EIOPA-BoS-14/180

27 November 2014

Final Report

on

Public Consultation No. 14/019 on

Guidelines on the use of internal models

Following the shortening exercise launched by EIOPA in 2026, the Guideline has been amended by EIOPA-BoS-2026-74. This final report has been therefore updated exclusively in its annex to reflect the amended Guidelines and the corresponding explanatory text.
The executive summary and the feedback statement remain unchanged and reflect the original text of the Guidelines. The feedback statement and the resolution of comments as a result of the shortening exercise are available at this link.

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1. Executive summary

Introduction

According to Article 16 of Regulation (EU) No 1094/2010 (EIOPA Regulation) EIOPA may issue guidelines addressed to National Competent Authorities (NCAs) or financial institutions.

According to Article 16 of the EIOPA Regulation, EIOPA shall, where appropriate, conduct open public consultations and analyse the potential costs and benefits. In addition, EIOPA shall request the opinion of the Insurance and Reinsurance Stakeholder Group (IRSG) referred to in Article 37 of the EIOPA Regulation.

According to Article Articles 112, 113, 115, 116, 120 to 126 and 231 of Directive 2009/138/EC[1] (Solvency II Directive) and according to Articles 223 to 247, and for groups Articles 343 and 347 of the Implementing Measures[2], EIOPA has developed guidelines on the use of internal models, including the guidelines on the functioning of colleges for internal models. These Guidelines also take into account the EIOPA Implementing Technical Standards on Internal Models Approval Processes and on the Process to Reach a Joint Decision for Group Internal Models.

As a result of the above, on 2 June 2014 EIOPA launched a Public Consultation on the draft guidelines on the use of internal models. The Consultation Paper is also published on EIOPA's website[3].

These guidelines were issued to NCAs to:

- Increase convergence of supervisory practices during the assessment of internal models;
- Provide guidance on what should be considered when approving and continue to allow the use of an internal model for the calculation of the solvency capital requirement.

Content

This Final Report includes the feedback statement to the consultation paper (EIOPA-CP-14/019) and the Guidelines. The Impact Assessment and cost and benefit analysis, and the Resolution of comments are published on EIOPA's website[4].

[1] OJ L 335, 17.12.2009, p. 1–155
[2] As published by the European Commission on 10 October 2014: http://ec.europa.eu/internal_market/insurance/docs/solvency/solvency2/delegated/141010-delegated-act-solvency-2_en.pdf
[3] [4] https://eiopa.europa.eu/consultations/consultation-papers/2014-closed-consultations/june-2014/public-consultation-on-the-set-1-of-the-solvency-ii-guidelines/index.html

Next steps

In accordance with Article 16 of the EIOPA Regulation, within 2 months of the issuance of these guidelines, each competent authority shall confirm if it complies or intends to comply with these guidelines. In the event that a competent authority does not comply or does not intend to comply, it shall inform EIOPA, stating the reasons for non-compliance.

EIOPA will publish the fact that a competent authority does not comply or does not intend to comply with these guidelines. The reasons for non-compliance may also be decided on a case-by-case basis to be published by EIOPA. The competent authority will receive advanced notice of such publication.

EIOPA will, in its annual report, inform the European Parliament, the Council and the European Commission of the guidelines issued, stating which competent authority has not complied with them, and outlining how EIOPA intends to ensure that concerned competent authorities follow its guidelines in the future.

2. Feedback statement

Introduction

EIOPA would like to thank the Insurance and Reinsurance Stakeholder Group (IRSG) and all the participants to the Public Consultation for their comments on the draft guidelines. The responses received have provided important guidance to EIOPA in preparing a final version of these guidelines. All of the comments made were given careful consideration by EIOPA. A summary of the main comments received and EIOPA's response to them can be found in the sections below. The full list of all the comments provided and EIOPA's responses to them is published on EIOPA's website.

General comments

The comments received on these guidelines mainly focus on the following concepts: the scope of Policy for Model Changes (PMC), which has raised questions as to whether parameter changes and changes in technical provisions should be considered as potential sources of model changes, and the Validation Policy. More details about the comments and EIOPA's resolution are provided below.

1. **Comments on parameter updates in the scope of the policy for model changes (Guideline 6)**

    a. A number of stakeholders, including the IRSG, commented about the reference to *parameter updates* in this guideline. Although they acknowledge that these should "only" be taken into account as sources of model changes, the stakeholders still believe that this would be wrong. According to the stakeholders, the internal model must be dynamic in order to adequately reflect the undertaking's risk profile. A notification to or approval by the supervisors is only necessary in case of a methodological change, which is not the case of parameter updates. The stakeholders believe that both supervisors and undertakings would be overburdened if any parameter update was a model change.

    Indeed, there have been similar discussions within EIOPA about this question: should all 'simple' parameter changes (there are sometimes thousands of them in a model) be mentioned in the Policy for Model Changes? And should they all be considered as potential sources of model changes?

    b. EIOPA has decided to keep the mentioning of parameter changes as a potential source of changes to the model: the Model Change process is a key component of the internal model framework to ensure the on-going appropriateness of the internal model. Parameters updates play an important role in maintaining an appropriate internal model. Hence the parameters update could not be disregarded by the model change process. EIOPA also thinks that the wording of the guideline "should take into account the update of the parameters of the internal model as a

potential source of changes" gives sufficient flexibility to undertakings to avoid a burdensome model changes reporting process.

2. **Comments on the Validation policy (Guideline 32)**

   a. A number of stakeholders, including the CFOF/ CROF, pointed out that Article 124 of the Level 1 text and Articles 241/242 of the latest draft Level 2 text do not contain a requirement for a written validation policy. The stakeholders therefore argue that creating a requirement for such a policy goes beyond the purpose of the guidelines.

      Nevertheless, the stakeholders recognise that many insurers will nonetheless establish a written validation policy as part of their effective internal model governance.

   b. EIOPA would like first to remind that previous draft Level 2 texts used to include the requirement for a written validation policy. This requirement was removed from the latest versions for reason of empowerment. However there is still a requirement to document the validation process in the level 2 text (see Article 244(n)). This requirement, together with the additional benefits of a written validation policy, offsets the additional cost, as concluded from the impact assessment performed.

General nature of the participants to the Public Consultation

EIOPA received comments from the Insurance and Reinsurance Stakeholder Group (IRSG) and seven responses from other stakeholders to the public consultation. All non-confidential comments received have been published on EIOPA's website.

Respondents can be classified into four main categories: European trade, insurance, or actuarial associations; national insurance or actuarial associations; (re)insurance groups or undertakings; and other parties such as consultants and lawyers.

IRSG opinion

The IRSG opinion on the draft set 1 of the Solvency II Guidelines on Pillar 1 and Internal Models, as well as the particular comments on the Guidelines at hand, can be consulted on EIOPA's website[5].

[5] https://eiopa.europa.eu/about-eiopa/organisation/stakeholder-groups/sgs-opinion-feedback/index.html

Comments on the Impact Assessment

A separate Consultation Paper was prepared covering the Impact Assessment for the Set 1 of EIOPA Solvency II Guidelines. Where the need for reviewing the Impact Assessment has arisen following comments on the guidelines, the Impact Assessment Report has been revised accordingly.

The revised Impact Assessment on the Set 1 of EIOPA Solvency II Guidelines can be consulted on EIOPA's website.

Annex: Guidelines

1. Guidelines on the use of internal models

Introduction

1.1. According to Article 16 of Regulation (EU) 1094/2010 of 24 November 2010 (hereafter, EIOPA Regulation)[6] EIOPA is issuing Guidelines addressed to supervisory authorities and insurance or reinsurance undertakings on the Use of Internal Models in application of Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II)[7], in particular in Articles 112, 113, 115, 116, 120 to 126 and 231 as further developed by Title I, Chapter VI and Title II, Chapter II of the Implementing Measures. These Guidelines also take into account the EIOPA Implementing Technical Standards on Internal Models Approval Processes and on the Process to Reach a Joint Decision for Group Internal Models[8].

1.2. The EIOPA Guidelines on the use of internal models aim to provide guidance on what supervisory authorities and insurance or reinsurance undertakings should consider in order to enable supervisory authorities to approve and continue to allow the use of an internal model for the calculation of the Solvency Capital Requirement and to enable insurance and reinsurance undertakings to use an internal model for the calculation of its Solvency Capital Requirement in compliance with the Solvency II requirements as further specified in the Implementing Measures.

1.3. The Guidelines also aim to increase convergence of supervisory practices with regard to the assessment of internal models. In the case of internal models for groups, there should be appropriate level of communication between supervisory authorities within the colleges, in particular between the supervisory authorities involved.

1.4. The Guidelines are addressed to supervisory authorities under Solvency II.

1.5. All the Guidelines apply, unless otherwise explicitly stated, to the use of:

- An internal model, full or partial, submitted for decision to use or currently used for the calculation of the Solvency Capital Requirement of an insurance or reinsurance undertaking.
- An internal model for a group, full of partial, as defined below, submitted for decision to use or currently used for the calculation of the Solvency Capital Requirement.

1.6. These Guidelines are amended by EIOPA-BoS-2026-74 and apply from 30 January 2027.

[6] OJ L 331, 15.12.2010, p. 48–83
[7] OJ L 335, 17.12.2009, p. 1-155
[8] https://eiopa.europa.eu/consultations/consultation-papers/index.html

1.7. For the purpose of the Guidelines following definitions apply:

- "*Internal model(s) for a group (or for groups)"* should be understood as both an internal model that is applied to be used for the calculation only of the consolidated group Solvency Capital Requirement (under Article 230 of Solvency II) and an internal model that is applied to be used for the calculation of the consolidated group Solvency Capital Requirement as well as the Solvency Capital Requirement of at least one related insurance undertaking included in the scope of this internal model for the calculation of the consolidated group Solvency Capital Requirement (referred as group internal model under Article 231 of Solvency II in the Guidelines).
- The concept of "*richness of the probability distribution forecast*" is determined mainly in two dimensions: the undertaking's extent of knowledge about the risk profile as reflected in the set of events underlying the probability distribution forecast and the capability of the calculation method chosen to transform this information into a distribution of monetary values that relate to changes in basic own funds. The concept of richness should not be reduced to the granularity of the representation of the probability distribution forecast because even a forecast in form of a continuous function might be of low richness.
- The "*reference risk measure*" should be understood as the Value-at-Risk of the basic own funds subject to a confidence level of 99.5% over a one-year period as set out in Article 101(3) of Solvency II.
- "*Analytical closed formulae*" should be understood as direct mathematical formulae that link the risk measure chosen by the undertaking to the reference one as defined above.
- "*t=0*" should be understood as the date of which the Solvency Capital Requirement computation is made by the undertaking according to its internal model.
- "*t=1*" should be understood as one year after the date of which the Solvency Capital Requirement computation is made by the undertaking according to its internal model.

Chapter 1: Application

Guideline 1 – Pre-application

1.8. Supervisory authorities should consider putting in place a pre-application process in order to form a view on how prepared an insurance or reinsurance undertaking is to submit an application for the use of an internal model for the calculation of the Solvency Capital Requirement under Solvency II and to meet the internal models requirements set out in Solvency II.

~~**Guideline 2 – Information to be submitted in an application for the use of group internal models under Article 231 of Solvency II**~~

~~1.9. In the case of an application for the use of a group internal model under Article 231 of Solvency II, the applicant should include for each related undertaking that applies to use the group internal model for the calculation of its Solvency Capital Requirement the information set out in Article 2 of the EIOPA Implementing Technical Standard on Internal Models Approval Processes which is specific to this related undertaking, unless this information is already covered in the documents submitted by the participating insurance or reinsurance undertaking.~~

~~1.10. The applicant should also explain, for each related undertaking included in the application to use the group internal model for the calculation of its Solvency Capital Requirement, to what extent the development, implementation or validation of the group internal model components which are necessary for the calculation of the Solvency Capital Requirement of the related undertaking, are performed by another related undertaking within the group.~~

~~**Guideline 3 – Request for further information in the case of an application for the use of internal models for groups**~~

~~1.11. In the case of an application for the use of an internal model for a group, a request for further information from a related undertaking by the supervisory authorities involved as defined in Article 343(2) of the Implementing Measures supervising this undertaking, should first be made to the group supervisor. The group supervisor should then forward the request to the related undertaking, or provide the supervisory authority involved requesting the information with the relevant documents if they have already been provided to the group supervisor.~~

~~1.12. In the case of an application for the use of a group internal model under Article 231 of Solvency II, any supervisory authority concerned as defined in Article 347(3) of the Implementing Measures, should be able to directly request further information from the related undertaking it supervises in order to assess the compliance of the group internal model with the internal models requirements in respect of the Solvency Capital Requirement of this related undertaking. In such case, this supervisory authority concerned should inform promptly the group supervisor about such request for information.~~

~~**Guideline 4 – Intention to extend the scope of an application for the use of internal models for groups**~~

~~1.13. In the case of an application for the use of an internal model for a group, as part of the justification of the scope of the internal model described in Articles 343(5) or 347(6) of the Implementing Measures, the applicant should describe in the application the intention, if any, to extend the scope of the internal model in the future in order to include, for the purposes of the calculation of the group Solvency Capital Requirement, any of the related undertakings within the scope of group supervision but which are not included according to the current application in the scope of the internal model for the calculation of the group Solvency Capital Requirement.~~

~~1.14. In the case of an application for the use of a group internal model under Article 231 of Solvency II, as part of the justification of the scope of the internal model, the applicant should also describe the intention, if any, to extend in the future the scope of the internal model in order to include the calculation of the Solvency Capital Requirement of any related undertaking which is not included in the scope of the current application for the calculation of its Solvency Capital Requirement with the group internal model.~~

Guideline 5 - Technical specifications in the case of an application for the use of group internal models under Article 231 of Solvency II

1.15. In case of an application for the use of a group internal model under Article 231 of Solvency II, the applicant should explicitly state in the application to what extent the technical specifications of the group internal model may differ when the internal model is used for the group Solvency Capital Requirement calculation and the calculation of the Solvency Capital Requirement of related undertakings, including:

a) the treatment of intra-group transactions for the calculation of both the Solvency Capital Requirement of related undertakings and where applicable the group Solvency Capital Requirement;

b) the list of parameters within the internal model that may be set differently for different calculations performed with the group internal model, for the purposes of the calculation of the group Solvency Capital Requirement and the calculation of individual Solvency Capital Requirements; and

c) the description of group specific risks only relevant in the group Solvency Capital Requirement calculation.

Chapter 2: Model changes

Guideline 6 - Scope of the policy for model changes

1.16. The insurance or reinsurance undertaking, when establishing the policy for changing the model, should ensure that this policy covers all relevant sources of change that would impact its Solvency Capital Requirement and at least the changes:

a) in the system of governance of the undertaking;

b) in the undertaking's compliance with the requirements to use the internal model;

c) in the appropriateness of the technical specifications of the undertaking's internal model; and

d) in the risk profile of the undertaking.

1.17. The undertaking should also ensure that the policy for changing the model:

a) specifies when a change to the internal model shall be considered as major or minor and when a combination of minor changes shall be considered a major change.

b) sets out the governance requirements in relation to changes to the internal model, including internal approval, internal communication, documentation and validation of changes.

1.18. The insurance and reinsurance undertaking should not cover the inclusion of new elements, such as the inclusion of additional risks or business units, as part of the changes to the internal model pursuant to the policy for changing the internal model. The inclusion of new elements in the internal model should be subject to supervisory approval following the procedure described in Article 7 of the Implementing Technical Standard on Approval Processes for Internal Models.

1.19. The insurance or reinsurance undertaking should take into account the update of the parameters of the internal model as a potential source of changes to the internal model.

Guideline 7 - Defining a major change

1.20. Whilst the quantitative impact of a model change on the Solvency Capital Requirement or on individual components of the Solvency Capital Requirement may be one of the indicators the insurance or reinsurance undertaking decides to use to identify major changes, the undertaking should develop and use a number of other key qualitative and quantitative indicators to define a major change.

Guideline 8 – Report of minor and major changes as a combination of minor changes

1.21. The insurance or reinsurance undertaking should report minor changes to the internal model to the supervisory authorities quarterly or more frequently where appropriate. Minor changes to the internal model should be communicated in a summarised report that should describe both the quantitative and qualitative impacts of changes and the approximate cumulative quantitative and qualitative effects of the changes on the approved internal model.

1.22. The insurance or reinsurance undertaking should use the latest internal model approved by supervisory authorities as the reference for evaluating whether a combination of minor changes is considered as a major change, unless otherwise agreed with supervisory authorities.

Guideline 9 – Policy for changing the model for group internal models under Article 231 of Solvency II

1.23. In the case of a group internal model under Article 231 of Solvency II, the participating undertaking and the related undertakings applying to use a group internal model to calculate their individual Solvency Capital Requirement should develop one policy for changing the model.

1.24. The participating undertaking and the related undertakings applying to use a group internal model to calculate their individual Solvency Capital Requirement should ensure that the policy for changing the model includes a specification of major and minor changes with regard to the group, as well as each of the related undertakings included in the application to use the group internal model to calculate their individual Solvency Capital Requirement.

1.25. The participating undertaking and the related undertakings applying to use a group internal model to calculate their individual Solvency Capital Requirement should ensure that any change that is major for a related undertaking included in the application is classified as a major change within the policy.

Guideline 10 – Extension of use and extension of the scope of group internal models under Article 231 of Solvency II

1.26. The following extensions of the group internal model should be submitted by the applicant to the group supervisor following the same process as for a major change to the internal model as set out in Article 7 of the EIOPA Implementing Technical Standard on Internal Model Approval Processes:

a) the extension to calculate the Solvency Capital Requirement of a related undertaking currently included in the scope of the group internal model for the calculation of the group Solvency Capital Requirement but which is currently not using the group internal model for the calculation of its Solvency Capital Requirement;

b) the extension to cover new elements at the level of the group; and

c) the extension to cover new elements at the level of a related undertaking currently using the group internal model for the calculation of its Solvency Capital Requirement, including the extension related to elements already used at the level of the group or of other related undertakings.

Chapter 3: Use test

~~**Guideline 11 – Incentive to improve the quality of the internal model**~~

~~1.27. The insurance or reinsurance undertaking should ensure that the internal model is used in its risk management system and decision-making processes in a way that creates incentives to improve the quality of the internal model itself.~~

Guideline 12 - Use test and changes to the internal model

1.28. In the process of improving the quality of the internal model, when a major change has been internally approved by the administrative, management or supervisory body, the insurance and reinsurance undertaking should be able to demonstrate compliance with the use test taking into consideration:

a) the different components of the use test;

b) the different uses of their system of governance.

1.29. The insurance or reinsurance undertaking should monitor and be able to demonstrate that any time lag between identifying that a change to the internal model is needed and the actual implementation of the change is appropriate. In the case of an application for a major change during the approval period, the insurance and reinsurance undertaking should ensure that the use of the internal model in its decision making process is appropriate.

Guideline 13 – Understanding of the internal model

1.30. The insurance or reinsurance undertaking should consider different approaches for ensuring the understanding of the internal model by the administrative, management or supervisory body and by relevant users of the internal model for decision-making purposes.

1.31. With the aim of assessing their understanding of the internal model, supervisory authorities should consider interviewing persons from the administrative, management or supervisory body and persons who effectively run the insurance or reinsurance undertaking.

1.32. Supervisory authorities should also consider reviewing the documentation of the minutes of the board meetings or appropriate decision-making bodies to assess the insurance or reinsurance undertaking’s compliance with the use test requirements.

~~**Guideline 14 – Support of decision-making**~~

~~1.33. The insurance or reinsurance undertaking should ensure and should be able to demonstrate that the internal model is used for decision-making.~~

~~1.34. In particular, when calculating the notional Solvency Capital Requirement for a ring-fenced fund, the insurance or reinsurance undertaking should comply with Article 81 of the Implementing Measures and explain how it ensures consistency between these outputs as required by Article 223 of the Implementing Measures.~~

Guideline 15 – Use test specificities for group internal models under Article 231 of Solvency II

1.35. The participating undertaking and the related undertakings applying to use a group internal model under Article 231 of Solvency II to calculate their individual Solvency Capital Requirement should cooperate to ensure that the design of the internal model is aligned with their business. They should provide evidence that the internal model governance provides that:

a) their individual Solvency Capital Requirement is calculated with the frequency required by Article 102 of Solvency II and whenever it is needed in the decision-making process;

b) they can propose changes to the group internal model, especially for components that are material to them or following a change in their risk profile and taking into account the environment in which the undertaking is operating;

c) the related undertakings possess the adequate understanding of the internal model for the parts of the internal model which cover the risks of that undertaking.

1.36. The insurance or reinsurance undertakings applying to use a group internal model to calculate their Solvency Capital Requirement should ensure that the design of the internal model is aligned with their business and their risk-management system, including the production of outputs, at group level and at related undertaking level, that are granular enough to allow the group internal model to play a sufficient role in their decision-making processes.

Chapter 4: Assumption setting and expert judgement

Guideline 16 – Materiality in assumptions setting

1.37. The insurance or reinsurance undertaking should set assumptions and use expert judgment, in particular taking into account the materiality of the impact of the use of assumptions with respect to the following Guidelines on assumption setting and expert judgement.

1.38. The insurance or reinsurance undertaking should assess materiality taking into account both quantitative and qualitative indicators and taking into

consideration extreme losses conditions. The insurance or reinsurance undertaking should overall evaluate the indicators considered.

Guideline 17 – Governance of assumptions setting

1.39. The insurance or reinsurance undertaking should ensure that all assumption setting and the use of expert judgement in particular, follows a validated and documented process.

1.40. The insurance or reinsurance undertaking should ensure that the assumptions are derived and used consistently over time and across the insurance or reinsurance undertaking and that they are fit for their intended use.

1.41. The insurance or reinsurance undertaking should approve the assumptions at levels of sufficient seniority according to their materiality, for most material assumptions up to and including the administrative, management or supervisory body.

Guideline 18 - Communication and uncertainty in assumptions setting

1.42. The insurance or reinsurance undertaking should ensure that the processes around assumptions, and in particular around the use of expert judgement in choosing those assumptions, specifically attempt to mitigate the risk of misunderstanding or miscommunication between all different roles related to such assumptions.

1.43. The insurance or reinsurance undertaking should establish a formal and documented feedback process between the providers and the users of material expert judgement and of the resulting assumptions.

1.44. The insurance or reinsurance undertaking should make transparent the uncertainty of the assumptions as well as the associated variation in final results.

Guideline 19 - Documentation of assumptions setting

1.45. The insurance or reinsurance undertaking should document the assumption setting process and, in particular, the use of expert judgement, in such a manner that the process is transparent.

1.46. The insurance or reinsurance undertaking should include in the documentation the resulting assumptions and their materiality, the experts involved, the intended use and the period of validity.

1.47. The insurance or reinsurance undertaking should include the rationale for the opinion, including the information basis used, with the level of detail necessary to make transparent both the assumptions and the process and decision-making criteria used for the selection of the assumptions and disregarding other alternatives.

1.48. The insurance or reinsurance undertaking should make sure that users of material assumptions receive clear and comprehensive written information about those assumptions.

Guideline 20 - Validation of assumptions setting

1.49. The insurance or reinsurance undertaking should ensure that the process for choosing assumptions and using expert judgement is validated.

1.50. The insurance or reinsurance undertaking should ensure that the process and the tools for validating the assumptions and in particular the use of expert judgement are documented.

1.51. The insurance or reinsurance undertaking should track the changes of material assumptions in response to new information and analyse and explain those changes as well as deviations of realizations from material assumptions.

1.52. The insurance or reinsurance undertaking, where feasible and appropriate, should use validation tools such as stress testing or sensitivity testing.

1.53. The insurance or reinsurance undertaking should review the assumptions chosen, relying on independent internal or external expertise.

1.54. The insurance or reinsurance undertaking should detect the occurrence of circumstances under which the assumptions would be considered false.

Chapter 5: Methodological consistency

Guideline 21 - Consistency check points

1.55. The insurance or reinsurance undertaking should ensure consistency between the methods used to calculate the probability distribution forecast and the methods used for the valuation of assets and liabilities in the balance sheet for solvency purposes.

1.56. The insurance or reinsurance undertaking should check consistency at the following steps of the calculation of the probability distribution forecast, in case that they are relevant to the model part under consideration:

a) the consistency of the transition from the valuation of assets and liabilities in the balance sheet for solvency purposes to the internal model for the purpose of Solvency Capital Requirements calculations;

b) the consistency of the valuation of assets and liabilities in the internal model at the valuation date with the valuation of assets and liabilities in the balance sheet for solvency purposes;

c) the consistency of the projection of risk factors and their impact on the forecast monetary values with the assumptions on those risk factors used for the valuation of assets and liabilities in the balance sheet for solvency purposes;

d) the consistency of the re-valuation of assets and liabilities at the end of the period with the valuation of assets and liabilities in the balance sheet for solvency purposes.

Guideline 22 - Aspects of consistency

1.57. The insurance or reinsurance undertaking, when assessing consistency, should take at least the following aspects into account:

a) the consistency of the actuarial and statistical techniques applied in the valuation of assets and liabilities in the balance sheet for solvency purposes, and in the calculation of the probability distribution forecast;

b) the consistency of data and parameters that are used as input for the respective calculations;

c) the consistency of the assumptions underlying the respective calculations, in particular assumptions on contractual options and financial guarantees, on future management actions and on expected future discretionary benefits.

Guideline 23 - Consistency assessment

1.58. The insurance or reinsurance undertaking should conduct regular consistency assessments on a quantitative basis whenever possible and proportionate.

1.59. The insurance or reinsurance undertaking, in its consistency assessment, should:

a) identify and document any deviation between the calculation of the probability distribution forecast and the valuation of assets and liabilities in the balance sheet for solvency purposes;

b) assess the impact of the deviations, both in isolation and in combination;

c) justify that the deviations do not result in an inconsistency between the calculation of the probability distribution forecast and the valuation of assets and liabilities in the balance sheet for solvency purposes.

Chapter 6: Probability distribution forecast

Guideline 24 - Knowledge of the risk profile

1.60. To ensure that the set of events of the probability distribution forecast underlying the internal model is exhaustive, the insurance or reinsurance undertaking should put in place processes that enable it to maintain sufficient and current knowledge of its risk profile.

1.61. In particular, the insurance or reinsurance undertaking should aim to maintain the knowledge of risk drivers and other factors which explain the behaviour of the variable underlying the probability distribution forecast, so that the

probability distribution forecast can reflect all relevant characteristics of its risk profile.

Guideline 25 - Probability distribution forecast richness

1.62. In assessing the appropriateness of the actuarial and statistical techniques used to calculate the probability distribution forecast [Article 229 of the Implementing Measures], the insurance and reinsurance undertaking should consider the capability of the techniques to process the knowledge of the risk profile as an important criterion.

1.63. The insurance or reinsurance undertaking should choose techniques that generate a probability distribution forecast that is rich enough to capture all relevant characteristics of its risk profile Article 229(e) of the Implementing Measures and to support decision-making Article 226 of the Implementing Measures.

1.64. The insurance or reinsurance undertaking, according to Article 229(g) of the Implementing Measures and as part of this methodological assessment, should consider the reliability of adverse quantiles resulting from the probability distribution forecast.

Guideline 26 – Assessment of the richness of the probability distribution forecast

1.65. To form a view according to Guideline 25, supervisory authorities should take into account at least:

a) the risk profile of the undertaking and to what extent it is reflected by the probability distribution forecast;

b) the current progress in actuarial science and the generally accepted market practice Article 229(a) of the Implementing Measures;

c) with respect to the level of probability distribution forecast richness, any measures that the insurance or reinsurance undertaking puts in place to ensure compliance with each of the internal model tests and standards set out in Articles 120 to 126 of Solvency II;

d) for a particular risk under consideration, the way in which the techniques chosen and the probability distribution forecast obtained by the insurance or reinsurance undertaking interact with other risks in the scope of the internal model as regards the level of richness of the probability distribution forecast Article 232 of the Implementing Measures;

e) the nature, scale and complexity of the risk under consideration as set out in Article 29(3) of Solvency II.

Guideline 27 – Probability distribution forecast enrichment

1.66. The insurance or reinsurance undertaking should ensure that the effort to generate a rich probability distribution forecast does not impair the reliability of

the estimate of adverse quantiles resulting from the probability distribution forecast.

1.67. The insurance or reinsurance undertaking should take care not to introduce into the probability distribution forecast unfounded richness which does not reflect the original knowledge of its risk profile (see also Guideline 24).

1.68. The insurance or reinsurance undertaking should ensure that the methodology followed to enrich the probability distribution forecast complies with the statistical quality standards regarding methods, assumptions and data Articles 229, 230 and 231 of the Implementing Measures. Where these techniques involve the use of expert judgement, the undertaking should take into account the relevant Guidelines on assumptions setting and expert judgement.

Chapter 7: Calibration - approximations

~~**Guideline 28 – Knowledge of approximations under extreme loss conditions**~~

~~1.69. When an undertaking uses approximations instead of using the reference risk measure directly, the insurance or reinsurance undertaking should challenge and justify the reliability of the output of these approximations over time and, under extreme loss conditions, according to its risk profile.~~

~~1.70. In particular, when the insurance or reinsurance undertaking uses analytical closed formulae to recalibrate its capital requirement from the internal risk measure to the reference one, the insurance or reinsurance undertaking should demonstrate that the assumptions underlying the formulae are realistic and are also valid under extreme losses conditions.~~

~~**Guideline 29 – Use of another underlying variable**~~

~~1.71. The insurance or reinsurance undertaking, if it uses the variation of an underlying variable different from the basic own funds to derive the value of basic own funds for the calculation of the Solvency Capital Requirement, should demonstrate that:~~

~~a) it is able to reconcile the difference between the basic own funds and the underlying variable at t=0;~~

~~b) it understands the difference between the basic own funds and the underlying variable in any situation up to and including t=1, especially under extreme losses conditions, according to the undertaking risk profile.~~

~~**Guideline 30 – Management actions if using a time period longer than one year**~~

~~1.72. If the insurance or reinsurance undertaking, chooses in its internal model a time period longer than one year, the insurance or reinsurance undertaking should take into account management actions in the context of the Solvency Capital~~

~~Requirement calculation, and should ensure that such management actions have effects on the balance sheet for solvency purposes between t=0 and t=1.~~

Chapter 8: Profit and loss attribution

Guideline 31 – Definition of profit and loss

1.73. The insurance or reinsurance undertaking should consider profit and loss as changes over the relevant period in:

a) basic own funds; or

b) other monetary amounts used in the internal model to determine changes in basic own funds, such as the actual change in economic capital resources.

To this end the profit and loss attribution should exclude movements attributable to the raising of additional own funds, the repayment or redemption of those funds and the distribution of own funds.

1.74. When it uses a variable other than the basic own funds in its internal model, the insurance or reinsurance undertaking should use this variable for the purposes of profit and loss attribution.

1.75. The undertaking should identify through the profit and loss attribution how changes in the risk drivers relate with the movement in the variable underlying the probability distribution forecast.

Chapter 9: Validation

Guideline 32 – Validation policy and validation report

1.76. The insurance or reinsurance undertaking should establish, implement and maintain a written validation policy which specifies at least:

a) the processes and methods to validate the internal model and their purposes;

b) the frequency of regular validation for each part of the internal model and the circumstances that trigger additional validation;

c) the persons who are responsible for each validation task; and

d) the procedure to be followed in the event that the model validation process identifies problems with the reliability of the internal model and the decision-making process to address those concerns.

1.77. The insurance or reinsurance undertaking should document in a validation report the results of the validation as well as the resulting conclusions and consequences from the analysis of the validation.

1.78. The insurance or reinsurance undertaking should include in the validation a reference to the validation data sets as mentioned in Guideline 42 as well as the sign-off from the main participants in the process.

Guideline 33 – Scope and purpose of the validation process

1.79. The insurance or reinsurance undertaking, when specifying the purpose of the validation, should clearly set out the specific purpose of the validation for each part of the internal model.

1.80. The insurance or reinsurance undertaking should cover both qualitative and quantitative aspects of the internal model within the scope of the validation.

1.81. When considering the scope of the validation, in addition to considering the validation of the various parts of the internal model, the insurance or reinsurance undertaking should consider the validation in its entirety and in particular the appropriateness of the calculated probability distribution forecast to ensure that the level of regulatory capital will not be materially misstated.

Guideline 34 – Materiality in validation

1.82. The insurance or reinsurance undertaking should consider the materiality of the part of the internal model being validated when using materiality to decide on the intensity of the validation activities.

1.83. The insurance or reinsurance undertaking should consider the materiality of the parts of the internal model not only in isolation but also in combination when deciding how they should be validated appropriately.

1.84. The insurance or reinsurance undertaking should consider sensitivity testing when determining materiality in the context of validation.

Guideline 35 – Quality of the validation process

1.85. The insurance or reinsurance undertaking should set out all the known limitations of the current validation process.

1.86. Where there are limitations to the validation of parts which are covered by the validation process, the insurance or reinsurance undertaking should be aware of them and document these limitations.

1.87. The insurance or reinsurance undertaking should ensure that the assessment of the quality of the validation process explicitly states the circumstances under which the validation is ineffective.

Guideline 36 – Governance of validation process

1.88. The insurance or reinsurance undertaking should have in place appropriate governance around the communication and internal reporting of the results of the validation it carries out.

1.89. The insurance or reinsurance undertaking should form and communicate internally an overall opinion based on the findings of the validation process.

1.90. The insurance or reinsurance undertaking should pre-define criteria in order to determine whether the results, or part of the results, of the validation, are required to be escalated within this undertaking.

1.91. The insurance or reinsurance undertaking should clearly define the escalation path in such a way that the validation process remains independent from the development and operation of the internal model.

Guideline 37 – Roles in validation process

1.92. If parties other than the risk-management function contribute to specific tasks in the validation process, the insurance or reinsurance undertaking should ensure that the risk-management function fulfils its overall responsibility as set out in Article 44 of Solvency II and Article 269(2)(a) of the Implementing Measures, including the responsibility to ensure the completion of the various tasks within the validation process.

1.93. The insurance or reinsurance undertaking should formally explain the role of each party in the validation process defined.

Guideline 38 – Independence of the validation process

1.94. The insurance or reinsurance undertaking should demonstrate that its risk-management function, in order to provide an objective challenge to the internal model, ensures that the validation process is done independently from the development and operation of the model. The risk management function of the undertaking should ensure that the validation tasks are set out and completed in a way that creates and maintains the independence of the validation process as set out in Article 241(2) of the Implementing Measures.

1.95. The insurance or reinsurance undertaking should decide on the parties which contribute to the tasks related to the validation process, taking into account the nature, scale and complexity of the risks that this undertaking faces, the function and the skills of people to be involved and how it ensures the independence of the validation process.

Guideline 39 – Validation specificities for group internal models under Article 231 of Solvency II

1.96. The participating undertaking and the related undertakings included in the application to use the group internal model under Article 231 of Solvency II for the calculation of their Solvency Capital Requirement, should establish a single validation policy to cover the validation process both at group and individual level.

1.97. The participating undertaking and the related undertakings should design the validation process of the internal model in the context of the calculation of both the consolidated group Solvency Capital Requirement and the Solvency Capital Requirement of related undertakings included in the application to use a group internal model. The participating undertaking and the related undertakings

should explicitly set out this consideration in the validation policy established for the group internal model.

Guideline 40 – Application of validation tools

1.98. The insurance or reinsurance undertaking should consider using quantitative or qualitative validation tools besides those referred to in Article 242 of the Implementing Measures.

1.99. The insurance or reinsurance undertaking should understand the validation tools it uses and choose the appropriate set of validation tools in order to ensure an effective validation process. The insurance or reinsurance undertaking should consider at least the following characteristics when selecting the validation tools:

a) characteristics and limitations of the validation tools;

b) nature: validation tools being qualitative, quantitative or a combination of both;

c) knowledge required: the extent of knowledge required by the persons performing the validation;

d) information required: potential restrictions to the amount or the type of information available for external versus internal validation;

e) cycle of validation: validation tools relevant to cover every key assumption made at different stages of the internal model from development, to implementation and to operation.

1.100. The insurance or reinsurance undertaking should document in the validation report which parts of the internal model are being validated by each of the validation tools used and why these validation tools are appropriate for the particular purpose by describing at least:

a) the materiality of the part of the model being validated;

b) the level at which the tool is applied from individual risks, modelling blocks, portfolio, business unit to aggregated results;

c) the purpose of this validation task;

d) the expected outcome from the validation.

Guideline 41 – Stress tests and scenario analysis

1.101. The insurance or reinsurance undertaking should use stress tests and scenario analysis as part of the validation of the internal model.

1.102. The insurance or reinsurance undertaking should ensure that the stress tests and scenario analysis it uses cover the relevant risks and are monitored over time.

Guideline 42 – Validation data sets

1.103. The insurance or reinsurance undertaking should ensure that the selected data and expert judgement used in the validation process effectively allow it to validate the internal model under a wide range of circumstances that have occurred in the past or could potentially occur in the future.

Chapter 10: Documentation

Guideline 43 - Control procedures of documentation

1.104. In order to ensure the on-going quality of the documentation according to Article 243(3) of the Implementing Measures, the insurance or reinsurance undertaking should have in place at least:

a) an effective control procedure for internal model documentation;

b) a version control procedures for internal model documentation;

c) a clear referencing system for internal model documentation which should be used in a documentation inventory required by Article 244(a) of the Implementing Measures.

Guideline 44 - Documentation of methodologies

1.105. The insurance or reinsurance undertaking should produce documentation which is detailed enough to evidence detailed understanding of the methodologies and techniques used in the internal model, including at least:

a) the underlying assumptions;

b) the applicability of such assumptions given the undertaking's risk profile;

c) any shortcomings of the methodology or of the technique.

1.106. The insurance or reinsurance undertaking, when documenting the theory, assumptions and mathematical and empirical basis underlying any methodology used in the internal model, in accordance with Article 125(3) of Solvency II, should include, if available, the material steps of the development of the methodology, as well as any other methodologies which were considered but not subsequently used by the insurance or reinsurance undertaking.

Guideline 45 - Circumstances under which the internal model does not work effectively

1.107. The insurance or reinsurance undertaking should include in its documentation an overall summary of the material shortcomings of the internal model, consolidated in a single document, containing at least the aspects referred to in Article 245 of the Implementing Measures.

~~**Guideline 46 – Appropriateness of documentation to addressees**~~

~~1.108. The insurance or reinsurance undertaking should consider having documentation of the internal model that consists of more than one level of documentation for the internal model, commensurate with the different uses and target audiences.~~

Guideline 47 - User manuals or process descriptions

1.109. The insurance or reinsurance undertaking should have in place, as part of the documentation of the internal model, user manuals or process descriptions for operation of the internal model which should be sufficiently detailed to allow an independent knowledgeable third party to operate and run the internal model.

~~**Guideline 48 – Documentation of model output**~~

~~1.110. The insurance or reinsurance undertaking should retain, as part of the documentation of the internal model, the outputs of the model that are relevant to satisfy the requirements of Article 120 of Solvency II.~~

Guideline 49 – Documentation of software and modelling platforms

1.111. The insurance or reinsurance undertaking, in its documentation, should provide information about the software, modelling platforms and hardware systems used in the internal model.

1.112. When using software, modelling platforms and hardware systems, the insurance or reinsurance undertaking should provide in the documentation sufficient information to be able to assess and justify their use, and enable supervisory authorities to assess their appropriateness.

Chapter 11: External models and data

Guideline 50 – External data

1.113. The insurance or reinsurance undertaking, given the nature of external data, should be able to demonstrate an appropriate level of understanding of the specificities of external data used in the internal model including any material transformation, rescaling, seasonality and any other processing inherent in the external data.

1.114. In particular, the insurance or reinsurance undertaking should at least:

a) understand the attributes and limitations or other peculiarities of the external data;

b) develop processes for identifying any missing external data and other limitations;

c) understand the approximations and processing made for missing or unreliable external data;

d) develop processes to run timely consistency checks including comparisons with other relevant sources to the extent that data are reasonably available.

Guideline 51 – Understanding of the external model

1.115. The insurance or reinsurance undertaking should be able to demonstrate that all parties involved in the use of the external model have a sufficiently detailed understanding of parts of the external model relevant to them including assumptions, technical and operational aspects.

1.116. The insurance or reinsurance undertaking should give particular attention to the aspects of the external model that are more relevant to its risk profile.

Guideline 52 – Reviewing the choice of external model and data

1.117. The insurance or reinsurance undertaking should periodically review its justification for selecting a particular external model or set of external data.

1.118. The insurance or reinsurance undertaking should be satisfied that it is not overly reliant on one provider and should have in place plans to mitigate the impact of any failures of the provider.

1.119. The insurance or reinsurance undertaking should pay attention to any updates of the external model or of the data that allows the undertaking to better assess its risks.

Guideline 53 – Integration of external models within the internal model framework

1.120. The insurance or reinsurance undertaking should be able to demonstrate that the approach for incorporating the external model into the internal model framework is appropriate; including the techniques, data, parameters, assumptions selected by the undertaking and the external model outputs.

Guideline 54 – Validation in the context of external models and data

1.121. The insurance or reinsurance undertaking should perform its own validation of the aspects of the external model that are relevant to its risk profile and of the process for incorporating the external model and data within its own processes and internal model.

1.122. The insurance or reinsurance undertaking should assess the appropriateness of the selection or the non-selection of features or options which are available for the external model.

1.123. As part of the validation the insurance or reinsurance undertaking should consider appropriate information and in particular the analysis performed by the vendor or other third party, and, when doing so, the insurance or reinsurance undertaking should ensure at least that:

a) the independence of the validation is not compromised;

b) it is consistent with the validation process the insurance or reinsurance undertaking sets out and is clearly laid out in the validation policy;

c) any implicit or explicit bias in the analysis performed by the vendor or other third party is taken into account.

Guideline 55 - Documentation in the context of external models and data

1.124. The insurance or reinsurance undertaking should ensure that the documentation of external models and data meets the documentation standards.

1.125. The insurance or reinsurance undertaking should produce documentation on at least the following:

a) the aspects of the external model and external data that are relevant for its risk profile;

b) the integration of the external model or external data within its own processes and internal model;

c) the integration of data, in particular inputs, for the external model, or outputs from the external model, within its own processes and internal model;

d) the external data used in the internal model and its source and use.

1.126. If, as part of its own documentation, the insurance or reinsurance undertaking leverages on the documentation produced by the vendors and service providers, the insurance or reinsurance undertaking should ensure that its ability to meet the documentation standards is not compromised.

Guideline 56 - Responsibility of the undertaking in the context of external models and data

1.127. The insurance or reinsurance undertaking should keep its responsibility for discharging its obligations related to its internal model and for the role of external model or data in the internal model and any other requirements.

Guideline 57 - Role of service providers when using external models and data

1.128. The insurance or reinsurance undertaking should put in place an outsourcing agreement when it chooses not to operate the external model directly.

1.129. Similarly, the insurance or reinsurance undertaking should put in place an outsourcing agreement when it chooses to mandate a service provider to perform some tasks related to the external data.

1.130. The insurance or reinsurance undertaking should, when putting in place an outsourcing agreement, comply with the requirements from Article 49 of Solvency II and Article 274 of the Implementing Measures.

Chapter 12: Internal models for groups - Functioning of colleges

Guideline 58 - Assessing the scope of the internal model

1.131. When assessing the appropriateness of the scope of the internal model, the group supervisor, the other supervisory authorities involved as defined in Article 343(2) of the Implementing Measures and other supervisory authorities identified by the college in accordance with Article 344(2) of the Implementing Measures should consider at least:

a) the significance of related undertakings within the group with respect to the risk profile of the group;

b) the risk profile of related undertakings within the group compared to the overall group risk profile;

c) if applicable, a transitional plan by the group to extend the scope of the model at a later stage and the timeframe to do so;

d) the appropriateness of the standard formula or another internal model approved or in the process of approval for the calculation of the Solvency Capital Requirement of any related insurance or reinsurance undertaking included in the scope of the internal model;

e) the appropriateness of the standard formula or another internal model approved or in the process of approval for the calculation of the Solvency Capital Requirement of any related insurance or reinsurance undertaking within the group but not included in the scope of the internal model for the group.

1.132. When assessing the appropriateness of the exclusion of related undertakings within the group from the scope of the internal model, the supervisory authorities referred to in the previous paragraph should assess whether the exclusion of the undertakings could lead to:

a) an improper allocation of own funds based on individual undertaking Solvency Capital Requirements rather than on its contribution to the risk profile of the group;

b) inconsistencies that would derive from the use of the internal model to calculate the group solvency capital requirement and the use of the standard formula or a different internal model, approved or in the process of approval, by any related undertaking within the group to calculate its Solvency Capital Requirement;

c) weaknesses in risk management of the group and related undertakings within the group resulting from the limited scope of the internal model; or

d) an inadequate group Solvency Capital Requirement in relation to the risk profile of the group.

Guideline 59 - Internal model work plan for the assessment and the approval process of internal models for groups

1.133. The group supervisor, in consultation with the other supervisory authorities involved, should set up an internal model work plan and the communication rules to follow among these authorities during the assessment and the approval process of internal models for groups.

1.134. When appropriate, the group supervisor, in consultation with the other supervisory authorities involved, should update the internal model work plan.

1.135. In relation to the assessment of the internal model, the group supervisor should ensure that the internal model work plan covers the timeline, main steps and deliverables for this assessment. In the case of a group internal model under Article 231 of Solvency II, the group supervisor and the other supervisory authorities concerned should consider including in the internal model work plan specific provisions between them. The group supervisor should ensure that the internal model work plan, at least:

a) establishes when and how to consult and involve in the assessment the other supervisory authorities involved referred to in Article 343(2) of the Implementing Measures;

b) establishes when and how to allow the other supervisory authorities within the college of supervisors referred to in Article 344(2) of the Implementing Measures to participate in the assessment;

c) identifies the priorities for the assessment, taking into account the scope of the internal model, the specificities of each related undertaking within the group, the risk profile of the group and related undertakings within the group, and the available and relevant information about the internal model;

d) establishes when and how to report the outcomes of the assessment made by the supervisory authorities involved to the other supervisory authorities involved.

1.136. In relation to the decision on an application to use a group internal model under Article 231 of Solvency II, the group supervisor, in consultation with the other supervisory authorities concerned, should ensure that the internal model work plan covers the timeline for all the steps and deliverables for reaching a joint decision as set out in the EIOPA Implementing Technical Standard on the Process to Reach a Joint Decision for Group Internal Models.

~~**Guideline 60 – Concerns about the process**~~

~~1.137. Whenever a supervisory authority involved identifies a substantial point of concern regarding the approval process, it should share its concern with the group supervisor and the other involved authorities as soon as feasible.~~

Guideline 61 - Joint on-site examinations carried out during the assessment of internal models for groups

1.138. The group supervisor and the other supervisory authorities involved should be able to request and discuss when and how to organize joint on-site examinations to verify any information concerning the assessment of an internal model for a group, with the aim of ensuring the effectiveness of the process.

1.139. The supervisory authorities requesting a joint on-site examination should inform the group supervisor by indicating the scope and purpose of this examination, taking into account the objectives of this examination in relation to the assessment as defined by the supervisory authorities involved.

1.140. The group supervisor should then notify the other supervisory authorities involved, EIOPA, and, where relevant, other members and participants of the college that may be affected or interested in the participation or in the outcome of the joint on-site examination.

1.141. Once the supervisory authorities participating in the joint on-site examination have been identified, they should discuss and agree the final scope, purpose, structure and allocation of tasks of the on-site examination, including who is leading the on-site examination.

1.142. The group supervisor should be kept informed on the progress and findings of the joint on-site examination.

1.143. The supervisory authority leading the on-site examination, if other than the group supervisor, should provide the relevant documentation to the group supervisor.

The group supervisor should make the relevant documentation available to the supervisory authorities involved, to the other supervisory authorities participating in the joint on-site examination and to EIOPA. The group supervisor should provide the other college members and participants with a list of the relevant documentation received and provide them with the documents upon specific request.

1.144. On the basis of a report stating the main findings of the joint on-site examination, the supervisory authority leading the on-site examination should discuss with the supervisory authorities involved the outcome of the joint on-site examination and the actions to be taken.

1.145. The group supervisor should notify the other college members and participants about the outcome and actions as part of the agreed communication within the college.

~~**Guideline 62 - Sharing of reviews of internal models for groups**~~

~~1.146. The supervisory authorities involved should share and discuss the main findings of their off-site and on-site activities related to the internal model with the group supervisor and the other supervisory authorities involved.~~

~~1.147. The supervisory authorities involved should share the approach they are following in the review of the elements of the internal model with the group supervisor and the other supervisory authorities involved.~~

~~1.148. If, as a result of this sharing, the supervisory authorities involved identify substantial differences in the approaches followed, they should discuss and they should agree on a process to develop consistent approaches when they consider appropriate to have this alignment.~~

~~1.149. When they deem appropriate, the supervisory authorities involved should consider sharing the tools and techniques they are using for the review of the elements of the internal model with the other supervisory authorities involved.~~

~~Guideline 63 – Involvement of third country supervisory authorities during the assessment of internal models for groups~~

~~1.150. The group supervisor and the other supervisory authorities involved should decide whether and which third country supervisory authorities should be consulted.~~

~~1.151. Before consulting the third country supervisory authority, the group supervisor, with the support of the other supervisory authorities involved, should take appropriate steps to ensure that the legislative provisions on the confidentiality of information of the jurisdiction where the third country supervisory authority is situated are equivalent to the professional secrecy requirements resulting from Solvency II.~~

Guideline 64 - Assessment of major changes to group internal models under Article 231 of Solvency II

1.152. In relation to the assessment of the application for approval of a major change to a group internal model under Article 231 of Solvency II, the group supervisor and the other supervisory authorities concerned should decide whether to delegate the assessment of changes at the level of a related undertaking to the relevant supervisory authority concerned.

Compliance and Reporting Rules

This document contains Guidelines issued under Article 16 of the EIOPA Regulation In accordance with Article 16(3) of the EIOPA Regulation, Competent Authorities and financial institutions shall make every effort to comply with guidelines and recommendations.

1.153. Competent authorities that comply or intend to comply with these Guidelines should incorporate them into their regulatory or supervisory framework in an appropriate manner.

1.154. Competent authorities shall confirm to EIOPA whether they comply or intend to comply with these Guidelines, with reasons for non-compliance, within two months after the issuance of the translated versions.

1.155. In the absence of a response by this deadline, competent authorities will be considered as non-compliant to the reporting and reported as such.

Final Provision on Review

1.156. These Guidelines shall be subject to a review by EIOPA.

2. Explanatory text

Chapter 1: Application

2.1. The Guidelines on application aim to provide guidance about what undertakings and supervisory authorities need to consider for the purposes of the submission by an undertaking of an application to use an internal model.

2.2. This specific internal model for groups provisions in these Chapters (Guidelines 3 to 6) complements the requirements set out in the EIOPA Implementing Technical Standard on Internal Models Approval Processes. The requirements of this Implementing Technical Standard have to be applied in a consistent manner in the case of the approval processes for the use of internal models for groups.

2.3. The specificities for internal models for groups set out in TITLE II CHAPTER III of the Implementing Measures have to be taken also into account in the case of applications to use internal models for groups.

Guideline 1 – Pre-application

Supervisory authorities should consider putting in place a pre-application process in order to form a view on how prepared an insurance or reinsurance undertaking is to submit an application for the use of an internal model for the calculation of the Solvency Capital Requirement under Solvency II and to meet the internal models requirements set out in Solvency II.

2.4. As set out in Recital 5 of the EIOPA Implementing Technical Standard on Internal Models Approval Processes, it is considered best practice to begin the communication between the undertaking and the supervisory authorities before the formal application is submitted by the undertaking.

2.5. This Guideline refers to pre-application processes for undertakings not aiming to use an internal model as of the first day on which Solvency II is applicable.

2.6. The pre-application process helps undertakings to develop their internal model framework and thereby prepare to submit an application to use an internal model under Solvency II.

2.7. The undertaking needs to prepare for the eventuality that its internal model may not be approved and set up processes to calculate the standard formula Solvency Capital Requirement as well as to consider the capital planning implications.

~~**Guideline 2 – Information to be submitted in an application for the use of group internal models under Article 231 of Solvency II**~~

~~In the case of an application for the use of a group internal model under Article 231 of Solvency II, the applicant should include for each related undertaking that applies to use the group internal model for the calculation of its Solvency Capital Requirement the information set out in Article 2 of the EIOPA Implementing Technical Standard on Internal Models Approval Processes which is specific to this related undertaking, unless this information is already covered in the documents submitted by the participating insurance or reinsurance undertaking.~~

~~The applicant should also explain, for each related undertaking included in the application to use the group internal model for the calculation of its Solvency Capital Requirement, to what extent the development, implementation or validation of the group internal model components which are necessary for the calculation of the Solvency Capital Requirement of the related undertaking, are performed by another related undertaking within the group.~~

2.8. Guideline 2 is deleted because it is deemed redundant (type 1 deletion) as it refers to practices essentially part of ITS 2015/460 (see recital 7 and article 2 number 4 of the ITS).

~~**Guideline 3 – Request for further information in the case of an application for the use of internal models for groups**~~

~~In the case of an application for the use of an internal model for a group, a request for further information from a related undertaking by the supervisory authorities involved as defined in Article 343(2) of the Implementing Measures supervising this undertaking, should first be made to the group supervisor. The group supervisor should then forward the request to the related undertaking, or provide the supervisory authority involved requesting the information with the relevant documents if they have already been provided to the group supervisor.~~

~~In the case of an application for the use of a group internal model under Article 231 of Solvency II, any supervisory authority concerned as defined in Article 347(3) of the Implementing Measures, should be able to directly request further information from the related undertaking it supervises in order to assess the compliance of the group internal model with the internal models requirements in respect of the Solvency Capital Requirement of this related undertaking. In such case, this supervisory authority concerned should inform promptly the group supervisor about such request for information.~~

2.9. Guideline 3 is deleted because it is considered not adding value and unnecessary (type 2). While the modalities for requesting further information could not be found in level 1 or level 2 regulation, this guideline describes the process of going through the group supervisor. However, this practice is well understood by insurance undertakings and NSAs. This guideline facilitates communication for new IM undertakings/groups but is not essential.

~~**Guideline 4 – Intention to extend the scope of an application for the use of internal models for groups**~~

~~In the case of an application for the use of an internal model for a group, as part of the justification of the scope of the internal model described in Articles 343(5) or 347(6) of the Implementing Measures, the applicant should describe in the application the intention, if any, to extend the scope of the internal model in the future in order to include, for the purposes of the calculation of the group Solvency Capital Requirement, any of the related undertakings within the scope of group supervision but which are not included according to the current application in the scope of the internal model for the calculation of the group Solvency Capital Requirement.~~

~~In the case of an application for the use of a group internal model under Article 231 of Solvency II, as part of the justification of the scope of the internal model, the applicant should also describe the intention, if any, to extend in the future the scope of the internal model in order to include the calculation of the Solvency Capital Requirement of any related undertaking which is not included in the scope of the current application for the calculation of its Solvency Capital Requirement with the group internal model.~~

Guideline 4 is deleted because it is deemed redundant (type 1 deletion). Delegated Regulation Article 343-5-a-(iv) states that "regarding the scope of the model, the participating undertaking shall provide information on any future plans to extend the use of the internal model to calculate the Solvency Capital Requirement of any related insurance or reinsurance undertaking;". DR article 349 "3. In the joint decision, the supervisory authorities concerned may require the applicant to submit a realistic transitional plan to extend the scope of the group internal model.". Guideline not essential.

Guideline 5 - Technical specifications in the case of an application for the use of group internal models under Article 231 of Solvency II

In case of an application for the use of a group internal model under Article 231 of Solvency II, the applicant should explicitly state in the application to what extent the technical specifications of the group internal model may differ when the internal model is used for the group Solvency Capital Requirement calculation and the calculation of the Solvency Capital Requirement of related undertakings, including:

a) the treatment of intra-group transactions for the calculation of both the Solvency Capital Requirement of related undertakings and where applicable the group Solvency Capital Requirement;

b) the list of parameters within the internal model that may be set differently for different calculations performed with the group internal model, for the purposes of the calculation of the group Solvency Capital Requirement and the calculation of individual Solvency Capital Requirements; and

c) the description of group specific risks only relevant in the group Solvency Capital Requirement calculation.

2.10. This specific group internal model provision complements the requirement set out in the EIOPA Implementing Technical Standard on Internal Models Approval Processes to provide in the application the technical specifications of the internal model.

Chapter 2: Model changes

2.11. As part of the initial approval of the internal model supervisory authorities have to approve the policy for changing the internal model.

2.12. The Guidelines on model changes aim to provide guidance about what supervisory authorities need to assess and an undertaking needs to do, in order to ensure the relevance and the adequacy of the policy for changing the internal model.

2.13. As potential sources for change, the model change policy may for instance, cover changes to or arising from but not limited to, the following areas:

- structure of the model (including use of IT systems and platforms);
- methods used to calculate the probability distribution forecast (including external models and data);
- assumption and parameter, or process to derive such assumption and parameter if such process is clearly defined, documented and part of the model governance;
- data governance, processing and application of data;
- system for measuring diversification effects or to take into account the dependencies across risks categories;
- use of the internal model including changes in reporting and outputs from the model;
- nature, scale and complexity of the risk profile (including material changes in business model, business strategy, products and lines of business, emerging risks, asset management policy and any other relevant changes to the risk profile);
- outsourcing (or in-sourcing activities previously outsourced) activities related to the internal model or the identification, measurement, monitoring and reporting of risks;
- legal environment may impact the internal model either through changes in jurisdiction or changes in law relevant to the undertakings within the same regulation;
- where applicable, any change that might impact the internal model, for example changes that might impact inputs to the internal models.

Guideline 6 - Scope of the policy for model changes

The insurance or reinsurance undertaking, when establishing the policy for changing the model, should ensure that this policy covers all relevant sources of change that would impact its Solvency Capital Requirement and at least the changes:

a) in the system of governance of the undertaking;

b) in the undertaking's compliance with the requirements to use the internal model;

c) in the appropriateness of the technical specifications of the undertaking's internal model; and

d) in the risk profile of the undertaking.

The undertaking should also ensure that the policy for changing the model:

a) specifies when a change to the internal model shall be considered as major or minor and when a combination of minor changes shall be considered a major change.

b) sets out the governance requirements in relation to changes to the internal model, including internal approval, internal communication, documentation and validation of changes.

The insurance and reinsurance undertaking should not cover the inclusion of new elements, such as the inclusion of additional risks or business units, as part of the changes to the internal model pursuant to the policy for changing the internal model. The inclusion of new elements in the internal model should be subject to supervisory approval following the procedure described in Article 7 of the Implementing Technical Standard on Approval Processes for Internal Models.

The insurance or reinsurance undertaking should take into account the update of the parameters of the internal model as a potential source of changes to the internal model.

Changes to the model

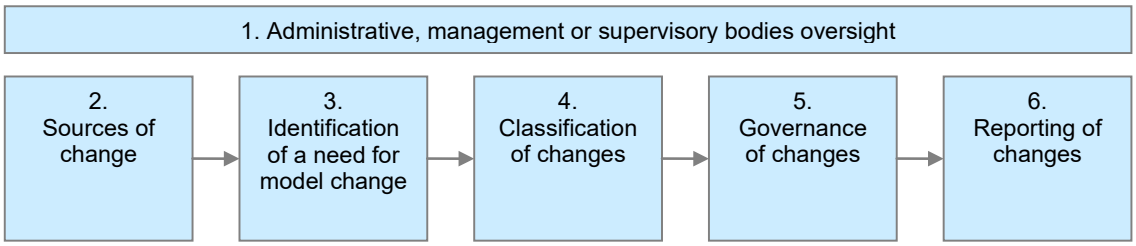
2.14. It is good practice for an undertaking to update its internal model in order to keep the model and its parameters accurate and up-to-date. For example, to update methodologies as appropriate in order to reflect improved techniques. The purpose of the policy for model change is to describe the procedures the undertaking puts in place to ensure that the internal model is appropriate and meets the requirements on an on-going basis.

2.15. The model change process is a framework for the undertaking and a useful tool for supervisory authorities. In particular for supervisory authorities as they would be able to use this information to satisfy themselves that the internal model, once the model is approved, continues to comply on an on-going basis with the tests and standards for model approval.

2.16. The policy for model change provides a framework to promote:

- good modelling practices: undertaking's ability to change its internal model to adapt to changing circumstances;
- enhanced risk management: the internal model provides a valuable tool for the undertaking to develop and constantly adapt its analysis and knowledge of its risks;
- efficient supervision: the policy provides insight to supervisory authorities into the undertaking's philosophy and appetite for making changes to the internal model.

2.17. It is expected that the policy for model change covers the following aspects:



Update of parameters

2.18. "Parameters of the internal model" or "model parameters" mean figures defined or calculated within the model. For example a quoted stock price is not a parameter of the internal model since its value is determined externally but the mean and variance of the random variable used for simulation of its future value are parameters of the internal model.

2.19. The update of parameters can have a significant impact on the model outputs and the Solvency Capital Requirement in particular and hence, according to Article 3 of the EIOPA Implementing Technical Standard on Internal Models Approval Processes, this is included within the scope of the model change policy.

2.20. Some internal models include a large number of parameters which interact together in impacting the outputs of the internal model. Hence it may be more appropriate for the undertaking to consider the impact of changes to some parameters in batch instead of individually if their change is not considered as major in accordance with the policy.

2.21. When the process for updating the parameters and the governance is also captured in the model change policy as approved by the supervisory authority, some reliance could be placed on the process for updating parameters to identify change to the internal model, the policy would identify the circumstances under which such reliance ceases to be appropriate in particular considering the impact on the Solvency Capital Requirement of the parameters update. The reliance on the process for updating the parameters, would be less appropriate if the process for updating the parameters is not adequately formalised, described and subject to appropriate level of governance. Notwithstanding the above, in some cases, significant changes in parameter

values qualify for individual notification as model change. For example, supervisory authorities would want to know when an undertaking providing significant interest rate guarantees starts using an unusually low value for interest rate volatility. In any case, it is important that the undertaking chooses its criteria for classifying changes so as to ensure that significant changes in material parameters are classified as major when appropriate.

Reporting minor changes resulting from parameters update

2.22. In all circumstances supervisory authorities, as part of the approval of the model change policy, might agree on the information to be provided as part of the reporting of minor changes as set out in Guideline 6. It is recognised that it is not always appropriate to report changes in value of individual parameters.

2.23. In order to assess the appropriate level of information that is reported by the undertaking when minor changes are performed, supervisory authorities may look at how the undertaking sets in the policy for changing the model a summarised report. This report may, at least, include the global impact of the parameters update to allow supervisory authorities to understand the breakdown of the variations of the Solvency Capital Requirement from one reporting date to another between some categories (e.g.: variations of the balance sheet, changes of the model methodology, updates of parameters, others). This quarterly reporting may not contain an exhaustive list of parameter values and may be provided together with a narrative explanation of the rationale for the changes and for the identification of key parameters.

2.24. When defining the groups of parameters for the impact of changes the undertaking might take into consideration several criteria: the risk category (a single impact of the update of all parameters related to life underwriting risk, for example) or categories of parameters (pure expert judgment parameters, parameters estimated after some reprocessing of data…).

2.25. For example changes due to the update of parameters could be reported including:

- the total variation of the Solvency Capital Requirement;
- of which the variation due to the update of parameters;
- of which the variation due to the update in the undertaking's exposure profile;
- of which the variation due to other minor changes (to be detailed as appropriate);
- other as appropriate.

2.26. The impact of parameters update could then be detailed further according to:

- the risk category: market risk, life underwriting, non-life underwriting etc.;
- the category of parameters: based on expert judgement, resulting from established statistical process etc.;

- other relevant criteria.

Guideline 7 - Defining a major change

Whilst the quantitative impact of a model change on the Solvency Capital Requirement or on individual components of the Solvency Capital Requirement may be one of the indicators the insurance or reinsurance undertaking decides to use to identify major changes, the undertaking should develop and use a number of other key qualitative and quantitative indicators to define a major change.

2.27. According to Article 115 of Solvency II, the policy for changing the internal model shall include a specification for identifying whether changes to the internal model are major or minor. The goal is for the undertaking to develop a reliable system to classify anticipated types of model changes.

2.28. It is expected that the undertaking ensures that this system is simple. But at the same time the system has to be flexible enough to serve both the undertaking's need for innovations on risk models and supervisory authorities' need to control the implementation of these innovations in order to maintain the overall integrity and adequacy of the internal risk model in an effective and efficient way.

2.29. If the undertaking put in place its own internal classification of model changes to meet internal needs, it can leverage this internal classification to determine minor and major changes, for instance through a clear mapping between the internal classification and minor and major changes.

2.30. The appropriate classification of model changes depends to a high degree on the individual situation of each undertaking. Therefore it is expected that the indicators developed by the undertaking take into account the specificities of the undertaking itself and of its internal model.

2.31. It is regarded as good practice that some of the indicators used are related to the tests or standards. The undertaking may also consider how they can use their validation report and their profit and loss attribution to design appropriate indicators.

2.32. The impact on the Solvency Capital Requirement is also an indicator. This criterion is obviously not applicable to changes to the model that would have no effect on the calculated Solvency Capital Requirement like changes in the system of governance or the use of the internal model. Furthermore, a change, even major, could have no consequences at a certain point in time on the Solvency Capital Requirement because of a specific risk profile of an undertaking (e.g. unpredictable netting effect). Even if a change has an effect, the magnitude depends strongly on the current parameterisation of the internal model. An example would be a change in the modelling of options and guarantees. If these are currently "deep out of the money" the immediate effect on the Solvency Capital Requirement may be negligible.

2.33. The impact of a change to the Solvency Capital Requirement may vary according to prevailing market conditions. This may be taken into consideration when considering the impact to the Solvency Capital Requirement.

2.34. The classification of changes into minor and major may take into account a series of qualitative as well as quantitative criteria such as to make the classification an objective and transparent process. The qualitative criteria may include for instance the areas of the model affected (such as governance, calculation methods, assumptions and parameters), the risks category (such as market risks, underwriting lines of business or product), or other relevant segmentation. The quantitative criteria include the impact to the Solvency Capital Requirement.

2.35. A way for the undertaking to "back-tests" that the model change policy, in general, and the definition of major changes, in particular, performs effectively, could be to evaluate the model change policy in the light of past changes made to the model.

Guideline 8 – Report of minor and major changes as a combination of minor changes

The insurance or reinsurance undertaking should report minor changes to the internal model to the supervisory authorities quarterly or more frequently where appropriate. Minor changes to the internal model should be communicated in a summarised report that should describe both the quantitative and qualitative impacts of changes and the approximate cumulative quantitative and qualitative effects of the changes on the approved internal model.

The insurance or reinsurance undertaking should use the latest internal model approved by supervisory authorities as the reference for evaluating whether a combination of minor changes is considered as a major change, unless otherwise agreed with supervisory authorities.

2.36. As required by the Article 3 of the EIOPA Implementing Technical Standard on Approval Process, the undertaking needs to consider when a combination of minor changes triggers a major change.

2.37. When a combination of minor changes constitutes a major change, it is expected that the internal model, including all the minor changes done since the last version of the model approved, is submitted by the undertaking to supervisory authorities for approval.

2.38. The last internal model approved includes the major changes previously submitted and approved by the relevant supervisory authority and therefore excludes any ulterior minor changes. Hence, the combination of minor changes to be considered to constitute a major change is the set of all minor changes since the last version of the internal model approved.

Guideline 9 – Policy for changing the model for group internal models under Article 231 of Solvency II

In the case of a group internal model under Article 231 of Solvency II, the participating undertaking and the related undertakings applying to use a group internal model to calculate their individual Solvency Capital Requirement should develop one policy for changing the model.

The participating undertaking and the related undertakings applying to use a group internal model to calculate their individual Solvency Capital Requirement should ensure that the policy for changing the model includes a specification of major and minor changes with regard to the group, as well as each of the related undertakings included in the application to use the group internal model to calculate their individual Solvency Capital Requirement.

The participating undertaking and the related undertakings applying to use a group internal model to calculate their individual Solvency Capital Requirement should ensure that any change that is major for a related undertaking included in the application is classified as a major change within the policy.

2.39. This Guideline aims to maintain the integrity of the internal model. There is always the risk that the model is changed independently at solo and group level resulting in models that are different.

Guideline 10 – Extension of use and extension of the scope of group internal models under Article 231 of Solvency II

The following extensions of the group internal model should be submitted by the applicant to the group supervisor following the same process as for a major change to the internal model as set out in Article 7 of the EIOPA Implementing Technical Standard on Internal Model Approval Processes:

a) the extension to calculate the Solvency Capital Requirement of a related undertaking currently included in the scope of the group internal model for the calculation of the group Solvency Capital Requirement but which is currently not using the group internal model for the calculation of its Solvency Capital Requirement;

b) the extension to cover new elements at the level of the group;

c) the extension to cover new elements at the level of a related undertaking currently using the group internal model for the calculation of its Solvency Capital Requirement, including the extension related to elements already used at the level of the group or of other related undertakings.

2.40. In relation with point b of the guideline, new elements could for example be the extension of the coverage on the internal model to new risks or the inclusion within the scope of the internal model of new major business units.

2.41. In relation with point c of the guideline, new elements could be similar as for point b described above through the use of existing components of the models

that were not previously used for the calculation of the SCR of that related undertaking or through the development of new components for the internal model.

Chapter 3: Use test

2.42. One of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation is the use test.

2.43. The Guidelines on the use test aim to provide guidance about what supervisory authorities need to assess and an undertaking need to do in order to ensure compliance with the use test for full and partial internal model.

2.44. Internal models in Solvency II are more than a calculation kernel, sometimes referred to as the "actuarial model". An undertaking would not be able to meet the use test if it follows a modelling framework for internal decision-making and a different one for regulatory capital assessment. It is expected for example that the model used for the calculation of the regulatory solvency capital requirements is also used for the internal capital allocation.

2.45. Although there are minimum requirements in Solvency II for the use test, there is no detailed and complete list of uses that the undertaking has to abide with. The uses of the internal model vary from undertaking to undertaking.

2.46. The future uses of the internal model may be considered by the undertaking at the early stage of the development of the internal model and may form part of the drivers for the development and specifications of the internal model.

2.47. The people element of the use test is emphasised through the need that the undertaking ensures proper understanding of the internal model by the administrative, management or supervisory body and by managers at different levels within the undertaking. There is guidance on the application of the use test at group level.

2.48. Some examples are provided on good and bad practices and also of how this can be assessed. Even though they are intended to be representative examples, they are not exhaustive and they are not intended to be used by the undertaking to build a checklist that they blindly abide to. The examples are high-level and simple to show how the use test assessment could work.

~~**Guideline 11 – Incentive to improve the quality of the internal model**~~

~~The insurance or reinsurance undertaking should ensure that the internal model is used in its risk management system and decision-making processes in a way that creates incentives to improve the quality of the internal model itself.~~

2.49. Guideline 11 is deleted because it is deemed redundant (type 1 deletion). This is introductory guideline to the concept of "Use test". Article 120 of SII states the model shall be widely used for risk management and decision making, that the ASMB shall be responsible for continuous adaptation for the risk profile. Because the risk profile is constantly evolving, the ASMB responsibility and

involvement should ensure that the IM is not forgotten within the insurance undertaking after the success of the application process. Art 226 of DR gives further details. The Use Test concept is developed further by the following guideline, so this is not essential.

Guideline 12 - Use test and changes to the internal model

In the process of improving the quality of the internal model, when a major change has been internally approved by the administrative, management or supervisory body, the insurance and reinsurance undertaking should be able to demonstrate compliance with the use test taking into consideration:

a) the different components of the use test;

b) the different uses of their system of governance.

The insurance or reinsurance undertaking should monitor and be able to demonstrate that any time lag between identifying that a change to the internal model is needed and the actual implementation of the change is appropriate. In the case of an application for a major change during the approval period, the insurance and reinsurance undertaking should ensure that the use of the internal model in its decision making process is appropriate.

2.50. Supervisory authorities need to be satisfied that any time lag between changes in the risk management system and change to the internal model is appropriate, and does not reduce the use of the internal model in decision making. Any major change to the internal model, as defined in the internal model change policy, has to be approved by supervisory authorities.

Guideline 13 – Understanding of the internal model

The insurance or reinsurance undertaking should consider different approaches for ensuring the understanding of the internal model by the administrative, management or supervisory body and by relevant users of the internal model for decision-making purposes.

With the aim of assessing their understanding of the internal model supervisory authorities should consider interviewing persons from the administrative, management or supervisory body and persons who effectively run the insurance or reinsurance undertaking.

Supervisory authorities should also consider reviewing the documentation of the minutes of the board meetings or appropriate decision-making bodies to assess the insurance or reinsurance undertaking's compliance with the use test requirements.

2.51. Both overall and detailed understanding may be gained from training provided by the undertaking.

2.52. Training, seminars or workshops for the administrative, management or supervisory body could include the overall review of:

- the structure of the internal model;

- the scope and purpose of the internal model and the risks covered by the internal model, as well as those not covered;
- the way the model fits with the business and the risk-management system
- the general methodology applied in the internal model calculations;
- the limitations of the internal model;
- the interpretation of the relevant inputs and outputs of the internal model;
- the diversification effects taken into account in the internal model;
- other relevant information for the manager.

2.53. The Guideline also applies to external models and data:

- understanding the effect and significance of proprietary elements of external models including the differences that may arise between different models or outputs;
- understanding all material risks related to the use and reliance of external models and data. For example: the risks arising given that the model provider may cease to operate, the risks arising given that in-house expertise that understands the external models and data may leave the organisation, the risks arising given that information may be required from the model provider and they are not able to disclose this or it falls outside the boundary of the contract agreed.

2.54. Evidence of challenges of key assumptions and limitations of the external model by the administrative, management or supervisory body is one way to demonstrate the understanding of the external model.

2.55. The CEIOPS Report on Lessons learned from the crisis also highlights the administrative, management or supervisory body understanding of the internal model as an important factor. The Report recommends that the administrative, management or supervisory body of the undertaking is required to understand the drivers behind market movements, together with its own portfolio positions, in particular in times when historical relationships in markets break down. It is expected that the risk management systems under Solvency II takes into consideration those lessons learned, and that this is reflected in the use of the internal model.

2.56. Thus demonstration of evidence of training, seminars, induction programmes or workshops for all members of the administrative, management or supervisory body or the persons effectively running the undertaking may be one way of forming a view on how ready is the undertaking to comply with the use test.

2.57. Supervisory authorities may want to consider what the objectives of these workshops are, how the objectives are achieved, how frequently they are run, participation rates and what assessment is done at the end. Supervisory review of a training handbook or other material does not prevent the responsible people within an undertaking being asked detailed questions to assess whether the contents of training has been understood.

2.58. In particular supervisory authorities may use interviews of the administrative, management or supervisory body or other persons who effectively run the undertaking to assess the understanding of diversification effects, dependencies or understanding capital allocation, as well as other aspects of the internal model.

Applying the understanding

2.59. Furthermore it is expected that the outputs of the internal model are discussed with the risk-management function of the undertaking and that the results of this discussion are reported to the administrative, management or supervisory body and can therefore be seen in the minutes of the board meetings or of other committees and decision-making bodies. Supervisory authorities may review minutes from the relevant committees / decision-making bodies in the undertaking to assess how output from the internal model is used, i.e. how it is discussed, how the discussion is documented, how suggested improvements to the internal model output are fed back to the risk-management function, etc. Where minutes refer to actions to be carried out, supervisory authorities may check that the actions have actually been implemented.

2.60. Supervisory authorities may also find it helpful to review what reports have been requested by members of the administrative, management or supervisory body of the undertaking. Then supervisory authorities can ask the board members to explain the reports and how they change over time. The undertaking may wish to consider the format of the internal model reporting and how the format could be improved to enhance senior management understanding; for example, the inclusion of graphics or diagrammatic representation of data can enhance communication.

2.61. Consequently the minutes of the board meetings with discussions and results of those discussions on risk profile of the undertaking can be reviewed by supervisory authorities. Supervisory authorities may also find it helpful to see how members agreed to act on the outcome of the discussions and how decisions were communicated and acted within the company.

~~**Guideline 14 – Support of decision-making**~~

~~The insurance or reinsurance undertaking should ensure and should be able to demonstrate that the internal model is used for decision-making.~~

~~In particular, when calculating the notional Solvency Capital Requirement for a ring-fenced fund, the insurance or reinsurance undertaking should comply with Article 81 of the Implementing Measures and explain how it ensures consistency between these outputs as required by Article 223 of the Implementing Measures.~~

2.62. Guideline 14 is deleted because it is deemed redundant (type 1 deletion). First point regarding importance of IM in decision making is already planned by article 120 of the Directive. The particular case of ring-faced funds is planned by article 81 with support of art 223. Guideline basically reminds that articles 120, 81 and 223 need to be respected without adding much more.

Guideline 15 – Use test specificities for group internal models under Article 231 of Solvency II

The participating undertaking and the related undertakings applying to use a group internal model under Article 231 of Solvency II to calculate their individual Solvency Capital Requirement should cooperate to ensure that the design of the internal model is aligned with their business. They should provide evidence that the internal model governance provides that:

a) their individual Solvency Capital Requirement is calculated with the frequency required by Article 102 of Solvency II and whenever it is needed in the decision-making process;

b) they can propose changes to the group internal model, especially for components that are material to them or following a change in their risk profile and taking into account the environment in which the undertaking is operating; and

c) the related undertakings possess the adequate understanding of the internal model for the parts of the internal model which cover the risks of that undertaking.

The insurance or reinsurance undertakings applying to use a group internal model to calculate their Solvency Capital Requirement should ensure that the design of the internal model is aligned with their business and their risk-management system, including the production of outputs, at group level and at related undertaking level, that are granular enough to allow the group internal model to play a sufficient role in their decision-making processes.

2.63. In the context of a group internal model, the use test applies to the model used to calculate the Solvency Capital Requirement. In particular the use test applies to the undertakings using the internal model to calculate their Solvency Capital Requirement in relation to the outputs at group level but also in relation to the outputs at the level of that undertaking. A key component of the use test is how the internal model is embedded in decision making, which may vary by entity.

2.64. An appropriate governance of the internal model provides the framework for the group and the related undertakings to cooperate closely in the use of the internal model. Such governance may be formalised in the forms of contracts/ legal arrangements such as service level agreements or through policies and dedicated procedures. This cooperation may be a way to identify where the internal model would be used in their systems of governance.

2.65. They need to be able to evidence that the group internal model would be adjusted to reflect changes in the group or in the related undertaking´s risk profile. For instance it is expected that the policy for changing the internal model foresees changes to the internal model as possible consequences of changes in the risk profile for all undertakings in the scope of the internal model.

2.66. In order to be able to calculate their Solvency Capital Requirements properly and to meet the use test requirements, related undertakings need to have adequate understanding about the internal model. A source of that understanding is, for example, having access to the relevant and up-to-date internal model documentation, created either at group or at individual level.

2.67. The above-mentioned requirements are equally important when the group uses external models or chooses not to operate the external model directly.

2.68. The undertakings fully or partially within the scope of an internal model for a group used to calculate the group Solvency Capital Requirement, but not be used to calculate their individual Solvency Capital Requirement, need also to comply with the use test in relation to the output of the internal model at group level. This implies that:

- the model is able, at the minimum, to produce outputs at the level of those related undertakings;
- those related undertakings are able to demonstrate an overall understanding for the parts of the internal model which would cover their risks;
- the consolidated group Solvency Capital Requirement needs to be recalculated if the risk profile of the related undertaking alters significantly since the last reported group Solvency Capital Requirement such as materially impacting the group Solvency Capital Requirement.

Chapter 4: Assumption setting and expert judgement

2.69. One of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation is being able to justify the assumptions underlying the internal model to supervisory authorities.

2.70. The models for risk ("internal models") use assumptions which must be based on the expertise of individual persons or committees with relevant knowledge, experience and understanding of the risks inherent in the insurance or reinsurance business (expert judgement). Expert judgement is therefore an important ingredient in the assumption setting process. These Guidelines on assumption setting and expert judgement aim to provide guidance about what supervisory authorities need to assess and undertakings do to ensure that the undertaking complies with the requirements in relation to the setting of those assumptions and in particular to the use of expert judgement on which these assumptions are based.

2.71. Especially where data availability or quality is limited, as well as in other situations where modelling decisions contain a large degree of subjectivity, risk models (as well as valuation models) need to overcome limitations in data by the use of assumptions which are based on expert judgement. In extreme cases, appropriate data may not be available at all and expert judgement can

allow risk assessment which otherwise would not be possible. In these cases, the use of assumptions based on expert judgement is actively encouraged. But even in cases where there is sufficient data the need for expert judgement arises in selecting the data to use.

2.72. Therefore, the focus of these Guidelines is the choice of modelling assumptions which are closely tied to limitations in data, although they need to be consistent with all assumptions for valuation and risk models in general. As an assumption overcoming the limitations in data is hard to be separated from other assumptions based on the expertise of persons with relevant knowledge, experience and understanding of the risks inherent in the insurance or reinsurance business thereof, the scope of the term "assumptions based on expert judgement" is kept rather broad and no explicit boundaries are given.

2.73. As the choice of assumptions based on expert judgement is associated with a large degree of subjectivity and, due to their nature, such assumptions do not lend themselves naturally to traditional methods for validation, it is important to ensure that the use of expert judgement as the basis for such assumptions happens in a controlled environment. Other controls take precedence such as a tight governance framework (Guideline 17), good communication that includes limits and uncertainties of the assumptions based on expert judgement (Guideline 18) and thorough documentation (Guideline 19). Validation also still plays a role, for example in the maintenance of a track record (Guideline 20).

2.74. The Guidelines on assumption setting and expert judgement provide guidance on these controls and explains their background.

2.75. Where committees rather than individual persons provide assumptions based on expert judgement, the requirements laid out in the Guidelines are also applicable to these committees.

Guideline 16 – Materiality in assumptions setting

The insurance or reinsurance undertaking should set assumptions and use expert judgment, in particular taking into account the materiality of the impact of the use of assumptions with respect to the following Guidelines on assumption setting and expert judgement.

The insurance or reinsurance undertaking should assess materiality taking into account both quantitative and qualitative indicators and taking into consideration extreme losses conditions. The insurance or reinsurance undertaking should overall evaluate the indicators considered.

2.76. In any internal model, the various assumptions differ widely in their materiality.

2.77. This also holds in the context of setting up a balance sheet for solvency purposes. This can either be the case where assumptions need to be taken for the valuation of assets where market values are not available and a model is required for this purpose or where the valuation of liabilities requires such assumptions to determine the value of the best estimate or the risk margin.

2.78. When the undertaking assesses materiality, it can take into account indicators and metrics such as the solvency capital requirement, technical provisions, own funds and other related metrics. The evaluation may differ depending on the indicator or the set of indicators that has been used.

2.79. Examples for quantitative indicators for materiality in relation to internal models are the estimated impact of the typical change or uncertainty in such assumptions on capital or other model outputs, or results of any tool used in model validation such as stress and scenario testing or sensitivity analysis. Qualitative indicators can also be used to determine whether assumptions are material or not.

2.80. Where individual assumptions are immaterial, they may still be related or sufficiently similar and together they may become material on the whole. In this case, they are to be treated according to this aggregate materiality. An example for this is the individual entries in a correlation matrix, which individually have very little impact on model output, but together can change model results dramatically.

Guideline 17 – Governance of assumptions setting

The insurance or reinsurance undertaking should ensure that all assumption setting and the use of expert judgement in particular, follows a validated and documented process.

The insurance or reinsurance undertaking should ensure that the assumptions are derived and used consistently over time and across the insurance or reinsurance undertaking and that they are fit for their intended use.

The insurance or reinsurance undertaking should approve the assumptions at levels of sufficient seniority according to their materiality, for most material assumptions up to and including the administrative, management or supervisory body.

2.81. This Guideline is connected with Guideline 19 on documentation. The documentation of the process enables to assess the validity of the resulting assumptions.

2.82. Instead of being the product of a black box, an assumption based on expert judgement is to be viewed as the end result of a process with distinct steps. This view improves documentation and transparency, and serves to differentiate the hypotheses on which the assumption is based from the processing of these hypotheses and the resulting judgement itself. In addition, validation efforts can focus on the steps of the process as well as the outcome.

2.83. A stylized view of the process of choosing the assumption based on expert judgement may consist of the following steps:

a. definition of the domain of the problem;

b. selection and briefing of the expert, e.g. by remaining experts about the inherent biases and shortcomings of judgements;

c. collection of available data and information which could be quantitative or qualitative in nature;

d. processing the available data, information and synthesis of the resulting assumption. This may involve construction of a micro-model[9] in the internal model context;

e. reporting and documentation;

f. validation.

2.84. Likewise, where assumptions on the same issue are derived by several experts in the same undertaking, for example in geographically dispersed locations, the process ensures consistency between these assumptions. Benchmarking of assumptions across entities by a group function may be a tool for ensuring consistency across the group.

[9] In this context, micro-model refers to the mechanism that translates the information used by the expert into something that is useable for the internal model.

Guideline 18 - Communication and uncertainty in assumptions setting

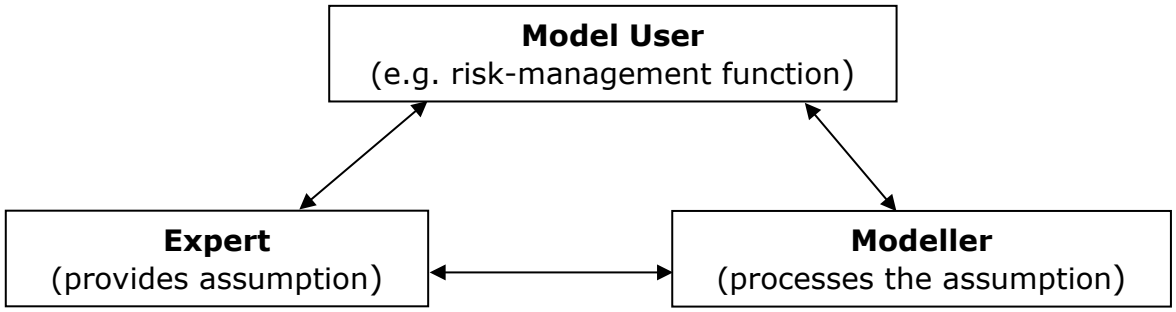
The insurance or reinsurance undertaking should ensure that the processes around assumptions, and in particular around the use of expert judgement in choosing those assumptions, specifically attempt to mitigate the risk of misunderstanding or miscommunication between all different roles related to such assumptions.

The insurance or reinsurance undertaking should establish a formal and documented feedback process between the providers and the users of material expert judgement and of the resulting assumptions.

The insurance or reinsurance undertaking should make transparent the uncertainty of the assumptions as well as the associated variation in final results.

2.85. Sometimes, there is the risk that the context and meaning of an assumption based on expert judgement is not fully understood by its users. For example, the expert responsible for providing an assumption and its users may be part of organisationally or geographically distant units with little regular communication. However, this Guideline does not imply that two roles cannot fall on the same person.

2.86. Generally, three different roles related to internal modelling and assumptions in the scope of this Guideline can be distinguished:



2.87. Miscommunication can appear on all three sides of this triangle. Even in cases where two roles fall on the same person (e.g. modeller and expert are the same person), there is still one communication link which can fail.

2.88. A formalized feedback between all three different roles reduces the risk of misunderstanding or misusing assumptions based on expert judgement.

2.89. An example for evidencing this feedback is to include in the documentation addressed in Guideline 19:

- a summary of the context and application of assumptions based on expert judgement, jointly signed off by the provider and the user;
- minutes of meetings where decisions on assumptions have been made;
- reports of working groups on which the decisions were based.

2.90. While a sound process, feedback and sign-off, as well as documentation and validation may reduce or eliminate bias in an assumption based on expert judgement and increase its reliability, some uncertainty always remains.

2.91. The remaining uncertainty can be made transparent in a variety of ways, both qualitative and quantitative ones: for example, the expert gives a qualitative indication of the degree of certainty; alternatively the expert provides plausible upper and lower bounds in case of a parameter setting.

2.92. Knowing the degree of uncertainty inherent in assumptions based on expert judgement enables the undertaking to judge its impact on the final model output as well as identifying areas of model risk and potential future model improvements, taking into account the materiality of the assumptions based on expert judgement.

Guideline 19 - Documentation of assumptions setting

The insurance or reinsurance undertaking should document the assumption setting process and, in particular, the use of expert judgement, in such a manner that the process is transparent.

The insurance or reinsurance undertaking should include in the documentation the resulting assumptions and their materiality, the experts involved, the intended use and the period of validity.

The insurance or reinsurance undertaking should include the rationale for the opinion, including the information basis used, with the level of detail necessary to make transparent both the assumptions and the process and decision-making criteria used for the selection of the assumptions and disregarding other alternatives.

The insurance or reinsurance undertaking should make sure that users of material assumptions receive clear and comprehensive written information about those assumptions.

2.93. Transparent documentation implies that instances in which an assumption based on expert judgement is used can be easily identified from the documentation. The undertaking might, for example, maintain an up-to-date index or reference list of instances where expert judgement is used, or make the use of electronic search tools feasible for the purpose.

2.94. Another implication of transparent documentation is that the undertaking provides thorough, i.e. clear and comprehensive, documentation for all material judgement. It may not be necessary or reasonable to provide extensive and highly detailed documentation on all instances in which an assumption based on expert judgement is used. The proportionality in the setting of the assumption (cf. Guideline 16) needs to be taken into account and could be reflected in the level of detail of documentation provided that all relevant information with respect to the particular assumption is still included in the documentation.

2.95. It is expected that the documentation of the model describes the assumptions in such a manner that they are transparent and that their validity can be

assessed by assumptions users and supervisory authorities. In this regard, the documentation needs to clarify, at least:

- how and what kind of expert judgement is involved in choosing the assumption;
- the materiality in the setting of the assumption (cf. Guideline 16);
- the context of the use of expert judgement;
- the reasons to call for the assumption;
- evidence for the expertise of the assumption provider; and
- the rationale for the assumption, including the information basis used.

2.96. The context and the reasons to call for the judgement with respect to the undertaking's internal modelling or valuation process and application of the judgement need to become clear from the documentation. The initial context, in which the assumption based on expert judgement was intended to be applied, as presented to the expert(s), is to be consistent with the context in which the assumption is being finally applied. Any inconsistency in this respect needs to be documented. It is important that the undertaking is aware of any limitations of the application of the judgement to ensure it is correctly and appropriately used.

2.97. Assumptions may be based on expert judgement formed by a group/committee or an individual. In the former case, the name and position of all experts with a specified role in the elicitation process and providing essential contribution to the process would be documented. Providing collective evidence for the expertise (the level and variety of knowledge) for the whole group/committee may in most instances be sufficient. Any relevant professional experience such as education, on-the-job-training and the access to information bases in the relevant field may serve as evidence for expertise.

2.98. It is expected that the undertaking documents the rationale for the opinion, including the information basis used, in order to make assumptions transparent. The documentation is expected to describe the problem-solving processes and methods, and report and justify all instances where an assumption based on expert judgement was changed, overruled or disregarded before its application. The description for the rationale behind the problem-solving processes and methods could include:

- inputs, interpretations and hypotheses on which the assumption is based (information basis), as well as how expert judgement has been used;
- outputs and any relevant shortcomings and uncertainty surrounding them. Where relevant, references to alternative assumptions are made. The opinions of all experts with essential contribution and involvement in the elicitation process are to be reported, irrespective of the opinions being used or not;

- processes and methods for deriving the assumption. The processes and methods used to derive the assumption, particularly when multiple and differing expert responses are aggregated, are explained to the extent possible and relevant for the assumption under consideration.

2.99. The results of the validation are also expected to be documented by the undertaking (cf. Guideline 20).

Guideline 20 - Validation of assumptions setting

The insurance or reinsurance undertaking should ensure that the process for choosing assumptions and using expert judgement is validated.

The insurance or reinsurance undertaking should ensure that the process and the tools for validating the assumptions and in particular the use of expert judgement are documented.

The insurance or reinsurance undertaking should track the changes of material assumptions in response to new information and analyse and explain those changes as well as deviations of realizations from material assumptions.

The insurance or reinsurance undertaking, where feasible and appropriate, should use validation tools such as stress testing or sensitivity testing.

The insurance or reinsurance undertaking should review the assumptions chosen, relying on independent internal or external expertise.

The insurance or reinsurance undertaking should detect the occurrence of circumstances under which the assumptions would be considered false.

2.100. As quantitative validation can be difficult, the validation by undertaking of the process of creating an assumption based on expert judgement is very important.

2.101. The validation of the process can include in particular the validation of the following items: definition of the problem to be addressed by expert judgement, criteria for selection of the expert(s), data and information gathered and used, decision, rationale of the decision (it needs to be transparent enough to clearly identify the factors weighted in the decision), uncertainty or conditions under which the selected decision would not be valid, and sign-off.

2.102. One purpose of the validation is to ensure a sufficient level of confidence in the assumptions that have a material impact on the output of the model and/or on decisions taken.

2.103. The process of tracking the assumptions against actual experience and new information is a key tool to determine whether the expert judgement is applied appropriately, both initially and on an on-going basis. Materiality, as expressed in Guideline 16, is to be considered by the undertaking in deciding which assumptions require tracking against actual experience and new information, as it may be impractical to complete this tracking for all assumptions.

2.104. Peer review, whether internal or external, can contribute to providing senior management with sufficient confidence in the areas of expert judgement affecting their decisions. It may contribute to the independence of the validation process, and increase over time the consistency across the undertaking.

2.105. Where possible, assumptions need to be compared against reality and to other external information.

2.106. For undertakings using an internal model, it is expected that the documentation of the process and the tools used for validating assumptions and in particular the use of expert judgement are included in the validation process.

Chapter 5: Methodological consistency

2.107. One of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation is the consistency between the methods used to calculate the probability distribution forecast and the methods used for the calculation of technical provisions. Therefore the undertaking needs to ensure this methodological consistency.

2.108. For the purpose of calculating the Solvency Capital Requirement of insurance or reinsurance undertaking, an internal model produces a probability distribution forecast of certain monetary amounts. The probability distribution forecast determines the impact of possible future events on the monetary amounts at the time horizon, which determine the financial situation of the undertaking.

2.109. As the calculation of the probability distribution forecast aims at capturing changes in the undertaking's basic own funds, which are in turn caused by changes in the values of assets and liabilities, a set of assumptions used by the undertaking for the calculation of the probability distribution forecast would be common with those used in the valuation of assets and liabilities in the balance sheet for solvency purposes. In practice the calculation methods, data and parameters used for the valuation and their underlying assumptions may not be identical to their counterparts in the calculation of the probability distribution forecast. The different objectives introduce deviations to some extent, which may have a material impact on the results.

2.110. However, Article 121(2) of Solvency II sets out that the methods used by the undertaking to calculate the probability distribution forecast shall be based on adequate actuarial and statistical techniques.

2.111. With respect to the ability of the internal model to capture changes in basic own funds, adequate methods used by the undertaking to calculate the probability distribution forecast would be consistent with the valuation of assets and liabilities. Accordingly it is expected that the undertaking chooses methods for the calculation of the probability distribution forecast that are consistent with the methods used for valuation of assets and liabilities in the balance sheet for

solvency purposes, and in particular consistent with the calculation of technical provisions.

Guideline 21 - Consistency check points

The insurance or reinsurance undertaking should ensure consistency between the methods used to calculate the probability distribution forecast and the methods used for the valuation of assets and liabilities in the balance sheet for solvency purposes.

The insurance or reinsurance undertaking should check consistency at the following steps of the calculation of the probability distribution forecast, in case that they are relevant to the model part under consideration:

a) the consistency of the transition from the valuation of assets and liabilities in the balance sheet for solvency purposes to the internal model for the purpose of Solvency Capital Requirements calculations;

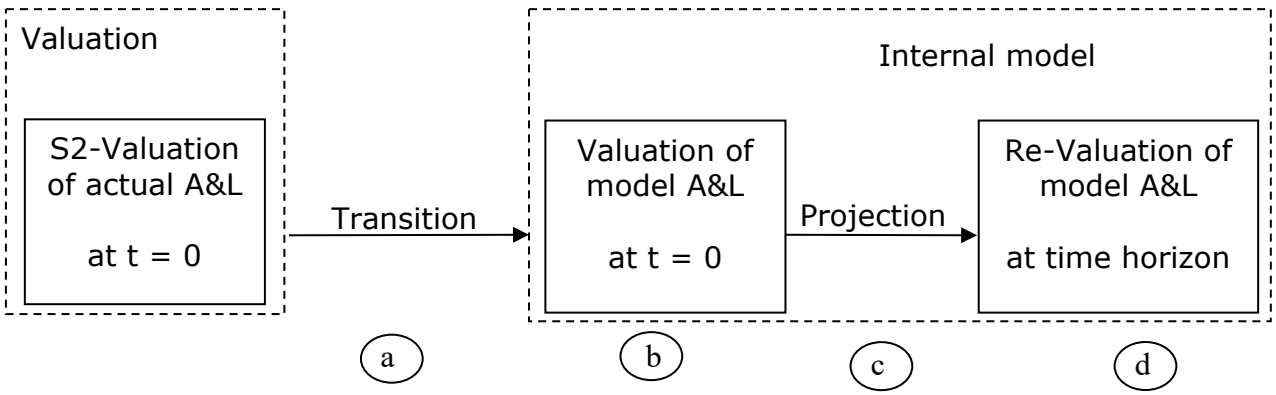
b) the consistency of the valuation of assets and liabilities in the internal model at the valuation date with the valuation of assets and liabilities in the balance sheet for solvency purposes;

c) the consistency of the projection of risk factors and their impact on the forecast monetary values with the assumptions on those risk factors used for the valuation of assets and liabilities in the balance sheet for solvency purposes; and

d) the consistency of the re-valuation of assets and liabilities at the end of the period with the valuation of assets and liabilities in the balance sheet for solvency purposes.

2.112. In principle, the calculation of the probability distribution forecast can be decomposed into an initial valuation, a projection step and a re-valuation. Depending on the risk type under consideration and the design of the internal model, some of these steps may coincide.

2.113. The consistency check points are indicated in the following illustration:



a. at the first step, the assets and liabilities contained in the balance sheet for solvency purposes may not be used directly as input for the internal model, but may be transformed into model assets and liabilities that are better suited for the projection and re-valuation steps within the internal model;

b. the initial value of the model assets and liabilities is calculated to determine the starting point of the projection;

c. the model assets and liabilities - more precisely, the underlying risk factors to which they are exposed - are projected into the future;

d. the model assets and liabilities are re-valued at the end of the time period.

2.114. The decomposition of the internal model calculation into an initial valuation, a projection and a re-valuation step can often be observed explicitly in practice or implicitly in the underlying theoretical framework of the internal model.

2.115. The assessment of consistency at step (a) (transition) and step (b) (initial valuation) ensures that the "starting point" of the projection is aligned with the values in the balance sheet for solvency purposes.

2.116. The assessment by the undertaking of consistency of the transition step needs to take into account that "consistency" is not a question of "similarity" between the valuation framework and the internal model. The calculation of the probability distribution forecast can be considerably different from the methods used for valuation in some cases, e.g. a Replicating Asset Portfolio approach may be used to project and re-value the liabilities of a Life Insurance undertaking, although a full projection is used to calculate the value of technical provisions.

2.117. At step (b), consistency can be assessed for instance by reviewing whether the techniques applied for the valuation of model assets and liabilities at the valuation date differ from the corresponding methods that were applied in the calculation of the balance sheet for solvency purposes.

2.118. Consistency at step (c) (projection) ensures that the development of the monetary values that are projected in the internal model are consistent with the calculation of corresponding monetary values within the valuation of assets and liabilities, and that the projected distribution of risk factors in the internal model is consistent with the assumptions that are applied in the valuation of the best estimate.

2.119. In most risk classes (mortality, for example), consistency typically requires a strong correspondence of parameters between valuation and internal model. For instance, the undertaking is expected to reconcile the expected value of the projected distribution of future claims reserves with the best estimate of these reserves and explain the remaining differences.

2.120. With respect to economic assumptions and market risk factors such as interest rate curves, equity returns, credit spreads, volatilities and their interdependence, the consistency assessment at step (c) takes into account that assumptions for valuation purposes typically are subject to a "risk neutral" framework and intended to reproduce observable prices, whereas the risk factors in the internal model are designed to emulate possible "real world" developments. This means that for market risk factors, parameters such as drift assumptions or volatilities can differ significantly between valuation and

internal model. Nevertheless, the valuation assumptions and the distribution of risk factors would be derived from a consistent basis, e.g. with respect to risk free interest rates or dependencies.

2.121. Consistency at step (d) (re-valuation) ensures that the re-valuation of the modelled assets and liabilities (or more generally, the calculation of projected basic own funds) at the end of the projection happens in a way that is consistent with the calculation methods used for the balance sheet for solvency purposes.

2.122. For a given internal model, some of these steps may coincide and the decomposition may not be fully applicable. The undertaking specifies the consistency check points outlined in the Guideline accordingly. For example, the valuation itself may already be based on model assets and liabilities rather than the original items, e.g. if a stochastic valuation method is applied. If the internal model uses the same model assets and liabilities, the transition step is trivial. The undertaking, if using in its internal model another representation of assets and liabilities, assesses the consistency of the transition.

Guideline 22 - Aspects of consistency

The insurance or reinsurance undertaking, when assessing consistency, should take at least the following aspects into account:

a) the consistency of the actuarial and statistical techniques applied in the valuation of assets and liabilities in the balance sheet for solvency purposes, and in the calculation of the probability distribution forecast;

b) the consistency of data and parameters that are used as input for the respective calculations; and

c) the consistency of the assumptions underlying the respective calculations, in particular assumptions on contractual options and financial guarantees, on future management actions and on expected future discretionary benefits.

Calculation Techniques

2.123. If the calculation of a certain monetary value – for instance, the future development of claims reserves in non-life – is performed differently in the valuation of assets and liabilities in the balance sheet for solvency purposes and in the calculation of the probability distribution forecast, the undertaking ensures consistency of the methods.

Data and Parameters

2.124. If the data used for valuation differs from the data used in the internal model, e.g. with respect to data aggregation, the undertaking assesses consistency of the data.

2.125. This also applies to calculation parameters.

Assumptions

2.126. The undertaking ensures that the underlying assumptions of valuation and Solvency Capital Requirement calculation by the internal model are consistent with each other, with special attention given to key assumptions.

2.127. In particular this holds for assumptions concerning:

- contractual options and financial guarantees;
- future management actions;
- expected future discretionary benefits.

Guideline 23 - Consistency assessment

The insurance or reinsurance undertaking should conduct regular consistency assessments on a quantitative basis whenever possible and proportionate.

The insurance or reinsurance undertaking, in its consistency assessment, should:

a) identify and document any deviation between the calculation of the probability distribution forecast and the valuation of assets and liabilities in the balance sheet for solvency purposes;

b) assess the impact of the deviations, both in isolation and in combination;

c) justify that the deviations do not result in an inconsistency between the calculation of the probability distribution forecast and the valuation of assets and liabilities in the balance sheet for solvency purposes.

2.128. Prescribing a defined set of consistency criteria limiting the extent of permissible methodological deviations would probably not lead to the desired goal, given the great variety in internal modelling. The undertaking reflects in its consistency assessment the specific properties of its risk profile and of the design of its internal model.

2.129. Establishing a tailored process for assessing consistency together with appropriate criteria and checking consistency on an on-going basis requires the undertaking to regularly identify any differences in the actuarial and statistical techniques used in the calculation of the probability distribution forecast and the valuation of assets and liabilities in the balance sheet for solvency purposes, respectively.

2.130. The undertaking, when developing consistency criteria, investigates all relevant methodological characteristics of the internal model. However particular attention needs to be paid by the undertaking to the key model assumptions as referred to in Article 124 of Solvency II and to the parameterisation of the model.

2.131. The undertaking particularly focuses the concept of consistency on adverse scenarios. If consistency would not be met with respect to tail events, the model would thus estimate a variation of a value that would not represent at all the variation of the balance sheet in these extreme scenarios, although this is typically the aim of the internal model.

2.132. A quantitative assessment may not always be possible for the undertaking. However, if a quantitative assessment is possible, the undertaking needs to conduct a quantitative assessment according to the principle of proportionality.

2.133. For example, the undertaking may contrast the value of the technical provisions with the average internal model outcome, i.e. the expected value of the probability distribution forecast.

2.134. It is essential that the undertaking is aware of every deviation as it may happen that the significance of a deviation changes over time.

2.135. For instance, policyholder options that were of little value and caused only negligible risk in former market conditions might have been excluded by the undertaking from the scope of the internal model and considered as "immaterial deviations". In other market conditions the risk inherent in those policyholder options may become material. Even if each individual deviation is small, the impact of a combination of deviations could result in an inconsistency and affect adversely the decision-making or the judgement of the users of that information.

Chapter 6: Probability distribution forecast

2.136. Some of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation are related to the probability distribution forecast, as defined in the Article 13(38) of Solvency II.

2.137. Internal modelling within a supervisory solvency regime generally focuses on distributions rather than risk numbers. For risk management purposes distributions represent a much more detailed and richer source of information than single numbers given that both representations are of comparable degree of reliability. Accordingly, Article 121(1) of Solvency II highlights the probability distribution forecast as the internal model output.

2.138. In accordance with Article 13(38) of Solvency II, this mathematical function is expected to display rich information about the undertaking's risk profile. This means illustratively that a rich probability distribution forecast well reflects the material features of the risk profile in the sense that, among other things, it informs about the range of possible outcomes, whether they are favourable or unfavourable, the expected outcome or the most probable outcome; it contains information especially in the tail of extreme loss events and allows the computation of certain statistical quantities.

2.139. It is expected that the undertaking allows for a methodological preference for richer probability distribution forecasts as they better enable in-depth analyses of the risk profile, permit a flexible use of risk management and risk mitigation techniques, support decision-making, facilitate the application of validation tools and may allow for a better risk aggregation and capital allocation.

2.140. Depending on limitations in the knowledge of the risk profile, in particular when relevant data and information is scarce, and/or on limitations in the capability

of available calculation methods, the richness of the resulting probability distribution forecast varies and might be comparatively lower or higher. To the extent that internal models that generate a probability distribution forecast of low richness contribute to adequate risk assessment and effective risk management and decision-making processes, supervisory authorities do not generally form a negative view on those models.

2.141. These Guidelines on probability distribution forecast apply at the highest level of the undertaking and all lower levels of aggregation taking into account the scope of the internal model. This applies by analogy to partial internal models. In the case of an internal model developed by a group, the group aims to arrive at a probability distribution forecast wherever the internal model is used at the level of individual insurance or reinsurance undertakings which are expected to be part of the group for Solvency Capital Requirement calculation or risk management purposes.

Guideline 24 - Knowledge of the risk profile

To ensure that the set of events of the probability distribution forecast underlying the internal model is exhaustive, the insurance or reinsurance undertaking should put in place processes that enable it to maintain sufficient and current knowledge of its risk profile.

In particular, the insurance or reinsurance undertaking should aim to maintain the knowledge of risk drivers and other factors which explain the behaviour of the variable underlying the probability distribution forecast, so that the probability distribution forecast can reflect all relevant characteristics of its risk profile.

2.142. For an undertaking using an internal model, the probability distribution forecast forms an important basis for both risk management and regulatory capital. Any characteristics about an undertaking's risk profile which are not reflected in the probability distribution forecast can potentially lead to wrong management decisions or inadequate regulatory capital.

2.143. A prerequisite for all relevant characteristics of the risk profile to be reflected in the probability distribution forecast is that they first have to be included in the set of events underlying the probability distribution forecast. Clearly, this is subject to proportionality and depends on the availability of relevant data and information. New relevant data and information may become available as e.g. scientific knowledge evolves. Any characteristic of the risk profile which is not included in the set of events is also not represented in the probability distribution forecast and thus may impair risk management and the calculation of the Solvency Capital Requirement.

2.144. These characteristics of the risk profile may be represented by risk factors, where risk factors may include financial market information such as interest rates, economic variables such as inflation or other underwriting risk factors, or in other ways, e.g. by the distributional characteristics of claims data sets.

2.145. In a risk-factor based internal model, the term "exhaustive" in the definition of the probability distribution forecast given in Article 13 of Solvency II refers to

the presence of risk factors, and specifically to their dependency as well as the granularity of individual risk factors. It is expected that the undertaking strives to improve both aspects of the set of events: the more information about the undertaking's risk profile is contained in the set of events, the more reliable the probability distribution forecast can be as a basis for risk management. These aspects may also increase the reliability of the Solvency Capital Requirement.

2.146. Conversely, in such a model the exhaustiveness of the set of events can be jeopardized e.g. if the modelling of individual risk factors is not sufficiently granular.

Guideline 25 - Probability distribution forecast richness

In assessing the appropriateness of the actuarial and statistical techniques used to calculate the probability distribution forecast [Article 229 of the Implementing Measures], the insurance and reinsurance undertaking should consider the capability of the techniques to process the knowledge of the risk profile as an important criterion.

The insurance or reinsurance undertaking should choose techniques that generate a probability distribution forecast that is rich enough to capture all relevant characteristics of its risk profile Article 229(e) of the Implementing Measures and to support decision-making Article 226 of the Implementing Measures.

The insurance or reinsurance undertaking, according to Article 229(g) of the Implementing Measures and as part of this methodological assessment, should consider the reliability of adverse quantiles resulting from the probability distribution forecast.

2.147. Within internal modelling in accordance to Solvency II, the probability distribution forecast, defined by a mathematical function based on an exhaustive set of events, generally results from a comprehensive calculation methodology. This function provides rich information about the undertaking's risk profile. Illustratively, one can say that the probability distribution forecast informs about the range of possible outcomes, whether they are favourable or unfavourable, as well as the expected outcome or the most probable outcome, etc. It is undisputed that a rich probability distribution forecast contains information especially in the tail of the function, i.e. for adverse quantiles. Moreover, a rich probability distribution forecast may allow the computation of certain statistical quantities.

2.148. There are two stages of the concept of probability distribution forecast richness. The first stage refers to the underlying information basis, i.e. the knowledge of the risk profile, as the starting point from which the probability distribution forecast is constructed. The second stage refers to the methodology used in the calculation of the probability distribution forecast, i.e. the chosen actuarial and statistical techniques.

2.149. In the first stage, irrespective of the calculation methodology, the underlying information basis has to be sound. As highlighted in Guideline 24, the probability distribution forecast can be reflective of all the relevant

characteristics of the undertaking's risk profile only to the degree that the corresponding event set is exhaustive. In the second stage, the calculation method must be capable to transform the information into a rich distribution forecast[10]. In the current state of internal modelling, available and widely used methods differ substantially in respect of this capability. For illustration, one example for market risk is considered. In comparison to other risk categories the information basis available in market risk is quite substantial and usually not the limiting factor, ruling out some approaches to constructing the probability distribution forecast. Here, a stress scenario approach typically results in a less rich probability distribution forecast as compared to a stochastic capital market model: a forecast that consists of a few selected points of the distribution function compares to a forecast that ranks a high number of events according to their loss potential.

2.150. It is important to stress that the concept of probability distribution forecast richness is not to be reduced to the granularity of the probability distribution forecast representation. The output may even be a continuous distribution, as obtained, for example, by a scenario approach that is complemented with a distribution assumption: in absence of a method which is powerful enough to process an exhaustive event set, a small number of selected scenarios is calculated and used to parameterize the distribution function chosen. Nevertheless, in many cases one would not qualify a distribution forecast resulting from such a methodological approach as rich without further considerations. On the contrary, one would challenge the methodology and investigate if unfounded richness was introduced by making the distribution assumption (cf. Guideline 27). While it is not always easy for the undertaking and supervisory authorities to judge a probability distribution forecast according to its richness, in some cases methodologies to calculate a probability distribution forecast exist that are more superior in terms of richness than others.

Preference for rich probability distribution forecasts

2.151. Richer probability distribution forecasts generally provide a stronger basis for the undertaking's risk management and provide better support for its decision-making processes. The undertaking, when assessing the adequacy of the methodology used in probability distribution forecast calculation, is expected to consider especially the richness of its output as an important criterion, being aware that there are other relevant criteria.

2.152. The preference for rich probability distribution forecasts can be most easily seen using an extreme example: single point probability distribution forecasts (maybe based on a stress scenario approach) as opposed to "full" probability distribution forecasts (maybe resulting from a purely stochastic simulation approach). Apart from this example, however, similar considerations do apply

[10] More precisely a distribution of monetary values that relates to the change in basic own funds. In a risk factor based model, for example, realisations of risk factors are transformed into profits or losses.

whenever the richness of a probability distribution forecast is affected due to some limitations.

2.153. First, some advantages of rich probability distribution forecasts are given, before possible negative implications of probability distribution forecasts of low richness are discussed.

2.154. A sound knowledge of the risk profile which is accurately represented by a rich probability distribution forecast

a. allows easy computation of many different risk measures:

- expected Shortfall / Tail VaR cannot be determined based on a single point in the distribution function;
- different risk measures may be needed for different stakeholders (regulators, shareholders, rating analysts, etc.);
- if only one point of the distribution function is known, risk management informed by internal model results is reduced to capital management;

b. facilitates computation of stress tests and scenario analyses;

c. enables an in-depth analysis of the risk profile, showing which risks dominate at which quantiles and which risk factors impact which parts of the distribution;

d. permits different risk management tools to be targeted at different quantiles in the probability distribution forecast.

2.155. There are various negative implications if the richness of the probability distribution forecast is low. They are presented based on the core requirement that the internal model plays an important role in the undertaking's risk management system and decision-making processes as well as its economic and solvency capital assessment and allocation processes (Use Test). Accordingly, examples in the areas of risk management, aggregation, capital allocation and model validation are given.

Risk Management

2.156. Full ranges of possible outcomes may be overlooked.

2.157. Risk limits corresponding to a single point in the distribution function can easily be circumvented by pushing risks beyond the concerned quantile. Therefore, it would be useful for persons in charge of the risk-management function as well as business and senior management to know what the risks to the left and right of that quantile are, if and why there are risks that fall beyond that quantile.

2.158. Risk mitigation techniques which impact the tail beyond certain quantile(s) are invisible and therefore disincentivised.

Aggregation

2.159. Often, it is already difficult to infer a statistically sound dependency structure for those risks which are well known. This is even more difficult when the marginal distributions provide little information.

2.160. When aggregating sub-portfolios into a total portfolio, even a single quantile of the total portfolio distribution depends on the full distribution of sub-portfolios. Distributions and aggregation method interact, and to achieve the desired quality of the result, as much as possible needs to be known about the distributions.

2.161. Additionally, if only one point of the distribution (one quantile) is known, it is possible to construct examples where the sub-additivity property does not hold just as in the case of the VaR risk measure.

Capital Allocation

2.162. An (almost) full distribution for the sub-risks is desirable for fair allocation of capital based on a complete risk profile. Any allocation method based on very few points of the distribution might lead to misallocation of capital because risks have not been accounted for in the allocation method. Conversely, a misspecification of the allocation method namely as a result of an incorrect application of enrichment techniques can result in significant bias in capital management and decision-making process.

Model validation

2.163. If only one quantile is available, the only back-testing exercise that can be carried out is whether observed changes, e.g. of basic own funds, are inside or beyond the quantile boundary. However, if the (almost) full distribution is available, such observations can be checked against the full distribution, which results in stronger basis for the application of validation tools.

Reliability of risk capital estimates

2.164. Of outstanding importance is the reliability of the probability distribution forecast in its tail. In particular, estimates of adverse quantiles used in the calculation of economic or regulatory risk capital must be highly reliable. While striving for a richer probability distribution forecast, undertakings are expected to take care not to impair the reliability of those estimates.

Guideline 26 – Assessment of the richness of the probability distribution forecast

To form a view according to Guideline 25, supervisory authorities should take into account at least:

a) the risk profile of the undertaking and to what extent it is reflected by the probability distribution forecast;

b) the current progress in actuarial science and the generally accepted market practice Article 229(a) of the Implementing Measures;

c) with respect to the level of probability distribution forecast richness, any measures that the insurance or reinsurance undertaking puts in place to ensure compliance with each of the internal model tests and standards set out in Articles 120 to 126 of Solvency II;

d) for a particular risk under consideration, the way in which the techniques chosen and the probability distribution forecast obtained by the insurance or reinsurance undertaking interact with other risks in the scope of the internal model as regards the level of richness of the probability distribution forecast Article 232 of the Implementing Measures; and

e) the nature, scale and complexity of the risk under consideration as set out in Article 29(3) of Solvency II.

2.165. The richness of the probability distribution forecast may be affected for mainly two reasons. In general, undertakings do not have full knowledge of every aspect of their risk profile. Often, relevant information or data as e.g. loss experience is scarcely available. Furthermore, there are limitations in the actuarial and statistical techniques available for calculation of the probability distribution forecast. The techniques may not be capable to process the undertaking's knowledge of the risk profile.

2.166. In the case of such limitations internal modelling may result into a comparatively low richness probability distribution forecast. If the internal model, for example, is not able to process a large number of different events, it is typically restricted to a selection of events and generates key points corresponding to some quantiles of a potential full distribution forecast. Then most often, these quantiles are exactly those required for internal and external use.

2.167. It is expected that undertakings assess the materiality of limitations in the knowledge of their risk profile and the capability of techniques chosen to calculate the probability distribution forecast. In doing so, they are expected to consider particularly the implications for the probability distribution forecast in terms of its richness (as pointed out in the explanatory text of Guideline 25).

2.168. It is an important but difficult task for supervisory authorities to assess the adequacy of the internal model according to the richness of the resulting probability distribution forecast. Is the basic knowledge of the risk profile sufficient? Is the event set processed exhaustive enough? Does the probability

distribution forecast provide information rich enough for its use in risk management and decision-making? These questions are not at all easy to answer.

2.169. Of course, the answer must be given on a case-by-case basis. However, there are limitations in modelling that are quite common to certain risk categories or insurance markets, and therefore encountered by supervisory authorities again and again in the course of their review work. This together with strong communication among supervisory authorities facilitates harmonised supervisory decision-taking.

2.170. In their assessment supervisory authorities take into account:

- current progress in actuarial science and the generally accepted market practice;
- measures taken to ensure compliance with internal model tests and standards;
- the interaction with other risks within the overall model scope; and
- the proportionality principle.

Scientific progress and market practice

2.171. A generally accepted modelling practice, provided that one has been established in the market for a particular risk category or type of business under consideration, may serve supervisory authorities as a reference. The market practice could be more or less advanced regarding to the richness of the probability distribution forecast. By contrasting these methods to those chosen by the undertaking, supervisory authorities may obtain an indication for the level of probability distribution forecast richness and the challenges faced by this undertaking. It is expected that this does not mislead the undertaking to simply adopt the market practice nor supervisory authorities to urge the undertaking to use it. It is rather expected that the market practice – the applicability given – needs some sort of adaptation to the undertaking's specific risk profile.

2.172. Awareness of the progress currently made in actuarial science is also important. This allows evaluating the undertaking's efforts to strive for a rich probability distribution forecast. Low richness probability distribution forecasts occur in areas where scientific developments have so far not resulted in methodologies which generate distributions in the very strict sense of Article 13 of Solvency II. However, many of those areas are evolving, so that in future improved methods can be expected. These methods would probably first be used in the scientific and research community and may not immediately be applicable in a business or industry context, for example because of stability or performance issues. However, over time those newly-developed methods would mature and find their way into the undertaking's production environment. Where this is the case, the undertaking making use of internal models is expected, in the absence of good reasons to the contrary, to keep pace and continually improve its internal model. Accordingly, supervisory authorities may ask the undertaking

to show how the methodology chosen would be kept up-to-date or why they have chosen such methodology against existing alternatives. This is particularly advisable if alternative methodologies exist that probably are appropriate and superior with respect to the richness of the probability distribution forecast.

Measures to comply with tests and standards

2.173. In case of limitations affecting the richness of the probability distribution forecast, the internal model may need to be subject to a more intensive model validation process by the undertaking and tighter integration into its system of governance. The undertaking using such a model is expected to make extensive use of validation tools (stress-testing, scenario analysis etc.) and puts more effort into improving the model.

2.174. In view of the possible implications, as outlined in the explanatory text to Guideline 25, the supervisory view on the adequacy of the internal model is largely determined by the effectiveness of any measures the undertaking puts in place to ensure compliance with internal model tests and standards.

Integration into the overall model scope

2.175. Supervisory authorities need to be aware that, within a modular approach, limitations in individual components of an internal model might be transferred to the internal model as a whole. Every single model component affects via aggregation the richness of the probability distribution forecast up to the topmost level of the undertaking (in line with the model scope). For this reason, supervisory authorities need to consider the different levels of aggregation in their assessment.

Proportionality Principle

2.176. The considerations described above are clearly subject to the proportionality principle set out in Article 29(3) of Solvency II.

Guideline 27 – Probability distribution forecast enrichment

The insurance or reinsurance undertaking should ensure that the effort to generate a rich probability distribution forecast does not impair the reliability of the estimate of adverse quantiles resulting from the probability distribution forecast.

The insurance or reinsurance undertaking should take care not to introduce into the probability distribution forecast unfounded richness which does not reflect the original knowledge of its risk profile (see also Guideline 24).

The insurance or reinsurance undertaking should ensure that the methodology followed to enrich the probability distribution forecast complies with the statistical quality standards regarding methods, assumptions and data Articles 229, 230 and 231 of the Implementing Measures. Where these techniques involve the use of expert judgement, the undertaking should take into account the relevant Guidelines on assumptions setting and expert judgement.

Richness vs. Reliability

2.177. According to Guideline 25, it is expected that the undertaking aims for rich probability distribution forecasts and judges the calculation methodology according to this criterion. This preference for rich probability distribution forecasts may be in conflict with the need for reliable probability distribution forecasts. For example, a methodological change could result in an increase of the probability distribution forecast richness, but possibly at the expense of its reliability. In those cases the undertaking needs to establish a reasonable balance between the reliability and the richness of the probability distribution forecast, and ensures that the outputs of the internal model do not include an undue model error or estimation error.

Enrichment

2.178. It is often necessary to enrich the probability distribution forecast. For a low richness probability distribution forecast consisting of only few points in the distribution function, for example, one might consider it beneficial to increase the number of data points, using techniques such as interpolation, extrapolation or fitting, thereby allowing for an advanced aggregation technique. Another example is to make additional assumptions in case that the tail risk is not appropriately reflected.

2.179. Enrichment heavily based on statistical or mathematical techniques with limited original information regarding to the specificity of the risk or possible outcomes needs to be appropriately challenged in order to ensure that the resulting probability distribution forecast adequately captures the risk profile.

2.180. It is expected that the undertaking avoids introducing unfounded richness into the probability distribution forecast, e.g. by adding unsubstantiated points to a single point probability distribution forecast. Moreover, enrichment must not be misused by the undertaking to establish desired properties of the probability distribution forecast. Otherwise the implication might be that the risk profile is represented incorrectly by the undertaking and the probability distribution forecast could be misleading for its use for risk management and decision-making processes.

2.181. Enrichment is part of the overall probability distribution forecast methodology, and consequently, the methodology used to enrich the output is subject to the Statistical Quality Standards too. The requirements regarding methods, assumptions and data do particularly apply. In practice, probability distribution forecast enrichment heavily relies on the use of expert judgement. Therefore, the corresponding Guidelines apply.

2.182. The undertaking is expected to make the enrichment transparent to the users of the probability distribution forecast. Especially in case that the impact is material, the undertaking needs to present to such users the enriched probability distribution forecast together with the related assumptions, enabling users to assess objectively its reliability.

Chapter 7: Calibration - approximations

2.183. One of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation is the calibration standard.

2.184. The insurance and reinsurance undertaking needs to demonstrate that it is able to derive from its internal model the value of the Solvency Capital Requirement as defined in the Article 101(3) of Solvency II, namely the Value-at-Risk of the basic own funds subject to a confidence level of 99.5% over a one-year period, which is referred as "the reference risk measure" for the sake of this Chapter. In doing so, an insurance or reinsurance undertakings is allowed by Article 122(3) of Solvency II to use approximations while ensuring that the Solvency Capital Requirement obtained provides a level of protection for policyholders which is equivalent to that set out in Article 101(3) of Solvency II.

2.185. The Guidelines on calibration-approximations aim to provide guidance on what supervisory authorities need to assess and the undertaking need to do, in order to ensure the relevance and the adequacy of the approximations used by the undertaking to derive the Solvency Capital Requirements from an internal model using another risk measure, time horizon, or underlying variable, than the reference one (see definition of the reference risk measure).

2.186. The Guidelines do not provide guidance about the adequacy of the risk measure used in the internal model.

2.187. This paper does not cover in a different way approximations arising at different levels of aggregation: there are no major differences in the process for assessing the adequacy of approximations at the topmost level of aggregation or at a lower one. Moreover, there is no need a priori to distinguish partial internal models from full internal models with respect to recalibration.

2.188. When the insurance or reinsurance undertaking has to make several approximations, the insurance or reinsurance undertaking is expected to assess whether there are any material interactions between these approximations that need to be allowed for explicitly.

General explanation

2.189. In practice, approximations to derive the reference risk measure from the probability distribution forecast may be justified in the following contexts:

1. another mathematical risk metric: e.g. Tail-Value-at-Risk instead of Value–at-Risk;
2. another confidence level: e.g. 99.95% instead of 99.5%;
3. another time period or horizon: e.g. 5 years instead of 1 year;
4. another underlying variable than basic own funds is used to determine the probability distribution forecast: e.g. IFRS equity

2.190. If relevant, all the Guidelines apply directly to the four possible practical differences quoted above. However, some of them are worth an explanation in one of the four practical contexts.

Context 1: Another mathematical risk metric

2.191. The Value-at-risk metric chosen by Solvency II is not the only risk metric known in financial institutions and academia to quantify a risk. Thus, some undertakings could use another mathematical risk metric in practice. In particular, this could be the case for branches of groups whose headquarters are located in a jurisdiction where the insurance regulatory framework imposes another mathematical risk metric.

2.192. The undertaking needs to inform the supervisory authorities about the use of a mathematical risk measure other than the reference one.

Context 2: Another confidence level

2.193. For risk management purposes, or external reasons (e.g. facilitate reporting to ratings agencies) some undertakings use different levels of confidence to derive their economic capital.

Context 3: Another time period or horizon

2.194. The undertaking may decide to use a different time horizon in their internal model than the prescribed one year.

2.195. For example the time horizon used by the undertaking could be longer than one year and could be aligned to their:

- risk appetite: Undertaking may set up their risk appetite for capital on a longer time horizon than one year for strategic reasons;
- life cycle of products: Some undertakings may look at the average term structure of their products and plan their capital requirements based on this average term especially to align with payments;
- business plan: Some undertakings may wish to align their capital requirements with their planning period, especially if smoothed earning over a long period is one of their goals and this is aligned to their dividend payments;
- management style: Some undertakings may choose a longer time horizon (for example ultimate) for capital management rather than a mark to market approach where the portfolio could be transferred to another party in the next year.

2.196. In some situations an undertaking may decide to use time horizons of less than one year:

- to align with the average terms of its products;
- it could also have a planning period shorter than a year for operational/financial reasons;

- to capture management actions which occur more frequently than annually – e.g. dynamic hedging.

Context 4: Another underlying variable

2.197. The undertaking may decide to use a different variable on which to base its probability distribution forecast than the basic own funds specified in Articles 88 of Solvency II, provided that these amounts can be used to determine the changes in basic own funds and that the undertaking is able to justify the underlying assumptions, as required in the Article 121 of Solvency II. An undertaking may typically want to do this if its own risk appetite is linked to a variable different than the basic own funds.

~~**Guideline 28 – Knowledge of approximations under extreme loss conditions**~~

~~When an undertaking uses approximations instead of using the reference risk measure directly, the insurance or reinsurance undertaking should challenge and justify the reliability of the output of these approximations over time and, under extreme loss conditions, according to its risk profile.~~

~~In particular, when the insurance or reinsurance undertaking uses analytical closed formulae to recalibrate its capital requirement from the internal risk measure to the reference one, the insurance or reinsurance undertaking should demonstrate that the assumptions underlying the formulae are realistic and are also valid under extreme losses conditions.~~

2.198. Guideline 28 is deleted because it is considered not adding value and unnecessary (type 2). The calibration guidelines only refer to the use of a risk measure deviating from the reference risk measure as e.g. defined in para 1.7. Nowadays, all undertakings use the reference risk measure. Accordingly, the calibration guidelines have long since ceased to play a role in practice.

~~**Guideline 29 – Use of another underlying variable**~~

~~The insurance or reinsurance undertaking, if it uses the variation of an underlying variable different from the basic own funds to derive the value of basic own funds for the calculation of the Solvency Capital Requirement, should demonstrate that:~~

~~a) it is able to reconcile the difference between the basic own funds and the underlying variable at t=0; and~~

~~b) it understands the difference between the basic own funds and the underlying variable in any situation up to and including t=1, especially under extreme losses conditions, according to the undertaking risk profile.~~

2.199. Guideline 29 is deleted because it is considered not adding value and unnecessary (type 2). The calibration guidelines only refer to the use of a risk measure deviating from the reference risk measure as e.g. defined in para 1.7. Nowadays, all undertakings use the reference risk measure. Accordingly, the calibration guidelines have long since ceased to play a role in practice.

~~**Guideline 30 – Management actions if using a time period longer than one year**~~

~~If the insurance or reinsurance undertaking, chooses in its internal model a time period longer than one year, the insurance or reinsurance undertaking should take into account management actions in the context of the Solvency Capital Requirement calculation, and should ensure that such management actions have effects on the balance sheet for solvency purposes between t=0 and t=1.~~

Guideline 30 is deleted because it is considered not adding value and unnecessary (type 2). The calibration guidelines only refer to the use of a risk measure deviating from the reference risk measure as e.g. defined in para 1.7. Nowadays, all undertakings use the reference risk measure. Accordingly, the calibration guidelines have long since ceased to play a role in practice.

Chapter 8: Profit and loss attribution

2.200. One of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation is the profit and loss attribution.

2.201. The Guidelines on profit and loss attribution aim to provide guidance on what supervisory authorities need to assess and the undertaking need to do, in order to ensure the relevance and the adequacy of the profit and loss attribution process.

2.202. These Guidelines provide a definition for profit and loss as the change in the economical capital resources.

Guideline 31 – Definition of profit and loss

The insurance or reinsurance undertaking should consider profit and loss as changes over the relevant period in:

a) basic own funds; or

b) other monetary amounts used in the internal model to determine changes in basic own funds, such as the actual change in economic capital resources.

To this end the profit and loss attribution should exclude movements attributable to the raising of additional own funds, the repayment or redemption of those funds and the distribution of own funds.

When it uses a variable other than the basic own funds in its internal model, the insurance or reinsurance undertaking should use this variable for the purposes of profit and loss attribution.

The undertaking should identify through the profit and loss attribution how changes in the risk drivers relate with the movement in the variable underlying the probability distribution forecast.

2.203. The undertaking ensures that the definition of profits and losses for the purpose of the attribution is consistent with the variable underlying the probability distribution forecast.

2.204. The undertaking ensures that the attribution includes all material risks, not only those that are modelled internally.

2.205. Examples of capital movements are dividend payments or public offerings.

2.206. For the purpose of profit and loss attribution, the undertaking ensures that the consistency over time of the method applied allows a useful comparison of the profit and loss attribution from one period to another.

2.207. The undertaking defines an appropriate risk categorisation that reflects its risk profile. The planned uses of the output of the internal model might influence the granularity of the internal model. Therefore the granularity of the profit and loss attribution might also differ depending on the planned application of the results of the profit and loss attribution.

2.208. The undertaking ensures that the attribution of profits and losses to risk categories is consistent with the granularity of risks modelled within the internal model, which itself is needed for decision-making and risk management in the undertaking.

2.209. The undertaking implements an appropriate process on an on-going basis with appropriate internal controls to implement relevant changes to the internal model as a result of the previous profit and loss attribution. More specifically, the undertaking properly documents the process and evaluates the design and operating effectiveness of the internal controls on an on-going basis (at least annually). It is expected that the results of the process would lead to adequate action within the undertaking.

2.210. The results of the profit and loss attribution exercise provide information that is important and relevant for the system of governance of the undertaking (including the scope of the internal model, risk management, limit setting, allocation processes).

2.211. One potential application by the undertaking is to test whether all relevant risk factors have been identified correctly and whether the functional dependencies between risk factors and the amount at which assets and liabilities could be settled have been properly specified. To this end, the undertaking could compare the observed market values of assets or liabilities with the output of the internal model when the actual realisations of the risk factors are used as an input. This application is similar to the application described above.

2.212. If actual market values deviate significantly from the internal model output, the undertaking could identify the causes. To do this, the undertaking may need to carry out a profit and loss attribution at a more granular level ("drill down"). One possible outcome could be that risk factors not yet included in the internal model by the undertaking have had a significant impact on profits and losses.

Chapter 9: Validation

2.213. One of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation is the validation standard.

2.214. The Guidelines on internal model validation aim to provide guidance on what supervisory authorities need to assess and the undertaking needs to do in order to ensure the adequacy of the validation process of the internal model.

2.215. These Guidelines cover both the validation process and the validation tools.

2.216. Fundamentally, the purpose of validation activities is to provide assurance to the administrative, management or supervisory bodies and other internal stakeholders, who base some decisions on the results of the model, that the internal model is fit for purpose and that model outputs and the Solvency Capital Requirement in particular appropriately reflect the undertaking's risk profile.

2.217. As set out in Article 116 of Solvency II, the administrative, management or supervisory body of the undertaking shall have responsibility for putting in place systems which ensure that the internal model operates properly on a continuous basis. One of these systems would be an effective validation process.

2.218. The validation of the internal model is part of the wider internal model governance requirements for the undertaking and is a regular process. As a result, the undertaking needs to ensure that the findings of the validation process are escalated to the appropriate level of management.

Guideline 32 – Validation policy and validation report

The insurance or reinsurance undertaking should establish, implement and maintain a written validation policy which specifies at least:

a) the processes and methods to validate the internal model and their purposes;

b) the frequency of regular validation for each part of the internal model and the circumstances that trigger additional validation;

c) the persons who are responsible for each validation task; and

d) the procedure to be followed in the event that the model validation process identifies problems with the reliability of the internal model and the decision-making process to address those concerns.

The insurance or reinsurance undertaking should document in a validation report the results of the validation as well as the resulting conclusions and consequences from the analysis of the validation.

The insurance or reinsurance undertaking should include in the validation a reference to the validation data sets as mentioned in Guideline 42 as well as the sign-off from the main participants in the process.

2.219. Many different types of internal models are used by undertakings to calculate the Solvency Capital Requirement. These models or the outputs of the model are used in the undertaking's business for different purposes and by different teams and individuals. This variety of internal models is supported by different processes, IT systems and software. In addition to all the possible differences in methodologies, processes and programmes, the risk profiles also vary from undertaking to undertaking.

2.220. Thus, setting out a detailed list of validation procedures are deemed to be appropriate may cause difficulties, as different procedures may be more appropriate for different undertakings, depending on the type of model, the risk profile and the corporate structure of the undertaking. In addition, setting out validation procedures that are appropriate and sufficient now may not be appropriate and sufficient in the future.

2.221. Therefore it is more appropriate for each undertaking to design their own validation policy, which sets out the way in which they validate their own internal model and why that way is appropriate.

2.222. The written policy and the written validation report may be one of the ways for the administrative, management or supervisory body to show its interest in the validation.

2.223. The undertaking includes in the validation policy not only the various validation methods to be used in the validation process, but also more information on the process, such as who is contributing to the validation tasks, what to do with the results of the validation tools, and explanation of how the validation process is done independently form model development and operation in such a way that

it provides objective challenge to the model (cf. Guideline 38). The outcomes of the validation (to be documented in a validation report) may mention the strengths and weaknesses of the model and the conditions of its applicability regarding the environment where the model operates (for instance data and external environment) as well as the usage for which the model is appropriate.

2.224. Guideline 37 of this paper considers which parties could contribute to the different tasks in the validation process. Regardless of the parties contributing to the validation tasks, the validation report could include details of the validation which has taken place. This applies wherever parts of the validation have been performed with some input from internal or external parties. When it is appropriate to do so, the persons responsible for each validation task could be identified by their position and role.

Guideline 33 – Scope and purpose of the validation process

The insurance or reinsurance undertaking, when specifying the purpose of the validation, should clearly set out the specific purpose of the validation for each part of the internal model.

The insurance or reinsurance undertaking should cover both qualitative and quantitative aspects of the internal model within the scope of the validation.

When considering the scope of the validation, in addition to considering the validation of the various parts of the internal model, the insurance or reinsurance undertaking should consider the validation in its entirety and in particular the appropriateness of the calculated probability distribution forecast to ensure that the level of regulatory capital will not be materially misstated.

2.225. The validation objectives under Solvency II are far broader and wider reaching than those typically considered previously. The validation process developed by the undertaking provides a framework to test that the qualitative and quantitative requirements of the model would be met and that the internal model would be fit for an appropriate calculation of the Solvency Capital Requirement.

2.226. In particular the validation programme or test plans set out by the undertaking, to the extent that is it not already stated in a validation policy, states which validation test would be conducted on which part or aspect of the model.

2.227. When considering validating that the various tests and standards would be met, unambiguous sets of criteria may be established by the undertaking.

2.228. The undertaking may want to consider what validation processes are in place along the different steps of the modelling process. For example, the undertaking may want to consider what validation processes are in place for:

- the inputs that are fed into the modelling process, such as data and expert judgements;
- the processes and calculation methods that are applied to the inputs themselves, such as setting parameters, making assumptions and assessing the correct application of the methodologies;

- the outputs of the model.

2.229. The undertaking may also want to consider what validation procedures would be required at the different stages of the modelling process. For example, the undertaking may want to consider what validation processes are in place during:

- the strategic planning of the model (origination);
- the design of the model;
- the implementation of the model and roll out of further enhancement;
- the on-going and regular use of the model.

2.230. The undertaking ensures that the validation is not limited to the origination and design of the model but that all stages of the modelling process are covered by the validation.

2.231. The undertaking may want to consider at what level of granularity the validation takes place. The level of granularity used needs to be sufficient to provide the undertaking with enough comfort that the model is appropriate for the purpose for which the model is being used.

2.232. If the validation tools are providing results that are not explainable by the undertaking, it may be an indication that more detailed validation is required.

2.233. Validation policies may differentiate between several areas of validation. For each area the validation policy may state:

- the topics that are covered by the specific type of validation (e.g. methodology and assumptions, data quality, expert judgement);
- the type of activities performed (e.g. desk research, interviews, tests) and volume of validation activities that is performed;
- the expected outcome of the validation: some criteria or threshold to specify when the result of the validation is a "passed" and when it is a "failed".

2.234. If an undertaking decides to deviate from the policy, it is expected that the validation report clearly states what the rational and the nature of the deviation is. The undertaking would need to also secure that items that were not covered by a particular validation activity, would be covered elsewhere or at another appropriate time.

2.235. Validation is not restricted to the quantitative aspects of the model, such as the data, methodology, assumptions and results' appropriateness. Qualitative aspects of the model need to be considered as well. The whole quantitative and qualitative aspects of the model to be validated would include at least the following areas: data, methods, assumptions, expert judgement, documentation, systems/IT (to the extent that it can materially impact the output of the internal model), model governance and use test. This is not an exhaustive list. For example, a challenge by means of quantitative evidence is warranted in the case of expert judgement, and particularly the relevant

(quantitative) information could form the basis to weigh alternative judgements, and contribute to the validation of the modelling choice.

2.236. The validation of qualitative aspects of the model, such as the model governance and the use test, may, for instance, relate to the steps taken by the undertaking to gain confidence that the qualitative aspects of the model are appropriate. For example, how has the undertaking gained confidence that they are meeting the use test, and how has the undertaking gained confidence that they have the appropriate governance systems in place? In addition, the validation may also include how the uses of the model and the governance in place satisfy the requirements.

2.237. In considering the validation in its entirety, the undertaking may understand limits of the validation process which may not be directly observable if all the validation components are considered in isolation. As an example, a number of components which are considered by the undertaking to be immaterial could have a material impact in combination. In this case if all of these immaterial components are not validated appropriately, then it may not be possible for the undertaking to get enough comfort from the model.

2.238. Consideration is to be given that the validation process aims particularly at building comfort in the appropriateness of the probability distribution forecast.

Guideline 34 – Materiality in validation

The insurance or reinsurance undertaking should consider the materiality of the part of the internal model being validated when using materiality to decide on the intensity of the validation activities.

The insurance or reinsurance undertaking should consider the materiality of the parts of the internal model not only in isolation but also in combination when deciding how they should be validated appropriately.

The insurance or reinsurance undertaking should consider sensitivity testing when determining materiality in the context of validation.

2.239. The insurance or reinsurance undertaking takes a proportionate approach to the validation process, as it may not be feasible to apply all validation tools to all parts of the model at the most granular level.

2.240. For qualitative parts of the model, sensitivity tests may not always be possible. In this case, an indication of the materiality of the model component may be gained by considering the impact on the overall robustness and credibility of the model if that component were not in place.

2.241. When setting the validation process attention is given to the various components that form part of the internal model. The components cover the different structural elements of the internal model – such as modules - as well as the risks impacting or underlying the risk profile – down to the appropriate level of granularity – and also the qualitative aspects of the internal model – such as governance and compliance with the test and standards.

2.242. It is important that validation has the appropriate focus on the components of the internal model that are most material.

Guideline 35 – Quality of the validation process

The insurance or reinsurance undertaking should set out all the known limitations of the current validation process.

Where there are limitations to the validation of parts which are covered by the validation process, the insurance or reinsurance undertaking should be aware of them and document these limitations.

The insurance or reinsurance undertaking should ensure that the assessment of the quality of the validation process explicitly states the circumstances under which the validation is ineffective.

2.243. The undertaking sets out all the known limitations of the current validation process.

2.244. More specifically, if there are components of the internal model framework which are not covered by the validation with a high level of accuracy due to their lack of materiality, the undertaking also explicitly states and justifies this.

2.245. It is expected that he validation controls and monitoring process ensure that the undertaking is satisfied that its validation approach, governance and scope is met in full. The control & monitoring process for validation is based on the same fundamental principles as that of the risk management process (identify/Measure/Control/Report).

2.246. In addition, where there are limitations to the validation of components which are covered by the validation process, the undertaking is aware of and documents these limitations.

2.247. The undertaking sets out its planned developments of its validation process if applicable.

Guideline 36 – Governance of validation process

The insurance or reinsurance undertaking should have in place appropriate governance around the communication and internal reporting of the results of the validation it carries out.

The insurance or reinsurance undertaking should form and communicate internally an overall opinion based on the findings of the validation process.

The insurance or reinsurance undertaking should pre-define criteria in order to determine whether the results, or part of the results, of the validation, are required to be escalated within this undertaking.

The insurance or reinsurance undertaking should clearly define the escalation path in such a way that the validation process remains independent from the development and operation of the internal model.

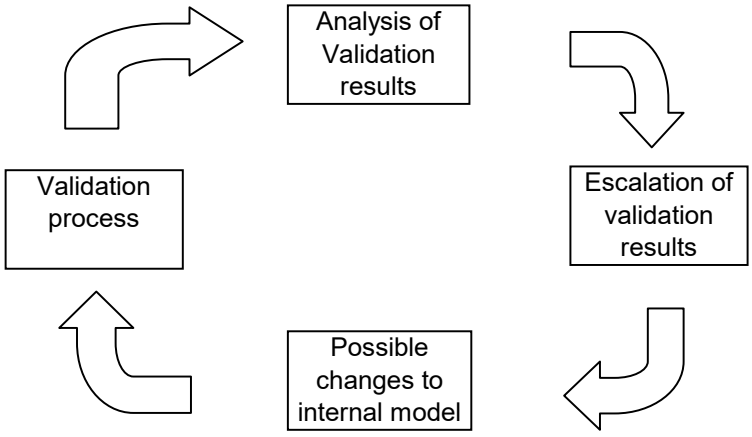
2.248. The governance of the internal model is not to be confused with the overall governance requirements of Solvency II, set out in Articles 40 to 49 of

Solvency II. The governance requirements set out in Articles 40 – 49 apply to all undertakings subject to Solvency II regardless of whether or not they would use an internal model to calculate the Solvency Capital Requirement. The governance referred to in this guidance paper only refers to the governance of the validation of the internal model.

2.249. The validation process of the undertaking includes the use of various validation tools. Once these validation tools are run, the results of the validation tools are analysed by the undertaking. This includes a qualitative analysis of the outputs of the quantitative validation tools.

2.250. An overall opinion presents the final result of a validation and is based on the underlying findings. The methodology to arrive at an overall opinion is not a mere mathematical exercise. The meaning of an overall opinion is clearly defined in terms of Solvency II compliance and of usability of the internal model.

2.251. The validation process is also linked to the wider internal model governance requirements, as the results of the analysis need to be escalated to the appropriate level of management within the undertaking. The undertaking then uses this information to determine any changes that may be required to the internal model. A simplified diagram of this validation process is included below:



2.252. This process is also linked to the principle of the use test requesting the undertaking to use the internal model in its risk-management system and decision-making processes in a way that creates incentives to improve the quality of the internal model itself. The validation process described above provides the opportunity for the undertaking to constantly monitor and improve the model, which may be required as a result from the pressure to improve the quality of the internal model.

Guideline 37 – Roles in validation process

If parties other than the risk-management function contribute to specific tasks in the validation process, the insurance or reinsurance undertaking should ensure that the risk-management function fulfils its overall responsibility as set out in Article 44 of Solvency II and Article 269(2)(a) of the Implementing Measures, including the responsibility to ensure the completion of the various tasks within the validation process.

The insurance or reinsurance undertaking should formally explain the role of each party in the validation process defined.

2.253. Due to the wide scope of the nature of the validation process, different areas within an undertaking could contribute to complete the validation tasks within the validation process. Thus, it is possible that many different parties are involved in the overall validation process.

2.254. The role of each party in the validation process is formally defined by the undertaking. The text below describes how different parties within the undertaking could contribute to the validation process.

Risk-management function

2.255. Article 44(5) of Solvency II sets out that the risk-management function shall cover testing and validating of the internal model. Thus it is the task of the risk-management function to ensure that all the necessary processes are in place to ensure that the tasks set out for the validation policy are met.

2.256. Due to the wide scope of the internal model, it may be more effective and efficient in some cases for other parties to contribute to some of the tasks required in the validation process. This can be allowed, as long as the risk-management function remains responsible for the completion of the various tasks.

2.257. Other parties may contribute to certain parts of the validation process, as long as there are clear lines of reporting and the risk-management function is responsible for putting the validation process in place and ensuring its completion.

Administrative, management or supervisory body (through the feedback loop)

2.258. Although there is no direct requirement in the Solvency II Framework, the administrative, management or supervisory body (AMSB) to be involved in the overall validation, the AMSB plays a role in providing for a risk-management function as required per Article 44(4) of Solvency II. The risk-management function needs to be granted with necessary power and resources to perform, as part of its duties set out in Article 44(5) of Solvency II, the validation of the internal model and to report on the analysis of the performance of the internal model. It is expected that the results of the validation process would be

covered in the report on the performance of the internal model, and that this report would be communicated to senior management and the AMSB.

2.259. The conditions under which results of the validation process are escalated to the senior management and AMSB are covered in the clear escalation path discussed in the previous Guideline.

Other parties

2.260. The following parties are examples of other parties that may contribute to the validation process:

Actuarial Function

2.261. Parts of the validation tasks include collecting and analysing information, for example providing an analysis of the actual against expected experience. It may be that there are systems in place within the actuarial function which have already been set up to collect this information. In this case it may be sensible for the actuarial function to be involved in contributing to some of the tasks in the validation process in order for the undertaking to streamline processes and to facilitate an efficient allocation of tasks.

Internal Audit

2.262. Internal audit may contribute to the assessment of the quality of the validation process and those activities may be used to support the validation by the risk-management function. As an example, internal audit may be involved in validating whether some of the processes required to meet the use test have been complied with or in validating the independence of the validation.

Internal control

2.263. Some of the tasks performed by the internal compliance function may be well co-ordinated with the tasks required to be performed for some of the validation tasks. Thus it may be efficient to leverage off some of the work done by the internal compliance function to complete some of the tasks required in the validation in particular regarding the suitability of processes and procedures.

External

2.264. The validation process may also include tasks performed by external providers, although having any of the tasks performed by external parties does not relax any of the other requirements set out for validation.

2.265. In accordance with the provisions from Article 44(5) of Solvency II, the risk-management function fulfils responsibility for the validation and to ensure the independence and expertise of external resources. For instance it is good practice for the risk-management function in charge of the model validation:

- to stay in close touch with the external party and to consider and perform any appropriate follow-up;
- to assess that the activities performed by the external party is free from restrictions and limitations that might influence the outcome;

- to assess that a realistic budget and timeframe are available for the services to be performed;
- to assess that the external party and the person who performs the validation activities do not have undue conflict of interest.

2.266. It is not required that all the above parties are involved in completing validation tasks. Also the above list is not exhaustive, and other parties may contribute to the validation process.

Guideline 38 – Independence of the validation process

The insurance or reinsurance undertaking should demonstrate that its risk-management function, in order to provide an objective challenge to the internal model, ensures that the validation process is done independently from the development and operation of the model. The risk management function of the undertaking should ensure that the validation tasks are set out and completed in a way that creates and maintains the independence of the validation process as set out in Article 241(2) of the Implementing Measures.

The insurance or reinsurance undertaking should decide on the parties which contribute to the tasks related to the validation process, taking into account the nature, scale and complexity of the risks that this undertaking faces, the function and the skills of people to be involved and how it ensures the independence of the validation process.

2.267. The lack of objective challenge by the undertaking in the validation process would result in a low amount of credibility that can be placed on the validation results.

2.268. It is a requirement of Solvency II that the risk-management function of the undertaking is tasked with both the design and implementation of the internal model as well as the testing and validation of the model. The fact that the risk-management function is responsible for both tasks does not mean that it is impossible to create and maintain independence, as:

- the validation process is owned by the risk-management function, but other parties could contribute to them;
- a degree of independence can also be maintained by separating out tasks by different employees within the risk-management function.

2.269. The validation process of the undertaking can leverage on some activities performed or supported by people involved in the development (by running some tests and calculations for instance), but cannot rely entirely on this work. It is expected that the undertaking ensures that the tasks are set independently and that at least the most material tests, calculations and analysis are performed by people not involved in the development of the model.

2.270. When leveraging on activities performed or supported by development, the people or team in charge of the internal model validation within the undertaking may consider:

- before the start of the validation, drafting a concise test plan including the minimum validation tests required to acquire sufficient comfort, in accordance with the validation policy;
- verifying that:
  - the people or team in charge of the model development performed the necessary tests (according to the test plan) in an adequate manner;
  - the tests can be reproduced;
  - the people or team in charge of the model development has substantiated possible deviations of the test plan in an adequate manner.

2.271. In any case, the people or team in charge of the model validation would be expected to form its own independent opinion.

2.272. The undertaking also considers how independence is maintained over time. As an example, if model changes are implemented in response to an independent review, the review of the change by the same reviewer in future validation cycles may result in a decrease in independence over time. A proportionate approach to maintaining independence over time would need to be taken by the undertaking to ensure that it is manageable.

2.273. In order to build an objective challenge, the undertaking may create opportunity for an internal challenge by knowledgeable staff and senior management. This challenge can for instance takes place between group staff and business units or between risk management and business people. To create the opportunity for this internal challenge, transfer of knowledge prior to the acceptance of the model is to be considered.

2.274. The principle of proportionality needs to be taken into account, especially in the case of undertakings with limited resources; taking into consideration the objective of the independence of the validation process to create an effective challenge. In this spirit, ensuring independence through separated reporting lines can be a means to that end. The right balance is to be struck between any potential conflict of interest that might arise in the course of the validation of the internal model on the one hand and a disproportionate level of segregation of duties on the other hand.

Guideline 39 – Validation specificities for group internal models under Article 231 of Solvency II

The participating undertaking and the related undertakings included in the application to use the group internal model under Article 231 of Solvency II for the calculation of their Solvency Capital Requirement, should establish a single validation policy to cover the validation process both at group and individual level.

The participating undertaking and the related undertakings should design the validation process of the internal model in the context of the calculation of both the consolidated group Solvency Capital Requirement and the Solvency Capital Requirement of related undertakings included in the application to use a group internal model. The participating undertaking and the related undertakings should explicitly set out this consideration in the validation policy established for the group internal model.

2.275. It may be possible for the undertaking to streamline the validation process, as some of the tasks performed to validate the components of the model used to calculate the group Solvency Capital Requirement are similar to the tasks performed to validate the components used to calculate the solo Solvency Capital Requirement.

2.276. The model may be using the same component in the calculation of both the group and some individual related undertakings. Some tasks performed to validate a component of the internal model in the context of the group Solvency Capital Requirement may provide comfort that the solo Solvency Capital Requirement is appropriate as well, while some tasks may only provide validation at the group level. In the latter case, some validation tasks need to be considered in the context of the solo Solvency Capital Requirement.

2.277. Particularly, it may be that validation tasks performed at the group level may be insufficient in the context of the solo Solvency Capital Requirement to provide the same quality of validation. Examples of this could include the following:

- there are different levels of materiality at group and at solo level. A component that is immaterial in the context of the group Solvency Capital Requirement may be very material in the context of the solo Solvency Capital Requirement;
- validation which is done at group level for a component may include analysis of the performance of the model against actual experience, where the actual experience was taken from aggregated data across the group. It may be in this case that the same test completed only for the scope of the solo business may result in different validation results.

2.278. Note that the examples above are only two examples of how validation performed at group level may not be appropriate in the context of the solo Solvency Capital Requirement, and is not an exhaustive list.

2.279. The undertaking explicitly considers, in the validation policy for the group internal model, how the validation is appropriate in the context of both the group and the solo Solvency Capital Requirement.

2.280. The risk-management function of the solo undertaking, given its understanding of the solo risk profile and how the model reflects this risk profile, may want to be involved in setting up the validation policy of the group internal model, to ensure that the validation provides appropriate comfort that the model is appropriate in the context of the solo Solvency Capital Requirement.

Guideline 40 – Application of validation tools

The insurance or reinsurance undertaking should consider using quantitative or qualitative validation tools besides those referred to in Article 242 of the Implementing Measures.

The insurance or reinsurance undertaking should understand the validation tools it uses and choose the appropriate set of validation tools in order to ensure an effective validation process. The insurance or reinsurance undertaking should consider at least the following characteristics when selecting the validation tools:

a) characteristics and limitations of the validation tools;

b) nature: validation tools being qualitative, quantitative or a combination of both;

c) knowledge required: the extent of knowledge required by the persons performing the validation;

d) information required: potential restrictions to the amount or the type of information available for external versus internal validation; and

e) cycle of validation: validation tools relevant to cover every key assumption made at different stages of the internal model from development, to implementation and to operation.

The insurance or reinsurance undertaking should document in the validation report which parts of the internal model are being validated by each of the validation tools used and why these validation tools are appropriate for the particular purpose by describing at least:

a) the materiality of the part of the model being validated;

b) the level at which the tool is applied from individual risks, modelling blocks, portfolio, business unit to aggregated results;

c) the purpose of this validation task; and

d) the expected outcome from the validation.

2.281. Undertakings, when using the validation tools, may want to:

- identify clearly what are the validation performed and communicate it to the administrative, management or supervisory body and the supervisory authorities;

- have performed a self-certification of the validation taking into consideration the limitations of the tools;
- have robust processes in place to ensure that the validation was actually performed;
- ensure that the tools and methods applied provide the comfort that the internal model is appropriate as set out in the validation policy.

2.282. A schematic of the model and role of validation tools may be a useful way to provide a clear and compact illustration of which components or aspects of the model are validated by the different tools used. This may help to ensure a robust process and be useful as a communication tool with the supervisory authority to review and assess the validation of the internal model.

2.283. The tools and methods used when approaching different aspects of the internal model are selected taking into account the aspect of the internal model to be validated. It is important to understand and be able to explain the main purpose of using any particular tool. Some tools and methods, for example mathematical analysis, would be more appropriate to validate the model structure (conceptual model validation). Some tools and methods, for example walk-through processes and calculation using fixed values for some variables in order to check the model results against easily calculated values, would be more appropriate to validate the computer programming and implementation aspect of the internal model (model verification). Some tools and methods, for example validation against experience, would be more appropriate to validate the accuracy of the model related to its intention (operational validity).

2.284. Where either a bottom-up (testing the sub-models first then the overall model) or top-down (testing the overall model first then the sub-model) approach is adopted, particular attention is given to the validation of aggregation inside the internal model where it is appropriate for both the causal relationships as well as statistical dependencies.

2.285. Specific tools involve specific limitations. For instance some quantitative techniques may be sensitive to sampling error; therefore it would be appropriate to run the tool using several different samples of data or to apply appropriate criteria in the selection of data used during the validation. The reliability of other tests or tools may be limited by the scarcity of data.

2.286. The undertaking takes into consideration the specific limitations of the validation tools used when applying and drawing conclusions from the validation process.

2.287. The purpose of a validation task drives the selection of the tool in light of the expected outcome. Different validation tasks would aim at different purposes such as for example: validating the accuracy of parameters. Before performing the validation tasks, the undertaking may set criteria to classify the outcomes of the tasks, for instance a confidence interval can be pre-set that establishes whether the outcome of a statistical test is either pass or fail.

2.288. Validation tools may be developed by the undertaking, which may be more effective or more appropriate than tools currently available. Sometimes an undertaking may decide to check the output of a particular validation tool against a validation that has been done before and in which the undertaking has better understanding.

2.289. A universe of tools that would contribute to the validation process includes:

- statistical tests;
- alternative models or modelling techniques;
- simplified models;
- qualitative tools.

2.290. It is up to the undertakings themselves to set how they use those validation tools within their validation process.

Testing the results of the model against experience

2.291. The testing of results of the internal model against experience is used to assess the discrepancies between forecasts made by the model and actual realisations. Where actual realisations may not be directly available, the model forecasts may be compared to realisations made on the base of a comparable data set.

2.292. Undertakings need to justify why the chosen comparable data set is appropriate. The reliability of the test depends on the selection of data used and specific attention to the data selection would increase the benefit undertakings and supervisory authorities may expect from the test.

2.293. This test against experience is referred to as "back-testing" and can be used by undertakings to find various kinds of errors. One objective of the analysis can be to determine whether differences come from omission of material risk factors from the model, whether they arise from errors from other aspects of the model specification such as the dependency structure including the assumptions of linearity, or whether the errors are purely random and thus consistent with acceptable performance of the model.

2.294. One way to use back testing is to statistically test the hypothesis that the observed frequency of exceptions equals the expected frequency. Of course this is subject to the amount of data reasonably available.

2.295. In addition to back-testing of the outputs, undertakings may perform additional tests such as fixing the outputs of the model and comparing actual experience conditions against the inputs to determine the quality of the parameter estimation, or overall goodness of fit tests to investigate the shape and stability of the distribution (please refer to the relevant Guideline in the Chapter on expert judgement).

Sensitivity testing

2.296. Another prescribed test in Article 124 of the Solvency II is sensitivity testing which aims at challenging the internal modelling by testing the sensitivity of the results to changes in key underlying assumptions. For instance out of sample testing, where relevant, may provide comfort that the results of the model are not dependent on particular sample used to set the assumptions.

2.297. The analysis may be performed by introducing small changes to the assumptions such as to the parameters, but also to some more structural aspects of the model like mathematical methods or statistical distributions. For instance, to test the sensitivity of the results to the choice of a particular statistical distribution selected, the undertaking may use a range of alternative distributions at risks or lines of business level and measure and analyse the impact on the results.

2.298. Sensitivity testing can also be used in validating parts of the internal model which place reliance on expert judgement, for example, where expert judgement is used to assist in determining the dependencies between risks.

2.299. Sensitivity tests may also examine the effect of making changes in a number of parameters or assumptions at the same time in order to validate the model for unexpected interactions, particularly if interactions between different variables are complex and material.

2.300. Testing the sensitivity of the internal model may also be useful to identify cases where a small difference in the input leads to significant changes in the output. In those cases, and where such behaviour can be justified, particular attention is given to the modelling of the cause-effect-relation.

Stability testing

2.301. Stability testing may be used to get comfort that the results produced by the internal model are reproducible, and that the same inputs lead to results which are similar. This is particularly relevant when using stochastic simulations, and can be used, for example, to validate that the number of iterations or simulations is sufficient to provide stable results, particularly in light of the calculation of the Solvency Capital Requirement, and regardless of the seed of the random number generator.

Stress tests and Scenario Analysis

2.302. Please see the following Guideline.

Reverse stress tests

2.303. In reverse stress tests the undertaking identifies the modelled stress and scenarios that could threaten its viability. This test induces the undertaking to consider scenario beyond normal business settings and leads to single out interaction between risks. In a group context, specific events including

contagion and systemic factors may prove useful in validating the internal model at group level.

2.304. In addition to its function as validation tool reverse stress tests may be used to set risk management actions to mitigate the impact on the undertaking's viability of the unidentified events and scenarios.

Profit and loss attribution

2.305. The results of the profit and loss attribution can also provide useful information for the purposes of validation.

Additional validation tools

2.306. Some other tools may be used in the validation such as but not limited to:

Benchmarking

2.307. For instance benchmarking against alternative approach(es) or technique(s) of specific components of the internal model. When observing and analysing the differences produced by the alternatives approaches or techniques consideration is given to the appropriateness of the approaches and techniques to the risk profile. A particular weakness of this approach, that needs to be considered when using this tool, is the risk that it may incentivise herding behaviour that may result in creating systemic risk.

Analysis of change

2.308. Analysis of change from one period or run of the model to the next may provide comfort that changes in results are clearly understood and their causes identified.

Hypothetical portfolio

2.309. Hypothetical portfolio of assets and/or liabilities can be used to validate the model by estimating the risk profile underlying the portfolio. This technique can be used to validate changes in the internal model.

Simplified models

2.310. Simplified models may prove to be valuable tools, for instance in comparing the results from the internal model with results obtained from a more simple and easy to understand approach. Simplified methods or approaches may contribute to providing comfort regarding the output produced by the internal model. This tool may also be valuable for analysing the impact of assumptions.

Manual tracking of some internal model calculation

2.311. To reproduce the calculation steps of the internal model may be useful to validate a proper implementation of the internal model or the proper integration of different parts or components of the internal model.

Peer review

2.312. Peer review can be used as a validation tool assuming the process brings an effective challenge. This tool may be particularly relevant in validating expert judgement when the independence between the original expert judgement and the peer review is achieved.

Tool Selection

2.313. Having a well-defined process for choosing the appropriate tools allows the knowledge about the tools to feedback through the validation cycle and ensures that tools are chosen consistently and appropriately.

2.314. The undertaking ensures, when choosing validation tools, that the complexity of the tools fits the purpose of the validation. Objective statistical methods may provide a more effective process of validation, particularly for the outputs for the model, but may have limitations in validating expert judgements. Nevertheless, when validating expert judgement, the challenge needs also to consider relevant data and numerical evidence. Some risk models can be more complicated than others with complex features and may require more advanced set of tools.

2.315. A simplified technique such as an easy-to-process proxy model may contribute to the validation of the model for a specific range of circumstances, but a more sophisticated method may be necessary to validate the performance of the model under other circumstances.

2.316. The validation process may also be applied to simplified configurations of the internal model. For instance validation may be applied to the model while turning off some of the features of the internal model like future management actions and/or risk mitigations techniques. Those features or layers of complexity can then be turned on successively (or through the capture of intermediate results), in order to validate the impact of those features on the internal model results.

2.317. Tools can be classified as qualitative, e.g. interviews and expert judgement and quantitative, e.g. back-testing. It is important to bear in mind that such qualitative tools are not solely for qualitative aspects of the models. Sometimes when applying quantitative methods, a qualitative tool such as expert judgement may be needed to provide a complementing critical view and evaluation of the results.

2.318. The undertaking may consider some tools particularly relevant for specific aspects of the model, for instance sensitivity testing may be particularly useful at the level of a single output or at the level of a particular risk, while scenario analysis may be particularly useful at the aggregated level for example to analyse and contribute to validate the dependencies between risks, business entities or solo undertakings at the group level.

2.319. Validation is not a purely mechanical exercise and when designing a validation process or deciding on a tool, one has to take into consideration the purpose of the model and potential use and its overall control environment. Whether designing questionnaires for qualitative assessment or developing back-testing

tools, one needs to take into account such information. Furthermore, validation performed by third party may lack this insight and the tools need to be designed to account for this.

2.320. The internal model follows a cycle from the design stage to the implementation and embedding stage. The validation process follows this cycle and takes into consideration that some validation tools may be more appropriate for some stages in the model life cycle (design, development, implementation and operation).

Guideline 41 – Stress tests and scenario analysis

The insurance or reinsurance undertaking should use stress tests and scenario analysis as part of the validation of the internal model.

The insurance or reinsurance undertaking should ensure that the stress tests and scenario analysis it uses cover the relevant risks and are monitored over time.

Stress tests and Scenario Analysis

2.321. Stress tests and scenario analysis are particularly useful to give insight into the tail of the loss distribution and in providing information relating to the dependencies between risks and capturing non-linearity. Stress or scenario testing as reverse testing may prove very useful in the process to internally challenge the model, and may provide useful opportunities for the senior management to develop their understanding on the model as well as to get comfort on its performance.

2.322. Stress test typically aims to assess the impact of a single event while scenario analysis aims to assess the impact of a combination of events. For a full stochastic model, the stress conditions/scenario may be represented by some of the simulated paths.

2.323. As a validation tool stress test and scenario analysis provides information about what the results may look like under various conditions including but not limited to exceptional but plausible large-loss events. It may also identify possible limitations of the model.

2.324. Scenario analysis may be particularly useful to validate the relations and dependencies between risks and variables under stress conditions. When reviewing this aspect, the undertaking pays particular attention in validating that tail and non-linear dependencies are appropriately captured.

2.325. By analysing the impact of stress events or scenarios, the undertaking may get insight into the features of the internal model such as tail of the loss distribution, and dependencies between risks including non-linearity. This type of validation may increase user's confidence that the internal model reflects appropriately the undertaking's risk profile.

2.326. Stress test and scenario analysis would be individually set out by the undertaking or group based on their own experience and their risk profile. The

stress event or scenario may be derived using historical scenarios, deterministic or stochastically generated scenarios.

2.327. In addition to its function as validation tool, stress test and scenario analysis may provide the undertaking with some insight regarding its risk profile, and may prove useful in risk management and decision-making.

Guideline 42 – Validation data sets

The insurance or reinsurance undertaking should ensure that the selected data and expert judgement used in the validation process effectively allow it to validate the internal model under a wide range of circumstances that have occurred in the past or could potentially occur in the future.

2.328. Data used by the undertaking in the validation of the internal model is a key factor for the success and the appropriateness of the validation process. The data sets used for testing individual components of the model may be different from the data sets used for testing the overall model. Furthermore, validating the model on a particular dataset may miss important limitations of the model, the attention given to the selection of the dataset or expert judgements to be used during the validation could mitigate this risk.

2.329. Deciding and generating the relevant datasets for validation need to be consistent across purposes. For example, where a validation cycle identified the need for changing the model, the data to check changes in the model need to be consistent to the datasets used in the original validation. Nevertheless different datasets might be used if this is appropriate and adequately explained.

2.330. Testing the model based on data, which are independent from the data used to calibrate the model can also remove any bias in the validation and gives a fairer view of the validity of the model.

2.331. Expert judgement is used in many aspects of the models. For instance there may be cases where the data-based validation alone does not allow covering sufficiently wide range of circumstances considering the calibration target of the Solvency Capital Requirement. In these cases appropriate validation tools (e.g. benchmarking to other models and statistical distributions or stress testing) can be used to supplement the information available in the data. There are also instances in validation where expert judgement is used, for example in the choice of the validation tool or in interpreting the results of the validation. In this regard, undertakings may refer to the relevant requirements for the use of expert judgement set out in the corresponding Guidelines.

Chapter 10: Documentation

2.332. One of the requirements that an insurance or reinsurance undertaking needs to fulfil in order to use an internal model for the Solvency Capital Requirement calculation is the documentation standard.

2.333. The documentation of an internal model is primarily a tool for the insurance and reinsurance undertaking but is also a tool for supervisory authorities in their

assessment of an internal model. The purpose of the documentation is not solely to support the internal model during the assessment by national supervisory authorities but is primarily to support the undertaking in its use of the model.

2.334. The Guidelines on internal model documentation aim to provide guidance on what the undertaking needs to do, in order to ensure that the internal model documentation requirements are complied with.

2.335. The documentation produced by the undertaking which is relevant for the supervisory authority's assessment of the internal model is likely to encompass more than the documentation required in the EIOPA Implementing Technical Standard on Internal Models Approval Processes and the minimum documentation in Article 244 of the Implementing Measures, including all the evidence that the tests and standards are met (where applicable).

2.336. Supervisory authorities are only able to give model approval if they are satisfied that the undertaking has provided all the required documentary evidence with their application and it meets the requirements of Articles 101, 112 and 120 to 126 of Solvency II. In order to gain this satisfaction, supervisory authorities assess the application specified in the referred EIOPA Implementing Technical Standard as well as the internal model documentation described in [Articles 243 to 246 of the Implementing Measures]. Additionally, supervisory authorities may need to refer to additional pieces of evidence to gain satisfaction that the undertaking meets all of the requirements.

2.337. For example, if an undertaking wanted to demonstrate compliance with Article 225 of the Implementing Measures (understanding of the internal model), it might be able to provide as evidence a training presentation describing the main features of the model which the members of the administrative, management or supervisory body have received. This material would not be expected to be included in the application. A more natural way to present the evidence would be for the undertaking to discuss its compliance with this requirement as part of the self-assessment required by Article 2 of the EIOPA Implementing Technical Standard on internal models approval processes and there make an explicit reference to this evidence and indicate that it is available for review. Supervisory authorities might then wish to request this evidence (as permitted by Article 4 of EIOPA Implementing Technical Standard on internal models approval processes) to obtain further understanding of the extent to which the undertaking complies with this requirement.

2.338. This example above illustrates some important considerations:

- Some of the materials required by Article 2 of the EIOPA Implementing Technical Standard on Internal Models Approval Processes are not part of the internal model documentation.
- During the assessment of the application supervisors are likely to require additional evidence as they seek to satisfy themselves that the undertaking has met all of the requirements. It is expected that this evidence is both in

written form (e.g. the training materials in the example) or otherwise (e.g. interviews, processes, systems etc.).

2.339. By the same principle, not all of the documentation of the internal model pursuant to Article 125 of Solvency II needs to be included in the application. The minimum contents of the application are those specified in Article 2 of the EIOPA Implementing Technical Standard on Internal Models Approval Processes.

2.340. Article 4 of the EIOPA Implementing Technical Standard on Internal models Approval Processes provides for supervisory authorities requesting additional information beyond that referred to in Article 2 of this EIOPA Implementing Technical Standard and Article 125 of Solvency II if it is necessary for the assessment of the application.

2.341. A number of ancillary documents may be necessary for the assessment of the internal model – for example, results of simulation runs, board minutes evidencing the Use Test, training material, validation results and output. It is not practicable to include all this documentation in a single documentation package, a practical approach could be to submit a documentation directory or similar. A specific reference could then be provided, for example, in the self-assessment described in Article 2 of the EIOPA Implementing Technical Standard on Internal Models Approval Processes where the undertaking may want to refer to supporting evidence.

Guideline 43 - Control procedures of documentation

In order to ensure the on-going quality of the documentation according to Article 243(3) of the Implementing Measures, the insurance or reinsurance undertaking should have in place at least:

a) an effective control procedure for internal model documentation;
b) a version control procedures for internal model documentation; and
c) a clear referencing system for internal model documentation which should be used in a documentation inventory required by Article 244(a) of the Implementing Measures.

2.342. The documentation does not have to be one single document or a set of documents nor does it need to be in paper form.

2.343. A clear reference system ensures that the undertaking's document references are precise.

2.344. In particular, an effective control procedure ensures that the internal model documentation is kept up to date and is regularly reviewed.

2.345. The documentation of the internal model by the undertaking needs to provide an audit trail, to recording the implementation of model changes (both minor and major).

Guideline 44 - Documentation of methodologies

The insurance or reinsurance undertaking should produce documentation which is detailed enough to evidence detailed understanding of the methodologies and techniques used in the internal model, including at least:

a) the underlying assumptions;

b) the applicability of such assumptions given the undertaking's risk profile; and

c) any shortcomings of the methodology or of the technique.

The insurance or reinsurance undertaking, when documenting the theory, assumptions and mathematical and empirical basis underlying any methodology used in the internal model, in accordance with Article 125(3) of Solvency II, should include, if available, the material steps of the development of the methodology, as well as any other methodologies which were considered but not subsequently used by the insurance or reinsurance undertaking.

2.346. The validity of externally produced documentation which may have been written for a purpose other than documenting the internal model under consideration is recognised. In such cases, it is particularly important that the methodology or technique is appropriate for the situation to which it is being applied. Therefore the undertaking needs to be able to demonstrate sufficient understanding of the contents of the document in order to assess and justify the suitability of the technique or methodology for use in its model and the fit for its business.

2.347. In particular the undertaking needs to meet the requirements related to the assumptions underlying a methodology or technique (e.g. a probability distribution or an estimation method). The undertaking also demonstrates through the documentation of methodologies understanding of any shortcomings of a methodology or technique of its internal model, and why any of such shortcomings are not material or do not render use of the methodology or technique inappropriate.

2.348. Academic papers, by their nature, can be complex and they may assume a high level of prior knowledge. Reference to such papers on their own may not be sufficient to demonstrate an undertaking's understanding of a method or technique and its appropriateness to the undertaking's business. However, exact formulation of model equations and variables is regarded as good practice.

2.349. Methodology development often involves trial and error. A record of that development could be useful for both supervisory authorities in assessing the appropriateness of the methodology, and for the undertaking (including the validation function) in further improving the model. Whilst the initial stages of such development may not be documented formally as they happen, documentation of the development of a methodology can enable the

undertaking to prepare itself for the fulfilment of the requirements of paragraph 3 of Article 125 of Solvency II.

Guideline 45 - Circumstances under which the internal model does not work effectively

The insurance or reinsurance undertaking should include in its documentation an overall summary of the material shortcomings of the internal model, consolidated in a single document, containing at least the aspects referred to in Article 245 of the Implementing Measures.

2.350. Where internal models take a modular form, it is quite likely that separating the documentation of each module would allow the undertaking to address any shortcomings of that particular module. However it is expected that the undertaking carries out an overall assessment of material shortcomings in a single summary document.

2.351. This summary overview also allows the undertaking and supervisory authorities to assess the materiality of any circumstances under which the internal model does not work effectively, the appropriateness of the model for the undertaking and any plans to address the shortcomings.

2.352. The overall summary of material shortcomings may be used by the undertaking to communicate internally with the relevant stakeholders including when relevant the administrative, management or supervisory body, and users of the internal model or its outputs.

~~**Guideline 46 – Appropriateness of documentation to addressees**~~

~~The insurance or reinsurance undertaking should consider having documentation of the internal model that consists of more than one level of documentation for the internal model, commensurate with the different uses and target audiences.~~

2.353. Guideline 46 is deleted because it is considered not adding value and unnecessary (type 2).

Guideline 47 - User manuals or process descriptions

The insurance or reinsurance undertaking should have in place, as part of the documentation of the internal model, user manuals or process descriptions for operation of the internal model which should be sufficiently detailed to allow an independent knowledgeable third party to operate and run the internal model.

2.354. User manuals or process descriptions for operation of the internal model is an important mitigant to key person risk, which exists both at model design level and model operation level.

~~**Guideline 48 – Documentation of model output**~~

~~The insurance or reinsurance undertaking should retain, as part of the documentation of the internal model, the outputs of the model that are relevant to satisfy the requirements of Article 120 of Solvency II.~~

2.355. Guideline 48 is deleted because it is considered not adding value and unnecessary (type 2), as no use in supervisory practice is known to NSAs.

Guideline 49 - Documentation of software and modelling platforms

The insurance or reinsurance undertaking, in its documentation, should provide information about the software, modelling platforms and hardware systems used in the internal model.

When using software, modelling platforms and hardware systems, the insurance or reinsurance undertaking should provide in the documentation sufficient information to be able to assess and justify their use, and enable supervisory authorities to assess their appropriateness.

2.356. A platform differs from an external model if the implementation of the model is independent of the platform on which it is run. For example, a model would theoretically give the same output if run on two different simulation platforms (with the same calibration), whereas two different natural catastrophe models would give different output.

2.357. In some cases, there may not be a clear distinction between what constitutes a modelling platform and what constitutes an external model. In such cases the undertaking and supervisory authorities are expected to consider the appropriate level of documentation, and the need to monitor potential restrictions arising from the use of external models.

Chapter 11: External models and data

2.358. The Guidelines on external models and data aim to provide guidance on what supervisory authorities need to assess and the undertaking needs to do in order to ensure compliance by the undertaking with the standards related to external models and data in the context of internal models used for the calculation of the Solvency Capital Requirement. These Guidelines do not cover the calculation of technical provisions but only external models and data intended to be used for the calculation of the Solvency Capital Requirement.

2.359. The requirements relating to the internal models and data set out in Solvency II also apply to external models used for the calculation of the Solvency Capital Requirements, and external data used in an internal model. The undertaking needs to pay particular attention to the specificities of such models and data.

Guideline 50 – External data

The insurance or reinsurance undertaking, given the nature of external data, should be able to demonstrate an appropriate level of understanding of the specificities of external data used in the internal model including any material transformation, rescaling, seasonality and any other processing inherent in the external data.

In particular, the insurance or reinsurance undertaking should at least:

a) understand the attributes and limitations or other peculiarities of the external data;

b) develop processes for identifying any missing external data and other limitations;

c) understand the approximations and processing made for missing or unreliable external data; and

d) develop processes to run timely consistency checks including comparisons with other relevant sources to the extent that data are reasonably available.

2.360. Some external data can be used directly by the undertaking such as market data, but external data is also quite important in external models.

2.361. The undertaking may decide to have a process for classification of data as external. The classification could for example, encompasses external data that are used directly in the internal model and data that is used indirectly for the development or calibration of external models and for transformations of inputs (e.g. inflation).

2.362. Article 126 of Solvency II requires that the same data quality standards apply to external data as to internal data. The data quality standards are set out in Article 121.

2.363. By their very nature, external data may pose further challenges that the undertaking may need to consider when applying the quality standards to the external data used in its internal model.

2.364. In cases where a reference source is readily available, periodical reasonability checks may be used to assess the quality of the data. For example, when indices are used, the undertaking may need to understand how they were created to account for seasonal adjustments and changes in basis. The adjustments for these changes may be included in a data directory to ensure continuity of the checks and the changes that need to be made on the data.

2.365. Where other processed data, such as volatility is used, the undertaking may need to understand and document the historical data used and the transformations applied to it.

2.366. When the source of external data or information is not available, for e.g. in proprietary data or where raw data is too onerous to gather, then the provider may need to provide the sufficient information with specific references wherever possible. The undertaking may find it useful to set up processes for developing an understanding of the attributes and weaknesses of the data (e.g. resolution, limited record length, missing data, etc.).

2.367. In some cases especially for calibrating catastrophe models, due to lack of exposure and claims data, a catastrophe model for a country may have been calibrated using data from another country or with the use of expert knowledge. In other cases, expert judgement and analytical methods, for example extrapolation is used to complement scarce data. It is expected that the undertaking clearly communicates and documents these limitations, and assesses the implications.

Guideline 51 – Understanding of the external model

The insurance or reinsurance undertaking should be able to demonstrate that all parties involved in the use of the external model have a sufficiently detailed understanding of parts of the external model relevant to them including assumptions, technical and operational aspects.

The insurance or reinsurance undertaking should give particular attention to the aspects of the external model that are more relevant to its risk profile.

2.368. Some models such as CAT models, Economic Scenario Generators and credit models can be classified as external models. In addition, external models may also include calculation components, libraries and risk models obtained from third-parties, which have an impact on the results of the internal model and are usually specifically designed for modelling of risks to which an insurance or reinsurance undertaking is exposed.

2.369. The undertaking may differentiate between external models and external platforms. However, some IT systems and software usually classified as platform may be regarded as external models. In some cases functions such as random number generator can have a significant impact on the calculation of the Solvency Capital Requirement. Similarly, the undertaking may decide to classify custom built functions (such as C++ library functions) as external models depending on their use in the internal model.

2.370. Article 126 of Solvency II sets out that the use of an external model shall not be considered to be a justification for exemption from any of the tests and standards set out in Article 120 to 125 of Solvency II. Therefore the undertaking needs to meet for the external model and data the same standard of understanding as required for other parts of the internal model.

2.371. An effective channel for regular communication between the undertaking and the vendor or service provider may give a positive indication of appropriate understanding of the model. This may be evidenced by the undertaking through meetings, emails and other correspondence and participation to educational seminars.

2.372. Many of the external models are complex and a full understanding of the whole model may not be possible or relevant for the undertaking. The external model may cover risks to which a particular undertaking is not exposed and as such are not relevant to the undertaking. The undertaking ensures a detailed understanding of the components of the external model that are used in the internal model and are relevant to its risk profile the same way as it ensures understanding of the theory and assumptions underlying the other parts of the internal model.

2.373. In order to demonstrate a detailed understanding of the external model used within the internal model, the undertaking:

- demonstrates that all the significant limitations and uncertainties have been communicated to and are understood by the relevant stakeholders at all the levels within the undertaking;
- ensures that persons who effectively run the undertaking have a sufficiently detailed understanding of the parts of the internal model used in the area which they are responsible of. This may include understanding the basic properties of the inputs, assumptions and the outputs and how they may impact the Solvency Capital Requirement and any decision based on them;
- demonstrates that the users understand in detail the main components of the external model (for instance in case of a catastrophe model the usual components are: the event set module, the hazard module, the vulnerability module and the financial module), main operational aspects and outputs of the model. This includes understanding the calibration of the model and the data used for the calibration;
- documents and justifies the processes for selection of any external model and ensures by regular reviews that the process is up-to-date and an appropriate external model is used;
- documents major changes in the external model either done externally or any adaptation made internally. This may include, for example, documentation of major updates to the models or how the outputs of the external model have been modified prior to use in the internal model.

Guideline 52 – Reviewing the choice of external model and data

The insurance or reinsurance undertaking should periodically review its justification for selecting a particular external model or set of external data.

The insurance or reinsurance undertaking should be satisfied that it is not overly reliant on one provider and should have in place plans to mitigate the impact of any failures of the provider.

The insurance or reinsurance undertaking should pay attention to any updates of the external model or of the data that allows the undertaking to better assess its risks.

2.374. There may be some operational constraints for the undertaking to change the external model or data used in the internal model. For instance the model or data may be embedded in the undertaking business processes, and in some cases changing the model and data may create additional risks related for instance to the appropriateness of IT systems. However, in order to ensure the on-going appropriateness of the external model or data, the undertaking may decide to have processes in place to assess regularly whether the external model or data is still adequate considering in particular any change in its risk profile. The undertaking may decide on a frequency for reviewing the justification of selecting a particular model or data.

2.375. The undertaking, when selecting an external model or set of data, particularly assesses the adequacy of the model or data to its risk profile, including the ability for the undertaking to collect appropriate data needed to run or parameterise the model.

2.376. If there are risks inherent in being overly reliant on one provider (such as in case of bespoke systems), the undertaking may decide to have risk mitigation plans in place, for example, source code escrow, identified alternative systems and expertise.

2.377. Similar attention could be paid to components of modelling platforms, software and hardware systems that can affect the use or results of the internal model. There are a number of ways that the undertaking and supervisory authorities can assess the appropriateness and robustness of components of modelling platforms, software and hardware systems. Available methods for such an assessment include: stress and scenario tests, mini-models to replicate results, replicating results on other platforms, benchmarking run-times on other systems.

2.378. When any deviation of the risk profile occur, the undertaking may consider if any available update of the external model or data is appropriate to address this deviation in the risk profile.

2.379. In some cases, the undertaking may decide on the use of multiple models:

- as a way to mitigate the risk of over reliance on a particular model;
- as a tool in the validation process; or
- to avoid over-reliance on a particular service provider or vendor.

2.380. A multi-model approach can also be used for assessing the uncertainty around a particular risk. A multi-model approach can involve multiple vendors, one vendor and also models developed internally. The method applied by the undertaking, where it chooses to blend output from multiple models, for instance as a way of mitigating the over-reliance on one model vendor, complies with the requirements applicable to the internal model and particularly the statistical quality standards as well as the validation standards. The undertaking gives particular attention to establishing and maintaining a written explanation of the calculation of the blended output. In doing so the undertaking may set out a priori criteria or blending parameters, or explain any deviation from pre-set criteria and parameters.

2.381. The undertaking may identify some shortcomings of the external model and may want to resolve those shortcomings by adapting the external model or its output. While identification of shortcomings could be viewed by supervisory authorities as an indicator of a detailed understanding by the undertaking, it is expected that the undertaking, when adapting the external model or its output, ensures that the adaptations comply with all the relevant tests and standards including statistical quality standards and that governance processes are in place for adapting the model.

Guideline 53 – Integration of external models within the internal model framework

The insurance or reinsurance undertaking should be able to demonstrate that the approach for incorporating the external model into the internal model framework is appropriate; including the techniques, data, parameters, assumptions selected by the undertaking, and the external model outputs.

2.382. There are many aspects that an undertaking may need to consider when incorporating the external model in its internal model framework. There are different approaches for doing this but all of them involve aligning systems, data and assumptions.

2.383. For example, the dependency structure inherent in the outputs of an external model may compromise the dependency structure used in the internal model or the systems may introduce operational risks in transferring data from one system to another. Also, the assumptions may not be properly aligned.

2.384. In order to ensure the appropriateness of the approach for incorporating the external model into the internal model framework, the undertaking can, for example:

- check and document the consistency of the assumptions and the input data of the components incorporated;
- make clear the ownership of the different phases of the process;
- demonstrate that the external model is fit for its use as internal model;
- notify and document the reasons for the approach used for processing inputs and outputs of the external model;

- develop a change process with defined timelines, such as setting a process for the continuous improvement of the granularity and quality of the exposure data used in the external model and ensuring the regular and timely update of the process with strategic feedback loops;
- evidence and justify the choice of the output and the way it is used.

Guideline 54 – Validation in the context of external models and data

The insurance or reinsurance undertaking should perform its own validation of the aspects of the external model that are relevant to its risk profile and of the process for incorporating the external model and data within its own processes and internal model.

The insurance or reinsurance undertaking should assess the appropriateness of the selection or the non-selection of features or options which are available for the external model.

As part of the validation the insurance or reinsurance undertaking should consider appropriate information and in particular the analysis performed by the vendor or other third party, and, when doing so, the insurance or reinsurance undertaking should ensure at least that:

a) the independence of the validation is not compromised;

b) it is consistent with the validation process the insurance or reinsurance undertaking sets out and is clearly laid out in the validation policy; and

c) any implicit or explicit bias in the analysis performed by the vendor or other third party is taken into account.

2.385. As defined in Guideline 34 of the Validation Chapter, the proportionality principle applies to the validation process.

2.386. The validation process by the undertaking particularly needs to:

- cover the key assumptions of the external model;
- cover any material adjustments made to the inputs of the model, the model itself or its outputs by, at least, demonstrating their appropriateness and explaining their underlying reason(s);
- be specific to the undertaking and focus on parts of the model that are relevant to the risks and lines of business underwritten by the undertaking;
- include tests of outputs or performances against experience (sense checks);
- make use of the service providers or other expert knowledge and competencies to create / calibrate tests;
- if some validation tasks are delegated to service providers, ensure that the delegated tasks are performed consistently with the undertaking's validation process including for instance:
  - specific validation report and deeper analysis to specific risks particularly relevant for the undertaking;

- frequency of validation;
- checks when changes happen.

2.387. The undertaking may use the model through reinsurance intermediaries (brokers) rather than holding the licence for the model. The undertaking may decide to use aspects of the validation performed by vendors or brokers provided that it can gain comfort that the validation performed by the brokers that it meets the requirements. The undertaking may decide to do their own validation for the sake of a better understanding of the modelling and objective challenge regarding material model assumptions, because the final onus for validation is on the undertaking.

2.388. For example, an external validation report provided to the undertaking by the vendor, the service provider or an independent party may be used by the undertaking to base their overall opinion assuming that the report provided is consistent with the validation process the undertaking establishes and complies with the Solvency II requirements on validation.

2.389. It is expected that validation performed by the undertaking covers the approach for incorporating the external model or data into its internal model.

2.390. Although common practice for validating specific aspects of the model and data used by vendors in the development of their external models, the peer review by a third party (e.g. university or other independent institution) of the models could be used by the undertaking as a piece of evidence of a qualified and objective generic validation of the external model. The independence of such a process could be assessed taking into consideration the other relation of the persons involved with the vendor. Using this third party review does not prevent the undertaking from explaining how this review is relevant to its own use of the external model.

2.391. The undertaking may decide that this review could be used for:

- the selection process of the service provider and the setting up of adequate contingency plan;
- setting the frequency of validation;
- setting the frequency of update;
- assessing other soft aspects (e.g. user friendliness, flexibility, stability);
- the validation of the outputs.

2.392. When complementing the vendors' validation, the undertaking may like to further develop their understanding of the validation performed through sensitivity analysis and benchmarking. The undertaking, as part of its validation process, justifies and documents the use of options selected and other features available when using the external model.

2.393. The undertaking may decide to validate the outputs of the model by demonstrating its understanding of (but not exhaustively):

- the material risk drivers;

- the limitations of the outputs.

2.394. The undertaking may decide to validate the inputs of the model by checking their appropriate treatment and demonstrating its understanding of:

- whether the data provided by the undertaking used by the service provider reflects the undertaking risk profile;
- the integration of the external model within the internal model framework;
- the audit trail within the external model.

Guideline 55 - Documentation in the context of external models and data

The insurance or reinsurance undertaking should ensure that the documentation of external models and data meets the documentation standards.

The insurance or reinsurance undertaking should produce documentation on at least the following:

a) the aspects of the external model and external data that are relevant for its risk profile;

b) the integration of the external model or external data within its own processes and internal model;

c) the integration of data, in particular inputs, for the external model, or outputs from the external model, within its own processes and internal model; and

d) the external data used in the internal model and its source and use.

If, as part of its own documentation, the insurance or reinsurance undertaking leverages on the documentation produced by the vendors and service providers, the insurance or reinsurance undertaking should ensure that its ability to meet the documentation standards is not compromised.

2.395. The undertaking documents any material adjustments made to the inputs, modelling components or outputs of the external model together with the reasons for the adjustments and evidence for their appropriateness. The same holds for the potential blending of any modelling results in the case that a multi-modelling approach is adopted.

2.396. The undertaking documents its understanding of the model. The undertaking may decide to build its internal documentation around information and documentation provided by the vendors or service providers assuming this does not compromise its ability to meet the documentation standards. If the information and documentation provided is sufficiently detailed then this allows the undertaking to develop an appropriate level of understanding of the model.

2.397. Additionally, an undertaking may decide to document that the incorporation of its data (in vendor models or service providers' systems) was done correctly.

Guideline 56 - Responsibility of the undertaking in the context of external models and data

The insurance or reinsurance undertaking should keep its responsibility for discharging its obligations related to its internal model and for the role of external model or data in the internal model and any other requirements.

2.398. The approval for an internal model is between supervisory authorities and the undertaking applying for the use of the internal model to calculate the Solvency Capital Requirement. Thus supervisory authorities deal directly with the undertaking in order to assess how the undertaking complies with the tests and standards as set out in Articles 120 to 125 of Solvency II.

2.399. More detailed provisions on this subject can be found in EIOPA Opinion on External Models and Data[11].

2.400. Nevertheless, supervisory authorities may want to contact the external model vendor directly in order to gain information on the external model which is used or would be used in an undertaking's internal model. This information may vary and could include, for example:

- context of the external model;
- historical development of the external model;
- theoretical basis of the model and assumptions;
- data on which the external model has been calibrated;
- optionality available within the external model.

2.401. The information gained by supervisory authorities may inform their review of internal model which includes the external model provided by the vendor, but the supervisory assessment is entirely based on each individual internal model.

2.402. It is expected that vendors, as part of their commercial relationship with undertakings, assist their clients in ensuring compliance with the requirements particularly, but not exclusively, regarding the documentation and validation of the external model, and where appropriate, the adaptation of the model to the client's needs.

[11] https://eiopa.europa.eu/fileadmin/tx_dam/files/publications/opinions/1622_001.pdf

Guideline 57 - Role of service providers when using external models and data

The insurance or reinsurance undertaking should put in place an outsourcing agreement when it chooses not to operate the external model directly.

Similarly, the insurance or reinsurance undertaking should put in place an outsourcing agreement when it chooses to mandate a service provider to perform some tasks related to the external data.

The insurance or reinsurance undertaking should, when putting in place an outsourcing agreement, comply with the requirements from Article 49 of Solvency II and Article 274 of the Implementing Measures.

2.403. In case of catastrophe models, the undertaking may mandate a reinsurance broker to run one or more catastrophe models using undertaking's specific exposures. The undertaking remains responsible for demonstrating to the supervisory authorities that the external models used and the tasks performed comply with the requirements.

Chapter 12: Internal models for groups - Functioning of colleges

2.404. In the case of an internal model for a group composed of several related undertakings which are supervised by supervisory authorities of different Member States, those supervisory authorities work together in order to review and take decisions on the use of the internal model.

2.405. All the Guidelines in this Chapter apply, unless otherwise stated, to both:

- the assessment of an internal model for the calculation only of the consolidated group Solvency Capital Requirement (Article 230 of Solvency II); and
- the assessment of an internal model for the calculation of the consolidated group Solvency Capital Requirement as well as the Solvency Capital Requirement of at least one related insurance undertaking included in the scope of this internal model for the calculation of the consolidated Solvency Capital Requirement (group internal models under Article 231 of 2009/138/EC).

2.406. As set out in Article 343(2) of the Implementing Measures, the supervisory authorities involved are the supervisory authorities of all the Member States in which the head offices of related undertakings included in the scope of the internal model for the calculation of the group Solvency Capital Requirement are situated.

2.407. The supervisory authorities concerned, according to Article 347(3) of the Implementing Measures, are the supervisory authorities of all the Member States in which the head offices of each related insurance and reinsurance undertakings applying for the use of a group internal model to calculate their Solvency Capital Requirement are situated.

2.408. In addition, the following provisions are useful background information:

- from Article 248(3) of 2009/138/EC, the membership of the college of supervisors shall include the group supervisor and supervisory authorities of all the Member States in which the head office of all subsidiary undertakings is situated. The supervisory authorities of significant branches and related undertakings shall also be allowed to participate in the college of supervisors. However, their participation shall be limited to achieving the objective of an efficient exchange of information;
- on the assessment of an application to use an internal model to calculate the consolidated group Solvency Capital Requirement, Article 344(1) of Implementing Measures sets out that the group supervisor shall consult and involve the supervisory authorities involved. [Article 344(2)] sets out that the other supervisory authorities within the college of supervisors that are not involved shall also be allowed to participate in the assessment of the application. However, their participation shall be limited to identifying and preventing circumstances where the exclusion of parts of the business from the scope of the internal model leads to a material underestimation of the risks of the group, or where the internal model conflicts with an internal model previously approved or in the process of approval by the relevant supervisory authority;
- in cases of application to use a group internal model, the group supervisor shall inform and forward the complete application to the other members of the college of supervisors without delay as set out in Article 231(1) of Solvency II.

Guideline 58 - Assessing the scope of the internal model

When assessing the appropriateness of the scope of the internal model, the group supervisor, the other supervisory authorities involved as defined in Article 343(2) of the Implementing Measures and other supervisory authorities identified by the college in accordance with Article 344(2) of the Implementing Measures should consider at least:

a) the significance of related undertakings within the group with respect to the risk profile of the group;
b) the risk profile of related undertakings within the group compared to the overall group risk profile;
c) if applicable, a transitional plan by the group to extend the scope of the model at a later stage and the timeframe to do so;
d) the appropriateness of the standard formula or another internal model approved or in the process of approval for the calculation of the Solvency Capital Requirement of any related insurance or reinsurance undertaking included in the scope of the internal model; and
e) the appropriateness of the standard formula or another internal model approved or in the process of approval for the calculation of the Solvency Capital Requirement of any related insurance or reinsurance undertaking within the group but not included in the scope of the internal model for the group.

When assessing the appropriateness of the exclusion of related undertakings within the group from the scope of the internal model, the supervisory authorities referred to in the previous paragraph should assess whether the exclusion of the undertakings could lead to:

a) an improper allocation of own funds based on individual undertaking Solvency Capital Requirements rather than on its contribution to the risk profile of the group;
b) inconsistencies that would derive from the use of the internal model to calculate the group solvency capital requirement and the use of the standard formula or a different internal model, approved or in the process of approval, by any related undertaking within the group to calculate its Solvency Capital Requirement;
c) weaknesses in risk management of the group and related undertakings within the group resulting from the limited scope of the internal model; or
d) an inadequate group Solvency Capital Requirement in relation to the risk profile of the group.

2.409. The supervisory authorities involved, with the participation of the other members of the college, cooperate in assessing the justification provided by the undertakings regarding the scope of the internal model, either full or partial, and the appropriateness of this scope.

2.410. When assessing the appropriateness of an internal model with a limited scope, any transitional plan to extend the internal model may provide useful indication of whether the internal model would play an important role in the system of governance of the undertaking on an on-going basis.

2.411. In assessing the scope on the internal model for a group, the supervisory authorities involved take into consideration the following points:

- the undertakings included in the scope of the internal model for the calculation of the group Solvency Capital Requirement; and
- in case of group internal models under Article 231 of Solvency II, the related undertakings included in the scope of the internal model for the calculation of their Solvency Capital Requirement with the group internal model.

2.412. Where the exclusion of a related undertaking from the scope of the internal model could create any of the situations listed in the Guideline above, it is desirable that the group supervisor and supervisory authorities involved consider the situations outlined below.

2.413. If the exclusion of the related undertaking could result in an improper allocation of own funds, assuming the Solvency Capital Requirements are appropriate, it is desirable that particular attention is given to the technique applied to integrate the partial internal model with the standard formula. This is because the allocation of the diversification benefit between related undertakings is likely to be the reason for the improper allocation of own funds.

2.414. If the exclusion of the related undertaking could create inconsistencies from the use of more than one model, it is desirable that the supervisory authorities

participating in the assessment of the scope of the internal model consider how those inconsistencies could impact the risk management system and the decision-making processes. In particular they may consider how the inconsistencies could impact the on-going compliance with the use test for the relevant internal models.

2.415. While evaluating the consequences of excluding related undertakings from the scope of the internal model, it is desirable that the group supervisor considers in particular whether supervisory authorities of related undertakings not yet included in the scope of the internal model but which are likely to be included in a future extension of the scope of the internal model, could be provided with relevant documents to enable them to participate in the current assessment and to prepare for the likely extension of the scope of the internal model.

2.416. If the exclusion of the related undertaking of the scope of the internal model could weaken the risk management system, it is desirable that the group supervisor and supervisory authorities involved seek additional explanations from the undertaking on how this risk is being addressed.

2.417. If the exclusion of a related undertaking could result in an inadequate group Solvency Capital Requirement, then some remediating action is expected to be needed:

- if the standard formula is not appropriate for the excluded undertaking, then it is desirable that the supervisory authority responsible for this undertaking considers requiring, if appropriate, the use of an internal model for this related undertaking, and that the group supervisor considers mentioning this inadequacy to the group. The latest could imply a transitional plan to extend the scope of the internal model and/or a new application by the group to extend the scope of the internal model;
- in case the exclusion of the undertaking results in an inappropriate integration of the partial internal model with the standard formula because, for example, the integration technique applied fails to accurately capture some dependency between the risks or major business units within the scope of the partial internal model, and the risks or major business units outside the scope of the partial internal model, it is desirable that the group supervisor considers mentioning this inadequacy to the group. This would imply some adjustment to the internal model and/or a new application by the group with a different scope, with a different integration technique or to extend the scope of the internal model.

2.418. An example of the different purposes of the review for a related undertaking depending on different situations is outlined in the following table:

	Group internal model used for the calculation of A SCR (application under Article 231).	**Internal model not used for the calculation of A SCR.**
Undertaking A (related undertaking) included in the scope of the internal model for the purpose of the group SCR calculation.	Review the appropriateness of the group internal model for both the calculation of A SCR and for the A contribution to the group SCR.	• Review the appropriateness of the internal model for the A contribution to the consolidated group SCR. • Review the appropriateness of the exclusion of A for the calculation of its SCR with the internal model.
Undertaking A (related undertaking) not included in the scope of the internal model for the purpose of the group SCR calculation.	Non-applicable.	• Review the appropriateness of the exclusion of A for the calculation of its SCR with the internal model. • Review the appropriateness of the exclusion of A for the calculation of the consolidated group SCR with the internal model. • Identifying and preventing the circumstances referred to in Article 344(2) of the Implementing Measures: circumstances where the exclusion of parts of the business from the scope of the internal model leads to a material underestimation of the risks of the group, or where the internal model conflicts with an internal model previously approved or in the process of approval by the relevant supervisory authority.

Guideline 59 - Internal model work plan for the assessment and the approval process of internal models for groups

The group supervisor, in consultation with the other supervisory authorities involved, should set up an internal model work plan and the communication rules to follow among these authorities during the assessment and the approval process of internal models for groups.

When appropriate, the group supervisor, in consultation with the other supervisory authorities involved, should update the internal model work plan.

In relation to the assessment of the internal model, the group supervisor should ensure that the internal model work plan covers the timeline, main steps and deliverables for this assessment. In the case of a group internal model under Article 231 of Solvency II, the group supervisor and the other supervisory authorities concerned should consider including in the internal model work plan specific provisions between them. The group supervisor should ensure that the internal model work plan, at least:

a) establishes when and how to consult and involve in the assessment the other supervisory authorities involved referred to in Article 343(2) of the Implementing Measures;

b) establishes when and how to allow the other supervisory authorities within the college of supervisors referred to in Article 344(2) of the Implementing Measures to participate in the assessment;

c) identifies the priorities for the assessment, taking into account the scope of the internal model, the specificities of each related undertaking within the group, the risk profile of the group and related undertakings within the group, and the available and relevant information about the internal model;

d) establishes when and how to report the outcomes of the assessment made by the supervisory authorities involved to the other supervisory authorities involved.

In relation to the decision on an application to use a group internal model under Article 231 of Solvency II, the group supervisor, in consultation with the other supervisory authorities concerned, should ensure that the internal model work plan covers the timeline for all the steps and deliverables for reaching a joint decision as set out in the EIOPA Implementing Technical Standard on the Process to Reach a Joint Decision for Group Internal Models.

2.419. The internal model work plan referred to in the Guideline may be included in the work plan of the college. The internal model work plan can be adapted and updated as appropriate as the review work of the internal model is proceeding.

2.420. For example a change or delay in the delivery of documentation, evidence or information by an undertaking within the group may lead the supervisory authorities involved to revise the internal model work plan. Similarly, findings and preliminary views during the review work may also lead the group supervisor to amend the internal model work plan in some circumstances either

to perform more review in a specific area of the model or of the requirements or to reallocate review work to other areas.

2.421. The following examples illustrate how the application process may look like in the case of group internal models under Article 231 of Solvency II.

2.422. Example 1: assume a group made up of a DE, FR, PL and BE entities, where FR is the group supervisor. The group submits to the FR supervisory authority, an application under Article 231 of Solvency II to use an internal model to calculate the group Solvency Capital Requirement covering FR, DE, BE but excluding PL and to calculate the Solvency Capital Requirement of the DE and FR entities and not the BE and PL ones. The joint decision with respect to the approval of the group internal model would have to be made by the supervisory authorities of FR and DE (supervisory authorities concerned), as the internal model would be used by the related undertakings they supervise for the calculation of their individual Solvency Capital Requirement. The supervisory authority in BE would have to be involved in the assessment (supervisory authority involved), and the supervisory authority in PL is to be allowed to participate for the limited purpose of identifying and preventing circumstances where the exclusion of parts of the business from the scope of the internal model leads to a material underestimation of the risks of the group, or where the internal model conflicts with an internal model previously approved or in the process of approval by the relevant supervisory authority.

2.423. Example 2: Assume starting from Example 1, that a new application is submitted by the group to extent the internal model to the calculation of the Solvency Capital Requirement for the related undertaking of BE. In this case the new joint decision would be taken by the previous supervisory authorities concerned (FR and DE) and BE (which thus becomes concerned). PL would still be allowed to participate for the limited purpose described in the previous paragraph.

2.424. Example 3: Assume starting from Example 1 that a new application is submitted by the group to extent the scope of the internal model for the calculation of the group Solvency Capital Requirement to PL, but the PL entity would not be using the group internal model for the calculation of its individual Solvency Capital Requirement. In this case the new joint decision would be taken by the same supervisory authorities concerned as Example 1 (FR and DE). The supervisory authorities in BE and PL would have to be involved in the assessment (supervisory authorities involved).

2.425. It is important to note that in the case of examples 2 and 3, the group internal model has already been approved. However, this would not automatically lead to the approval of the extensions of the use of the internal model.

2.426. When the scope of a group internal model is extended so that the extension of the scope results in the inclusion of a new supervisory authority as supervisory authority concerned, the supervisory authorities concerned, including the new authority, have the ability to review and assess all parts of the application, including the parts that are not changed compared with the application

previously approved. Indeed, some aspects of the model previously approved for the limited scope might have a different impact when considering the extended scope of the model. From a legal point of view this is automatically the case since the extension of the scope starts a new joint decision process. However, from a practical point of view, the assessment process may rely on some decisions taken during the initial model approval.

2.427. It is expected that, in the case of the assessment of a group internal model under Article 231 of Solvency II, the supervisory authorities concerned contribute more heavily and more actively than the supervisory authorities only involved but not concerned.

2.428. In the case of a group internal model, where the internal model is only for the calculation of the Solvency Capital Requirement of related undertakings whose head offices are based in the same Member State as the group supervisor, the decision is taken by the group supervisor only, although all supervisory authorities involved need to be consulted.

2.429. In all other circumstances than the in previous paragraph, for group internal model, more than one supervisory authority is concerned in the joint decision.

2.430. This Guideline also aims to ensure efficiency and avoid diverging and inconsistent views on the same topic between different supervisory authorities. In essence, the assessment of an internal model for the calculation of the group Solvency Capital Requirement is a combination of off-site activities and on-site examinations carried out at both group and related undertaking levels for the different components of the internal model.

2.431. The contribution of each supervisory authority in the assessment is agreed upon by the group supervisor and the other supervisory authorities involved. The process needs to be adapted to suit the assessment. Nevertheless a process that maximises the efficient use of the resources is desirable. For this aim, the participation in colleges provides the opportunity for a horizontal view that may help spreading observed good practices among colleges.

2.432. To ensure an effective process all supervisory authorities involved make their best effort to perform the allocated tasks.

2.433. It is desirable not to duplicate work related to the assessment of an internal model methodology which is used consistently across the different entities of the groups. Although supervisory authorities involved in the process may have different views about the adequacy of this methodology for the different related undertakings, it would be more efficient to coordinate the review activities.

2.434. In the case of the assessment of a group internal model under Article 231 of Solvency II, each supervisory authority concerned is expected to review the implementation of the common methodology referred to in the paragraph above for their respective related undertaking, although aiming at leveraging this work through common on-site examinations. This approach is not contradictory to the aim of an efficient allocation of tasks as long as this implementation can be assessed at the level of the related undertaking.

2.435. The group supervisor and the other supervisory authorities involved may in particular take into consideration for each component of the group internal model:

- the persons who are responsible for designing the component;
- the persons who are responsible for validating the component;
- the persons who are responsible for providing the data;
- the persons who are responsible for the parameterisation; and
- how the component is integrated in the internal model at group level and/or at related undertaking level.

2.436. The group supervisor and the other supervisory authorities involved in the process set up an internal model work plan to allow each authority involved to give its views on its area of competence while optimising the use of the resources of all supervisory authorities.

2.437. For example, if component "A" of the internal model applies the same methodologies through-out the group and the tools provided by the group are used by local entities, on local data, it is likely that the process would be more efficient as it leads to:

- common off-site activities at group level to study the methodology;
- common on-site examination at group level to assess the tools; and
- separate on-site local examination by the supervisory authorities involved to check that data is adequate and by the authorities concerned to check that the component is implemented properly.

2.438. If, on the other hand, component "B" is strictly limited to undertaking A, it may be more efficient to:

- arrange on-site examinations at local level involving the supervisory authority of the individual undertakings and if it chooses to do so the group supervisor; and
- apply a process at group level to assess how this component is integrated in the group internal model.

~~Guideline 60 – Concerns about the process~~

~~Whenever a supervisory authority involved identifies a substantial point of concern regarding the approval process, it should share its concern with the group supervisor and the other involved authorities as soon as feasible.~~

Guideline 60 is deleted because it is considered not adding value and unnecessary (type 2). The Guideline stresses the need for cooperation, but requirements in Article 231 of the SII Directive 2009/198 are already sufficiently clear.

Guideline 61 - Joint on-site examinations carried out during the assessment of internal models for groups

The group supervisor and the other supervisory authorities involved should be able to request and discuss when and how to organize joint on-site examinations to verify any information concerning the assessment of an internal model for a group, with the aim of ensuring the effectiveness of the process.

The supervisory authorities requesting a joint on-site examination should inform the group supervisor by indicating the scope and purpose of this examination, taking into account the objectives of this examination in relation to the assessment as defined by the supervisory authorities involved.

The group supervisor should then notify the other supervisory authorities involved, EIOPA, and, where relevant, other members and participants of the college that may be affected or interested in the participation or in the outcome of the joint on-site examination.

Once the supervisory authorities participating in the joint on-site examination have been identified, they should discuss and agree the final scope, purpose, structure and allocation of tasks of the on-site examination, including who is leading the on-site examination.

The group supervisor should be kept informed on the progress and findings of the joint on-site examination.

The supervisory authority leading the on-site examination, if other than the group supervisor, should provide the relevant documentation to the group supervisor. The group supervisor should make the relevant documentation available to the supervisory authorities involved, to the other supervisory authorities participating in the joint on-site examination and to EIOPA. The group supervisor should provide the other college members and participants with a list of the relevant documentation received and provide them with the documents upon specific request.

On the basis of a report stating the main findings of the joint on-site examination, the supervisory authority leading the on-site examination should discuss with the supervisory authorities involved the outcome of the joint on-site examination and the actions to be taken.

The group supervisor should notify the other college members and participants about the outcome and actions as part of the agreed communication within the college.

2.439. This Guideline applies to joint on-site examinations carried out during the assessment of internal models for groups organised either by the group supervisor, by another supervisory authority involved, or by one of the other supervisory authorities within the college.

2.440. For the purpose of the assessment, supervisory authorities involved or other authorities within the college may also in addition of joint on-site examinations, conduct local on-site examinations. This Guideline is applicable to joint on-site examinations, not to local ones.

2.441. Verifying information is not limited to checking information for accuracy based on what has already been submitted by the undertaking, or from off-site analysis carried out by the supervisory authorities within the college as part of the assessment: it includes in the broadest sense investigating, probing and evaluating any information needed for the decision.

2.442. Some joint on-site examinations may be already foreseen in the internal model work plan agreed for the assessment, but further examinations can take place when deemed necessary.

2.443. The participation in joint on-site examinations can bring expertise about local specific products and helps the group supervisor and other supervisory authorities involved. The supervisory authorities who participated in the joint on-site examinations provide input to the supervisory authority responsible for reporting the main findings.

2.444. In the case of group internal models under Article 231 of Solvency II, participating to joint on-site examinations is particularly useful for supervisory authorities concerned, because some specificities designed at group level would be relevant for their individual Solvency Capital Requirement calculation by the group internal model under.

2.445. Joint on-site examinations organised by supervisory authorities involved other than the group supervisor may be useful in the context of both internal models for the calculation only of the group Solvency Capital Requirement and group internal models for the calculation of both, the group Solvency Capital Requirement and one or several individual Solvency Capital Requirements. In the first case, the supervisory authorities involved need to assess how the undertaking's risk profile is reflected in the calculation of the consolidated group Solvency Capital Requirement, while in the second case, the supervisory authority concerned also aim at assessing whether the group internal model is appropriate to derive the Solvency Capital Requirement of the related undertaking.

2.446. If the joint on-site examination is organised by a supervisory authority of a related undertaking included in the scope of the internal model for a group, but which Solvency Capital Requirement would not be calculated by the internal model, this on-site examination may cover some of the following objectives:

- assess the appropriateness of the individual contribution the related undertaking to the calculation of the group Solvency Capital Requirement using the internal model;
- assess the appropriateness of the exclusion of the relevant related undertaking from the calculation of its Solvency Capital Requirement using the internal model;
- assess the appropriateness of the internal model itself, including in particular the reasons for the exclusion of undertakings from the internal model for the calculation of the group solvency, and the reasons why the internal model covers a related undertaking for the calculation of the

consolidated group Solvency Capital Requirement but it is not used to calculate the Solvency Capital Requirement of that related undertaking.

2.447. In the case of a group internal model under Article 231 of Solvency II, if the joint on-site examination is organised by a supervisory authority concerned, in addition to the previous paragraph, the examination may cover the assessment of whether the group internal model is appropriate to calculate the individual Solvency Capital Requirement of the related undertaking, in particular, for the compliance with the tests and standards for this related undertaking.

2.448. A joint on-site examination may be also organized by one of the supervisory authorities of a related undertaking not included in the scope of the internal model for the calculation of the group consolidated capital requirement. This on-site examination has the aim of identifying and preventing the circumstances referred to in Article 344(2) of the Implementing Measures: circumstances where the exclusion of parts of the business from the scope of the internal model leads to a material underestimation of the risks of the group, or where the internal model conflicts with an internal model previously approved or in the process of approval by the relevant supervisory authority.

~~**Guideline 62 – Sharing of reviews of internal models for groups**~~

~~The supervisory authorities involved should share and discuss the main findings of their off-site and on-site activities related to the internal model with the group supervisor and the other supervisory authorities involved.~~

~~The supervisory authorities involved should share the approach they are following in the review of the elements of the internal model with the group supervisor and the other supervisory authorities involved.~~

~~If, as a result of this sharing, the supervisory authorities involved identify substantial differences in the approaches followed, they should discuss and they should agree on a process to develop consistent approaches when they consider appropriate to have this alignment.~~

~~When they deem appropriate, the supervisory authorities involved should consider sharing the tools and techniques they are using for the review of the elements of the internal model with the other supervisory authorities involved.~~

2.449. Guideline 62 is deleted because it is considered not adding value and unnecessary (type 2). It is stressing the need for cooperation within the group, but requirements in Article 248 of the SII Directive 2009/198 are already sufficiently clear.

~~**Guideline 63 – Involvement of third country supervisory authorities during the assessment of internal models for groups**~~

~~The group supervisor and the other supervisory authorities involved should decide whether and which third country supervisory authorities should be consulted.~~

~~Before consulting the third country supervisory authority, the group supervisor, with the support of the other supervisory authorities involved, should take appropriate steps to ensure that the legislative provisions on the confidentiality of information of the jurisdiction where the third country supervisory authority is situated are equivalent to the professional secrecy requirements resulting from Solvency II.~~

2.450. Guideline 63 is deleted because it is considered not adding value and unnecessary (type 2). The point raised is not specific to IM, i.e., it must also be taken into account in assessments/cooperation in other fields, and after 10 years of SII and of group model assessments, a practice should have been established in this regard.

Guideline 64 - Assessment of major changes to group internal models under Article 231 of Solvency II

In relation to the assessment of the application for approval of a major change to a group internal model under Article 231 of Solvency II, the group supervisor and the other supervisory authorities concerned should decide whether to delegate the assessment of changes at the level of a related undertaking to the relevant supervisory authority concerned.

2.451. Although the approval of major changes follows similar process as the first approval of an internal model, specific circumstances may arise in the case of group internal models, as changes might not affect simultaneously both the group Solvency Capital Requirement calculation and all of the individual undertaking Solvency Capital Requirement calculation.

2.452. The provisions of this Guideline aim at making the process as efficient as possible.