, and expectations towards the undertaking in such cases.

3.2 When considering the issues mentioned in the previous paragraph, this paper focuses on requirements relating to the collection, storage and processing of the data by the insurer as a first step in the valuation process.

3.3 However, it should be noted that the quality of the data used in the determination of technical provisions is also an essential aspect during the provisioning analysis itself, where the insurer has to select and assess the data used in the valuation. Therefore, this paper also discusses the data quality issues in this particular context.

3.1.1 Criteria to assess the quality of data

3.4 From Article 82 of the Level 1 text it can be inferred that, the quality of data should be assessed by scrutinising a set of three criteria: appropriateness, completeness and accuracy. Thus, as a general principle, the valuation of technical provisions should be based on data which is considered complete, accurate and appropriate for that purpose.

3.5 The assessment of the quality of data – in particular, the criteria of appropriateness and completeness – should in principle be done at the portfolio level, and where relevant at a more granular level, including if necessary the analysis relating to the individual items. The assessment shall take into account the set of available data which is necessary and relevant to carry out the intended analysis. This includes both internal and external information to the undertaking. The assessment of the accuracy criteria should be carried out at a more granular level, relating to the individual items.

- 3.6 In particular, this applies when a set of data is used to set a particular assumption. The set of data used for this purpose should be checked for verification of the three criteria, as to ensure that the assumptions used in the valuation of technical provisions are as much as possible adequate, up-to-date, prospective, realistic and credible.
- 3.7 The following paragraphs discuss how each of these three criteria should be interpreted when assessing the quality of data.

Appropriateness

- 3.8 Data is considered to be appropriate if it is suitable for the intended purpose (e.g. the valuation of technical provisions, setting of assumptions) and relevant to the portfolio of risks being analysed (i.e. directly relates to the underlying risk drivers).
- 3.9 In particular, to be appropriate for valuation purposes the data needs to be representative of the portfolio of liabilities being valued and suitable to be used for an estimation of future cash flows (consistent with a prospective view on the behaviour of the relevant risks).

Completeness

- 3.10 Data is considered to be complete if it allows for the recognition of all the main homogeneous risk groups⁷ within the insurance or reinsurance portfolio. It should be noted that Article 80 implicitly implies that the calculation of technical provisions shall be done at the level of homogeneous risk groups.
- 3.11 Thus, data is considered to be complete if it has sufficient granularity to allow for the identification of trends and the full understanding of the behaviour of the underlying risks. The detail of information collected should be such that it allows for the application of adequate provisioning methodologies.⁸ Moreover, data is considered complete if sufficient historical information is available (e.g. the run-off triangle is of a sufficiently large size compared to the number of years within is considered reasonable that all claims are paid and closed).
- 3.12 In principle, the more heterogeneous the portfolio is, the more detailed the data should be. Where data is complete, it would generally allow for the application of a reliable actuarial method for the valuation of technical provisions.
- 3.13 All material information shall be taken into account and reflected in the data set. No relevant items shall be omitted in the process of data collection as this would distort the image of the undertaking's activity. In case of a lack of information, data can be considered as complete only if such deficiency can be justified as immaterial. The assessment should also include an analysis of whether the undertaking's information is

⁷ Former CP 27 defines the concept of 'homogenous risk group'. See CEIOPS-DOC-22/09 at <http://www.ceiops.eu/index.php?option=content&task=view&id=575>.

⁸ For instance, if run-off triangles are used to calculate the best estimate, it is necessary to record separately all payments and the date at which the payment was made, instead of just the total amount paid.

comprehensive and a relative comparison with other data for similar lines of business and/or risk factors.

Accuracy

- 3.14 Data is considered to be accurate if it is free from material mistakes, errors and omissions. Most of these will be caused by human error or IT failures, thus a particular link exists with operational risk, in particular the systems and processes employed by the company. An additional exposure to errors may stem from data and system architecture weaknesses, such as: several different data systems are being used, the interface between such systems is not fully automated, the data systems are outdated and/or there is not a general policy to link the design of data systems with the technical areas of the company.⁹ Furthermore, the sales channel and the outsourcing of services is also important, as the undertaking may lose certain control over the data collection process if the products are sold or managed via intermediaries.
- 3.15 Moreover, data is considered to be accurate if the recording of information is adequate, performed in a timely manner and is kept consistent over time. This is particularly applicable to certain information which may be obvious – for instance, recording information on the claims date for latent claims may be particularly challenging, but what would be of particular importance is to define and document an adequate policy to deal with such situations in a consistent manner.¹⁰
- 3.16 Accuracy means that a high level of confidence can be placed on the data. The undertaking must be able to demonstrate that it recognises the data set as credible by using it throughout the undertaking's operations and decision-making processes. The assessment of the accuracy criteria should include appropriate cross-checks and internal tests to the consistency of data (i.e. with other relevant information or with the same data in different points in time).

3.1.2 Data deficiencies

- 3.17 Frequently the data available to the undertaking may not be fully appropriate, accurate and complete. There are two broad reasons why such data deficiencies may occur:
- Reasons related to the nature or size of the portfolio; and
 - Reasons related to deficiencies in the undertakings' internal processes of collecting, storing or validating data quality.
 - Reasons related to deficiencies in the exchange of information with business partners in a reliable and standardized way

⁹ For instance, if the actuarial function, who is responsible for the provisioning process has no say on the identification of the data that needs to be collected and stored.

¹⁰ Other examples include the treatment of nil claims, how to record an event leading to several claims (one claim or multiple claims?), etc.

3.18 The following are examples for reasons related to the nature or size of the portfolio:

- The frequency of claims may be low, leading to a slow building process of the database;
- The extent to which historical claims data is available may be insufficient (e.g. in the case of a new insurance company or a new line of business);
- The quantity of data may be limited because the volume of business is small;
- Legal or other fundamental external or internal changes in the operating environment may reduce the adequacy of the historical data in predicting future behaviour.
- The claims data are not sufficiently homogeneous to determine claims patterns on the basis of which a reliable estimate could be derived.

3.19 Deficiencies in the undertaking's internal processes could stem, for instance, from IT mistakes, high cost of collecting or maintaining existent data, or a misinterpretation of what is necessary in achieving an appropriate valuation.

3.20 Where the undertaking has only insufficient own data of appropriate quality available for the valuation of technical provisions, it should assess why this is the case and, subject to proportionality, which steps it could take to increase the quality and quantity of its data.

3.21 In particular, the undertaking should assess:

- Whether the lack of data is related to deficiencies in the internal processes;
- whether the lack of data is related to deficiencies in the data transmission process with third parties (including related entities);
- Whether any external data supplied by third parties or market data could be used;
- Whether the quality of the available data could be enhanced.

3.22 Where the data deficiency is related to insufficient internal processes, the undertaking should, subject to proportionality, take appropriate measures to remedy in due course this situation and to ensure the adequacy of internal processes and procedures for collecting, storing and validating of data used for the valuation of technical provisions.

3.23 To enhance the quality of its data, it may be appropriate for the undertaking to apply adjustments to its data. For example, changes in the operating environment (e.g. changes in legislation) may reduce the

appropriateness of the historical data, because it becomes less credible for prediction exercises. In these cases it may be possible to enhance the quality of the data by reasonably adapting the historical data to the new reality, for instance by means of adjustments to the quantitative data and/or by complementing it with expert opinion (see CEIOPS-DOC-33/09 advice actuarial and statistical methodologies to calculate the best estimate).¹¹

- 3.24 However, any such adjustment and the underlying assumptions should be carefully justified and documented, and should not overwrite the raw data.
- 3.25 In circumstances where (e.g. due to the nature or size of the portfolio) a lack of data for the valuation of technical provisions is unavoidable for the undertaking, insurers may have to use "*appropriate approximations, including case by case approaches*" (Article 82). In such cases, further judgmental adjustments or assumptions to the data may often need to be applied in order to allow the valuation to be performed using such approximations in line with the principle of proportionality. The use of expert judgement and the assumptions applied for this purpose, shall meet the requirements set out in CEIOPS-DOC-33/09.
- 3.26 However, in no case should the use of approximations be seen as an alternative to implementing appropriate systems and processes for collecting material relevant information and building historical databases.

3.1.3 Application of the principle of proportionality

- 3.27 The degree of appropriateness, completeness and accuracy of data expected from the insurer should be consistent with the principle of proportionality and with the purpose of the analysis.
- 3.28 In practice, as the requirements should be seen in relation to the intended purpose of the analysis/valuation, for portfolios whose underlying risks are considered simple in terms of nature, scale and complexity, "appropriate" would automatically be interpreted differently than in a situation where there are complex risks (since it would be expected that less data is needed to evaluate simple risks).
- 3.29 However, this should not work as a justification to lower the general standards for the collection of data procedures and on the efforts to ensure its appropriateness, completeness and, especially, accuracy. It should be noted that past data may become relevant in the future if the way in which the principle of proportionality applies for that line of business changes in the future.
- 3.30 On the other hand, proportionality should apply symmetrically, i.e. where the nature, scale and complexity of the underlying risks is high, companies should pay increased attention to the standards and requirements regarding data quality management.

¹¹Former CP 39. See <http://www.ceiops.eu/index.php?option=content&task=view&id=590>.

3.31 However, in certain circumstances there may be a clash between the amount of information available in practice and the principle of proportionality. For instance, complex risks may have a relatively low frequency (e.g. aviation, catastrophes, etc.), thus leading to a very slow process of collecting claims information. The relative amount of claims information seems to be at odds with the proportionality principle. In such cases, the process of collecting, storing and validating information should still be robust, but the company would be required to complement it by making extra efforts to look for relevant external information to allow the understanding of the underlying risks and to use extensively adequate expert opinion and judgements. Documentation is also a key aspect in this subject.

3.1.4 Requirements on internal processes and procedures

3.32 In order to ensure on a continuous basis a sufficient quality of the data used in the valuation of technical provisions, the undertaking should have in place internal systems and procedures covering the following areas:

- Data quality management;
- Internal processes on the identification, collection, and processing of data; and
- The role of internal/external auditors and the actuarial function.

3.1.4.1 Data quality management - Internal processes

3.33 Data quality management is a continuous process that should comprise the following steps:

- a) Definition of the data;
- b) Assessment of the quality of data;
- c) Resolution of the material problems identified;
- d) Monitoring data quality.

3.34 Definition of the data comprises the identification of the needs in terms of data, a detailed description of the items that should be collected and the eventual relations between the different items. When performing a provisioning analysis, this step represents the starting point for the IT extractions, and the eventual calculations. In case of an inaccurate data description, the interpretation of the requirement could be too wide and then would imply errors. A comprehensive list of the data required by the provisioning process should be maintained. This would include specification of segmentation by homogenous risk groups and any additional split of the data required.

- 3.35 The assessment of the quality of data implies the verification of the features that data must possess in order to be able to produce credible estimates of technical provisions, i.e. the verification of the criteria of appropriateness, completeness and accuracy for the purpose of the analysis. Although such assessment may make use of adequate objective measures and indicators, it should also be subject to judgement.
- 3.36 The assessment of data quality should have due regard to the quality and performance of the channels used to collect, store, process and transmit data, in particular when data is provided by third parties (e.g. intermediaries) or through electronic sources (e.g. internet).
- 3.37 If material problems with the verification of the data quality criteria have been identified, the insurer should try to solve them within an appropriate timeframe (to the extent possible, but while keeping track of the raw data) and should work towards the improvement of the data collection, storage or other relevant internal processes, so as to ensure the quality of the future data. Those data limitations should be appropriately documented, including a description of how such situations can be remedied and the assignment of responsibilities within the undertaking.
- 3.38 Finally, data quality should be monitored periodically, with due regard to the principle of proportionality. This involves, in particular, the monitoring of the performance of the relevant IT systems and of the channels used to collect, store, transmit and process data. This process could be based, namely, on data quality performance indicators, but expert judgement needs to play a key role in the analysis.

3.1.4.2 Identification, collection and processing of the data

- 3.39 Identification, collection and processing of the data are steps required to perform the calculation of technical provisions. Hereunder, the main principles that should be followed in these processes are being listed.
- Data should be registered and maintained on a comprehensive basis and the underlying processes and procedures should be transparent;
 - Data collected should be sufficiently granular in order to apply adequate provisioning methodologies and generate results with a sufficient level of detail and robustness;
 - Where it remains useful for the purpose of valuing technical provisions, historical data should generally be kept and its availability should increase over time (e.g. for instance, this would not happen if valuable data from the older accident years is automatically ignored or truncated);
 - Any adjustments to the original data must be documented as well as its reasons, in particular the correction of any data errors and omissions, and the original database should be maintained;

- Data quality assessments should be made periodically and, once the results are obtained, corrections may take place in the form of suitable quantitative or qualitative changes.

3.1.4.3 Role of external auditor and actuarial function

- 3.40 Generally speaking, the role of both the external auditors and the actuarial function requires that some degree of analysis is performed with regard to the quality of the data, although the focus, the objectives and the techniques employed for such an assessment will be different.
- 3.41 External auditors will be required to audit specific sets of data, i.e. to conduct a formal and systematic examination for the purpose of testing its accuracy, using techniques commonly employed by audit professionals.
- 3.42 On the other hand, the actuarial function will be required to 'review' the quality of data, more specifically, to perform examinations of the characteristics of the selected data to determine if such data appear to be reasonable and consistent for the purposes of the analysis (note that review is not an audit of data).
- 3.43 In the calculation of technical provisions, actuarial expertise presents an important role in selection of data to be included. A more detailed description of the role of the external auditor and actuarial function is out of the scope of this paper. Interested parties should refer to CEIOPS-DOC-29/09 advice on the system of governance.¹²

3.1.5 Issues of data quality in the context of a provisioning analysis and review

- 3.44 As has already been observed, data quality issues are also important in the context of a valuation analysis and review carried out by the actuarial function.
- 3.45 This would for example include:
- The selection of data to be used for the valuation;
 - A review of the appropriateness of the data, having regard to the three criteria (appropriateness, completeness and accuracy) as described above and the specific valuation methodology to be applied;
 - An assessment on whether additional external data would be needed or whether enhancements to the available data should be sought; and

¹² Former CP33. See <http://www.ceiops.eu/index.php?option=content&task=view&id=581>.

- An assessment whether any adjustments may need to be applied to the available data, as part of actuarial best practice, to improve the goodness-of-fit and the reliability of the estimates derived from actuarial and statistical provisioning methodologies.
- 3.46 In such a specific context, the assessment of data quality for the purpose of the analysis would necessarily be more granular, as it would be made with a view to fit a specific methodology or to review the appropriateness of specific assumptions and parameters.
- 3.47 The requirements to set up adequate internal processes and procedures, in the context of Article 82, should not relate to such a granular level, but it should consider data quality from an overall perspective for the purposes of calculation of technical provisions, without necessarily relating it to the application of particular methodologies.
- 3.48 It is noted that data quality issues in the context of a valuation analysis and review (including any adjustments made by the actuarial function as part of the provisioning process) in relation to the quality of data vis-à-vis particular methodologies, are also relevant in the context of the call for implementing measure stipulated in Article 86(a)¹³. Moreover, such data quality issues are related to two of the responsibilities of the actuarial function: “to ensure the appropriateness of the methodologies and underlying models used as well as the assumptions made in the calculation of technical provisions” (Article 48(b)) and “to assess the sufficiency and quality of the data used in the calculation of technical provisions” (Article 48(c)).
- 3.49 As a general principle, the actuarial function should judge how much credibility should be assigned to historical data and to prospective assumptions. This judgement has to be based, namely, on a careful analysis of the underlying liabilities, the company and portfolio’s experience and relevant qualitative information.
- 3.50 In particular, to fulfil the criteria of the appropriateness of data, the analysis of the source and impact of unusual observations is necessary, in order to decide which weights should be assigned to these observations. Sometimes these observations should be treated as outliers but in other cases they are the effect of the randomness of the process (bad/good luck) and therefore indicate the hidden nature of the process and, for this reason, should be duly considered and documented.

3.1.5.1 Circumstances where adjustments to historical data may be needed in the context of the provisioning analysis

- 3.51 When applying provisioning methodologies, the actuarial function may need to introduce adjustments to the historical data, not because the data is considered inaccurate, but because it is necessary to increase its credibility and to better align it with the characteristics of the (sub-)

¹³ Former CP 26. See <http://www.ceiops.eu/index.php?option=content&task=view&id=574> and former CP 39 at <http://www.ceiops.eu/index.php?option=content&task=view&id=590>.

portfolio being valued and with the future expected behaviour of risks. The following is a non-exhaustive list of situations that are likely to require adjustments to the historical data, specifically when the best estimate is calculated from the projection of run-off triangles:

- unusually heavy or light experience in a given period;
- reflection of claims cycles;
- reflection of future expected trends;
- reflection of changes in risk, for instance due to a one-off change in the operating environment (e.g. court award increasing the costs of a particular type of claims);
- reflection of changes in cover (e.g. company may decide to introduce/change/remove an excess in its policies, and the past claims data reflects a different reality in policy covers);
- reflection of changes in the reinsurance policies;
- occurrence of large or exceptional claims;
- lower the credibility of older data, because the further back we go, the less relevant and appropriate the data may be;
- create statistical mass sufficient to extract statistically credible conclusions by pooling more than one homogeneous risk group.

3.1.5.2 Issues related to external data or market benchmarks

3.52 In the context of the provisioning analysis, it may be necessary to complement the internal data available with external data supplied by third parties or market data. This will be the case, for instance, for inflation indices and other information that effectively contributes to the understanding of the risks underlying the liability portfolio and to the setting of realistic and credible assumptions.

3.53 As mentioned in paragraph 3.5, when assessing the general requirements on data quality – appropriateness, completeness and accuracy –this external and market information should be part of the analysis.

3.54 In the particular case of external and market information, the verification of the three criteria implies:

- Appropriateness and completeness: the assessment of these criteria is performed at the portfolio level, considering the set of available data necessary to fully carry out the intended analysis (in particular, when setting one particular assumption). Where relevant, the assessment of appropriateness and completeness shall also be performed at a more granular level, including if necessary the analysis relating to the individual items.

Undertakings are expected to verify that the inclusion of the individual items of external and market information contribute towards the enhancement of the appropriateness and completeness criteria having regard to the intended purpose of the analysis;

- Accuracy: as individual items of external and market information have not been collected and compiled by the undertaking itself, the assessment of its accuracy is likely to be challenging. The verification of this criterion will have to consider the reliability of the sources of information and the consistency and stability of its process of collecting and publishing information across time.

3.55 Moreover, whenever adequate, measurement of the quality and credibility of the available data in the context of provisioning analysis should have regard to available industry or market data which is deemed comparable, having regard in particular to the requirements set in Article 76(3). Any material deviations should be identified and interpreted, for instance by referring to the specificities of the own portfolio being valued.

3.2 CEIOPS' advice

Definition of the term 'data'

3.56 For the purposes of this advice, 'data' refers to all the information which is directly or indirectly needed in order to carry out a valuation of technical provisions, in particular enabling the use of appropriate actuarial and statistical methodologies, in line with the underlying (re)insurance obligations, undertaking's specificities and with the principle of proportionality. Moreover, data comprises numerical, census or classification information but not qualitative information. Assumptions are not regarded as data, but it is noted that the use of data is an important basis in the development of actuarial assumptions.

General requirements on data quality in the context of valuing technical provisions

3.57 As a general principle, undertakings should make all efforts to ensure that the data available for the valuation of technical provisions is as appropriate, complete and accurate for that purpose as possible.

3.58 Undertakings should assess and monitor the quality of the data used in the valuation of their technical provisions. An assessment of the quality of data should be carried out on basis of three criteria: appropriateness, completeness and accuracy. This also applies to data used to set a particular assumption, as to ensure that the assumptions used in the valuation of technical provisions are as much as possible adequate, up-to-date, prospective, realistic and credible.

3.59 In order to ensure the appropriateness, completeness and accuracy of the data used in the valuation of technical provisions, undertakings should have in place adequate internal processes and procedures. These processes and procedures shall cover the undertakings' systems used for data quality management and for the collection, storing and processing of the data.

3.60 In the context of the calculation of technical provisions, the degree of appropriateness, completeness and accuracy of data expected from the insurer should be consistent with the principle of proportionality, as with the other requirements set out in the present advice. However, the application of such principle should not lead to a lowering of the general standards for the collection of data procedures and on the efforts to ensure its appropriateness, completeness and, especially, accuracy.

Appropriateness, completeness and accuracy of data

3.61 The assessment of the quality of data used in the calculation of technical provisions – in particular, the criteria of appropriateness and completeness – should in principle be done at the portfolio level, and where relevant at a more granular level, including if necessary the analysis relating to the individual items. The assessment shall take into account the set of available data which is necessary and relevant to carry out the intended analysis. This includes both internal and external information to the undertaking. On the

other hand, the assessment of the accuracy criteria should consider a more granular level, relating to the individual items.

3.62 Data is considered **appropriate** if:

- it is suitable for the intended purpose (i.e. the valuation of technical provisions, setting of assumptions); and
- relevant to the portfolio of risks being analysed (i.e. directly relates to the underlying risk drivers).

3.63 Hence, to be appropriate for valuation purposes the data needs to be representative of the portfolio of liabilities being valued and suitable to be used to estimate the future in- and out-going cash flows from the liabilities (consistent with a prospective view on the behaviour of the relevant risks).

3.64 Data is considered to be **complete** if:

- it allows for the recognition of all the main homogeneous risk groups within the liability portfolio;
- it has sufficient granularity to allow for the identification of trends and to the full understanding of the behaviour of the underlying risks; and
- if sufficient historical information is available.

3.65 The assessment of the completeness criteria should include an analysis of whether the undertaking's information is comprehensive and a relative comparison with other data for similar lines of business and/or risk factors.

3.66 Data is considered **accurate** if:

- it is free from material mistakes, errors and omissions;
- the recording of information is adequate, performed in a timely manner and is kept consistent across time;
- a high level of confidence is placed on the data; and
- the undertaking must be able to demonstrate that it recognises the data set as credible by using it throughout the undertakings operations and decision-making processes.

3.67 The assessment of the accuracy criteria should include appropriate cross-checks and internal tests to the consistency of data (i.e. with other relevant information or with the same data in different points in time).

3.68 The combination of accuracy, completeness and appropriateness of information collected should be such that it allows for the application of adequate provisioning methodologies.

Data deficiencies

3.69 Where the undertaking has only insufficient own data of appropriate quality

available for the valuation of technical provisions, it should assess why this is the case and which options would be available to him to increase the quality and quantity of its data.

3.70 In particular, the undertaking should assess:

- whether the lack of data is related to deficiencies in the internal processes;
- whether the lack of data is related to deficiencies in the data transmission process with third parties (including related entities);
- whether the quality of the available data could be enhanced.
- whether any external data supplied by third parties or market data could be used;

3.71 Where the data deficiency is related to insufficient internal processes, the undertaking should take appropriate measures to remedy this situation in due course and to ensure the adequacy of internal processes and procedures for collecting, storing and validating of data used in the valuation of technical provisions.

3.72 To enhance the quality of its data, it may be appropriate for the undertaking to apply adjustments to its data (e.g. to adapt historical data in case of changes in the operating environment or changes in legislation). These adjustments and the underlying assumptions should be carefully justified and documented, and should not overwrite the raw data.

3.73 In circumstances where (e.g. due to the nature or size of the portfolio) a lack of data for the valuation of technical provisions is unavoidable for the undertaking, further judgmental adjustments or assumptions to the data may need to be applied in order to allow the valuation to be performed (using appropriate approximations). The use of expert judgement and the assumptions applied for this purpose, shall meet the requirements set out in CEIOPS-DOC-33/09 advice on actuarial and statistical methodologies to calculate the best estimate.

3.74 However, in no case should the use of approximations be seen as an alternative to implementing appropriate systems and processes for collecting material relevant information and building historical databases.

Systems of data quality management

3.75 Data quality management is a continuous process that should comprise the following steps:

- Definition of the data;
- Assessment of the quality of data;
- Resolution of the material problems identified;
- Monitoring data quality.

- 3.76 Definition of the data comprises the identification of the needs in terms of data, a detailed description of the items that should be collected and the eventual relations between the different items.
- 3.77 The assessment of the quality of data implies the verification of the features that data must possess in order to be able to produce credible estimates of technical provisions, i.e. the verification of the criteria of appropriateness, completeness and accuracy for the purpose of the analysis. Although such assessment may make use of adequate objective measures and indicators, it should also be subject to judgement.
- 3.78 The assessment of data quality should have due regard to the quality and performance of the channels used to collect, store, transmit and process data, in particular when data is provided by third parties (e.g. intermediaries) or through electronic sources (e.g. internet).
- 3.79 If material problems with the verification of the data quality criteria have been identified, the insurer should try to solve them within an appropriate timeframe (to the extent possible, but while keeping track of the raw data) and should work towards the improvement of the data collection, storage or other relevant internal processes, so as to ensure the quality of the future data. Those data limitations should be appropriately documented, including a description of how such situations can be remedied and the assignment of responsibilities within the undertaking.
- 3.80 Data quality should be monitored periodically, with due regard to the principle of proportionality. This involves, in particular, the monitoring of the performance of the relevant IT systems and of the channels used to collect, store, transmit and process data. This process could be based, namely, on data quality performance indicators, but expert judgement needs to play a key role in the analysis.

Collection, storing and processing of data

- 3.81 Data should be registered and maintained on a comprehensive basis and the underlying processes and procedures should be transparent.
- 3.82 Data collected should be sufficiently granular in order to apply adequate provisioning methodologies and generate results with a sufficient level of detail and robustness.
- 3.83 Where it remains useful for the purpose of valuing technical provisions, historical data should generally be kept and its availability should increase over time.
- 3.84 Any adjustments to the original data must be documented as well as its reasons, in particular the correction of any data errors and omissions, and the original database should be maintained.
- 3.85 Data quality assessments should be made periodically and, once the results have been obtained, corrections may take place in the form of suitable quantitative or qualitative changes.

Issues of data quality in the context of a provisioning analysis and review

- 3.86 Adjustments to the available data may be necessary in order to improve the reliability of the estimates derived from actuarial and statistical provisioning methodologies. In such a specific context, the assessment of data quality for the purpose of the analysis would necessarily be more granular, as it would be made with a view to fit a specific methodology or to review the appropriateness of specific assumptions and parameters.
- 3.87 The requirements to set up adequate internal processes and procedures, in the context of Article 82, should not relate to such a granular level, but it should consider data quality from an overall perspective for the purpose of the calculation of technical provisions, without necessarily relating it to the application of particular methodologies.
- 3.88 In the context of a provisioning analysis, it may be necessary to complement the internal data available with external data supplied by third parties or market data. When assessing the general requirements on data quality – appropriateness, completeness and accuracy – this external and market information should be part of the analysis.
- 3.89 In the particular case of external and market information, the verification of the three criteria implies:
- Appropriateness and completeness: the assessment of these criteria is performed at the portfolio level, considering the set of available data necessary to fully carry out the intended analysis (in particular, when setting one particular assumption). Where relevant, the assessment of appropriateness and completeness shall also be performed at a more granular level, including if necessary the analysis relating to the individual items. Undertakings are expected to verify that the inclusion of the individual items of external and market information contribute towards the enhancement of the appropriateness and completeness criteria having regard to the intended purpose of the analysis;
 - Accuracy: as individual items of external and market information have not been collected and compiled by the undertaking itself, the assessment of its accuracy is likely to be challenging. The verification of this criterion will have to consider the reliability of the sources of information and the consistency and stability of its process of collecting and publishing information across time.
- 3.90 Moreover, whenever adequate, measurement of the quality and credibility of the available data in the context of provisioning analysis should have regard to available industry or market data which is deemed comparable, having regard in particular to the requirements set in article 76(3). Any material deviations should be identified and interpreted, for instance by referring to the specificities of the own portfolio being valued.