

# **SOLVENCY II**

## **DETAILED GUIDANCE NOTES**

### **MARCH 2010**

## **SECTION 2 - MODEL SCOPE, GOVERNANCE AND USE**





## SECTION 2: MODEL SCOPE AND GOVERNANCE

### Overview

This section outlines the Solvency II requirements for model scope and governance. Managing agents should note that the scope of the internal model under Solvency II is significantly broader than the capital calculation kernel alone and it will not be sufficient just to have a sophisticated capital model.

To ensure that the internal model meets Solvency II standards, agents will need to demonstrate that the internal model plays a key part in the running of the business, that there is sufficient governance and standards around the model and that the risk management process is embedded within capital setting.

### Guidance

Managing agents should note that this guidance represents Lloyd's best view of current requirements but is subject to ongoing discussion and change as both CEIOPS proposals and FSA requirements become finalised and Lloyd's own development on Solvency II progresses. Lloyd's will continue to monitor and review progress in these areas and seek to update the guidance as appropriate.

The commentary on proposed level 2 measures attached highlights the relevant sections for the dry run and does not reproduce the full level 2 text. Any additional guidance provided in this document is intended to supplement the level 2 measures, not repeat them, and agents must therefore ensure that they are familiar with all of the requirements and do not rely solely on the additional guidance provided here.

Whilst this document refers to general Solvency II requirements, this guidance is specific to Lloyd's and managing agents in many areas. Due to the unique structure of Lloyd's and the application of the Solvency II directive at society level, some of this guidance will not be relevant to non Lloyd's firms.

### Contents

This section includes the following

- Level 1 directive text and commentary on application of proposed level 2 requirements to Lloyd's managing agents
- Guidance on model scope
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- Appendix 2a – list of example uses referred to by CEIOPS
- Appendix 2b – illustrative syndicate specific use examples
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# LEVEL 1 AND LEVEL 2 MEASURES

The Level 2 measures set out here are based on CEIOPS paper DOC 28/09 (formerly CP 37), published October 2009, Doc-48/09 (formerly CP 56), published October 2009 and DOC-61/10 (formerly CP 61) published January 2010. These measures may be subject to modification before they come into force

## Risk and business coverage

### Directive Article 101.4

4. *The Solvency Capital Requirement shall cover at least the following risks:*

- (a) non-life underwriting risk;*
- (b) life underwriting risk;*
- (c) health underwriting risk;*
- (d) market risk;*
- (e) credit risk;*
- (f) operational risk.*

### Directive Article 121.4 (extract)

The internal model shall cover all of the material risks to which insurance and reinsurance undertakings are exposed. Internal models shall cover at least the risks set out in Article 101(4).

## Application of proposed level 2 requirements to Lloyd's managing agents

### Article 121.4/CEIOPS Doc 48/09: 5.222-5.229

An internal model can support risk management and inform decision making only if it provides the full picture within its scope, so the risk profile must be reflected in its entirety. It is essential to ensure that there is no material risk that is in the model scope but is not included in the model.

The model approval process requires the supervisory authority to assess the adequacy of model coverage and to examine whether all material risks within the model scope are covered by the internal model. Following approval, the internal model must continue to cover all material risks within its scope.

Consequently, a managing agent must:

Identify the risks that each managed syndicate faces, then decide if each risk is quantifiable and whether it can be covered by the internal model. To demonstrate that the model covers all material risks, the managing agent shall use qualitative and quantitative risk indicators that reveal the materiality of the risks concerned.

Use quantitative risk indicators that are consistent with 99.5% VaR over 12 months, as well as any other quantitative risk indicator used within its risk management or decision-making processes.

Other quantitative risk indicators that may confirm adequacy of coverage include:

- capital allocations to the risks under consideration
- the amount of profits and losses that cannot be explained to any particular modelled risk
- the results of validation tests, including sensitivity analysis, stress and scenario analysis and testing against experience

The set of qualitative risk indicators may include one or more of the following:

- the existence of dedicated risk management processes for individual risks
- the existence of dedicated risk mitigation
- the identification of this risk in the ORSA
- identification of the risks as material in risk management reporting to the board

When assessing the coverage of material risks, a managing agent must consider the impact of dependent risks which may appear immaterial separately but are material jointly.

## The Use Test

### Directive Article 120

*Insurance and reinsurance undertakings shall demonstrate that the internal model is widely used in and plays an important role in their system of governance, referred to in Articles 41-50, in particular:*

- (a) *their risk management system as laid down in Article 44 and their decision-making processes;*
- (b) *their economic and solvency capital assessment and allocation processes, including the assessment referred to in Article 45.*

*In addition, insurance and reinsurance undertakings shall demonstrate that the frequency of calculation of the Solvency Capital Requirement using the internal model is consistent with the frequency with which they use their internal model for the purposes covered by the first paragraph.*

### Application of proposed level 2 requirements to Lloyd's managing agents

#### Article 120/CEIOPS Doc 48/09: 3.102-3.127

In the proposed level 2 requirements, the use test is underpinned by one foundation principle and nine underlying general principles. Demonstrating that these principles are met is key to demonstrating compliance with the use test.

**Foundation principle: The undertaking's use of the internal model shall be sufficiently material to result in pressure to improve the quality of the internal model.**

The Foundation principle underpins the remaining nine principles, and should be the point of reference where there is a lack of clarity. Examples of probable non-compliance with the use test include the following situations:

- the internal model outputs are calculated for regulatory purposes with little or no internal incentive for ensuring the quality of those outputs
- deterioration in the accuracy, robustness or timeliness of the internal model outputs is unlikely to be picked up by the managing agent's internal processes
- the managing agent lacks a process for improving the internal model
- the internal model is seemingly producing low results compared with the results of the syndicate's ORSA, and the managing agent is unable to explain this satisfactorily

**Principle 1: Senior management and the administrative, management or supervisory body, shall be able to demonstrate understanding of the internal model.**

A managing agent's board must give evidence of understanding of the internal model.

Each board member shall have an overall understanding, which may be gained from internal training.

Each member of senior management shall also have an overall understanding, as well as a detailed understanding in the specific areas where they use the internal model.

The board must demonstrate where internal model outputs are used to inform decision-making. Decisions informed by the internal model shall include strategic decisions with an impact on the agent's future direction.

The board's understanding of the internal model is evidenced through understanding of:

- the internal model's structure and how it fits with their business model and risk management framework
- the methodology behind the internal model
- the dynamics of the model, i.e. how the different elements fit together
- the limitations of the internal model, including the limitations of statistical assumptions and limitations in business planning assumptions, and that these limitations are taken into account in decision-making

- the areas and the entity/hierarchy levels within the syndicate where diversification effects arise, as well as the dependencies throughout the risk profile
- the scope and purpose of the internal model and the risks covered by the internal model, as well as those not covered

Neither the board nor its senior management shall manipulate the internal model in order to obtain outputs that do not appropriately reflect its risk profile.

**Principle 2: The internal model shall fit the business model.**

The internal model's design shall align with the syndicate's business model in at least the following aspects:

- the methods used to calculate the probability distribution forecast underlying the internal model shall be consistent with the methods used to calculate technical provisions
- internal model outputs shall reconcile with internal and external financial reporting
- modelling approaches adopted in the internal model may vary within the model, reflecting the nature, scale and complexity of the specific risks being modelled
- the internal model shall be changed to reflect material changes in the business model. The managing agent shall allow for changes of this nature in the internal model change policy
- the capital allocation approach and the granularity of allocation shall reflect the managing agent's risk management system and the syndicate's business model, and include information on the consumption of regulatory capital. The granularity shall especially correspond to the level of decision-making processes within the agent.

Insofar as the profit and loss attribution process reflects internal definitions of profits and losses and is consistent with the variable underlying the internal model's probability distribution forecast, it may be used as part of satisfying the use test. The variable may differ from basic own funds, because a different internal definition may be used for economic capital resources. In that case, the managing agent shall be aware how the profits and losses used in profit and loss attribution may differ from the profits and losses reported in its accounting systems and what the causes of the differences are.

The internal model shall at least be able to produce results at the level of material lines of business and have overall capital results split by material risks to assist in risk management activities. The granularity of internal model output shall reflect the syndicate's decision-making processes.

**Principle 3: The internal model shall be used to support and verify decision-making in the undertaking.**

The internal model shall be used in decision-making processes, including setting business or risk strategy. It shall be able to give information that will allow assessment of the expected profit and of the variability in the expected profit arising from potential decisions.

Analysis supporting decision-making shall be proportionate to the expected outcome of each decision. Such analysis shall be documented.

The internal model and its results shall be regularly discussed in relevant committees and at board level.

Managing agents must not make decisions that follow the output of the internal model without question. Decision-makers need to be aware of the internal model's shortcomings and tailor their decisions accordingly. They should document the rationale for each significant decision, including, the reliance placed upon internal model outputs and details of additional information that was used to arrive at the decision.

**Principle 4: The internal model shall cover sufficient risks to make it useful for risk management and decision-making**

Managing agents must demonstrate that the internal model's scope covers sufficient uses and risks to be widely used, and play an important role, in its system of governance, risk management system and decision-making processes, as well as in capital assessment and allocation.

The internal model must be capable of informing significant risk management and business decisions.

**Principle 5: Undertakings shall design the internal model in such a way that it facilitates analysis of business decisions**

A managing agent must design its internal model to ensure that the results are used to inform internal debate. Results from the internal model may be discussed with people responsible for risk on the agent's board. The results must be communicated to all board members, so that they are able to take responsibility for them.

Managing agents may use the results of the internal model for many purposes, for example:

- their development plan for the internal model
- internal project plans
- their governance strategy
- their model change and data policy

**Principle 6: The internal model shall be widely integrated with the risk management system**

A managing agent must demonstrate that the internal model is used in its risk management system. Uses that will assist in demonstrating this include:

- that the quantifications of risks and risk ranking, including the diversification effects produced by the internal model, trigger action;
- that the quantifications of risks and risk ranking, including the diversification effects produced by the internal model and the assessment of accumulations of risk and tail dependencies, are used to formulate risk strategies, including the development of the syndicate's risk appetite and any risk mitigation, and improve the risk management system overall;
- that outputs are used to formulate risk limits and appear on reports to internal forums in the managing agent.

At each point in the internal model where explicit diversification effects occur, there shall be clear responsibility in the managing agent for quantifying and allocating those diversification effects.

If the risk management system changes or if significant changes are proposed, the internal model must be changed to reflect this.

**Principle 7: The internal model shall be used to improve the undertaking's risk management system.**

A managing agent must have an adequate risk management system. As part of such a system, the internal model, which is used to quantify risks, shall be designed to allow the agent to gain more insight into its risks, and hence improve risk management by using a feedback loop between the risk management system and the internal model.

Areas where the internal model could lead to improvements may include:

- risk mitigation techniques
- clarifying the risk appetite of the syndicate
- allowing more informed monitoring of risks
- more risk-based decision making

**Principle 8: The integration into the risk management system shall be on a consistent basis for all uses.**

A managing agent's internal model shall produce output that is based on the relevant internal or external accounting basis for each use. The agent's board shall demonstrate that they understand the basis of this output.

The use test always applies at least at the level at which risk strategy and risk management are defined. If a managing agent is part of a larger insurance group, Lloyd's will assess the use test at the level of the Lloyd's managing agent and syndicate(s).



**Principle 9: The Solvency Capital Requirement shall be calculated at least annually from a full run of the internal model, and also when there is a significant change to the undertaking's risk profile, assumptions underlying the model and/or the methodology arising from decisions or business model changes, and whenever a recalculation is necessary to provide up to date information for decision-making or any other use of the model, or to fulfil supervisory reporting requirements.**

A managing agent must use a full run of the internal model to calculate the syndicate Solvency Capital Requirement (SCR) at least annually, and may do so more frequently.

Lloyd's may require a managing agent to calculate the syndicate SCR using a full run of the internal model more frequently than annually, if necessary.

As a managing agent will update internal model methodology, parameters and data input on a regular basis, it may calculate change in syndicate SCR for only the risk modules affected by such changes.

The MCR must be calculated quarterly and is linked to the SCR. Under the principle of proportionality, a managing agent shall apply a quarterly calculation that is sufficiently sophisticated to produce the quarterly syndicate SCR. However, this does not assume necessarily a full model run and approximations may be allowed.

## Model governance

### Directive Article 120 (extract)

*The administrative, management or supervisory body shall be responsible for ensuring the on-going appropriateness of the design and operations of the internal model, and that the internal model continues to appropriately reflect the risk profile of the insurance and reinsurance undertakings concerned.*

### Application of proposed level 2 requirements to Lloyd's managing agents

#### Article 120/CEIOPS Doc 48/09: 4.46-4.53

A managing agent's system of internal model governance forms part of its overall governance framework. Requirements that an agent's overall system of governance must meet are set out in "Systems of Governance". Internal model governance shall operate as follows:

High level internal model governance is the responsibility of the managing agent's board and covers:

- Approving the application for approval to use the internal model to calculate the SCR, and applications for approval for major changes or extensions to the model.
- Deciding roles and responsibilities for internal model governance.
- Deciding on the strategic direction of the model and hence any related changes to the model.
- Agreeing major changes in advance of the change being made
- Aligning model design and operations with the managing agent's and syndicate's risk profile and operations.
- Ensuring that there are sufficient resources to develop, monitor and maintain the model.
- Monitoring on-going compliance with the requirements for internal model approval, and informing Lloyd's if the model ceases to comply.
- Ensuring there are adequate, independent review procedures in place around internal model design, operation and validation.
- Ensuring that outputs are aligned with use, i.e. that management information produced by the model assists in decisions made at board level.
- If the internal model ceases to comply with the requirements for approval, ensuring that a plan to restore compliance is developed or assessing the non-compliance as immaterial.
- There must be an ongoing feedback loop between the agent's board and its risk management function.

Detailed internal model governance is the responsibility of the managing agent's risk management function and covers:

- Design and implementation of the internal model.
- Testing and validation of the internal model.
- Documentation of the internal model and any changes to it.
- Analysing the performance of the internal model, and reporting on the performance to the board, including compliance with internal model approval requirements.
- Suggesting areas for improvement and reporting to the board on the status of efforts to improve previously identified weaknesses.
- Close liaison with users of internal model outputs.
- Developing a communication loop with the actuarial function to pass the detailed actuarial perspective to the risk management function and, in return, receiving insights on the internal model.

Governance of the internal model must encourage organisation of a dialogue between every user of the model and the risk management function about the internal model's characteristics, in order to increase understanding of the model and its outputs.

Operation of the internal model must be subject to on-going internal review. In this regard the agent's board may, as part of their overall governance, set up an internal control committee, to whom the managing agent assigns the task of providing advice and making proposals.

The agent's board shall set up a feedback loop that allows information to flow from the risk management function to the board, and for decisions on the strategy for developing the internal model to flow to the risk management function for implementation. Discussions forming part of the feedback loop shall be documented.

## Model change policy

### Directive Article 115

*As part of the initial approval process of an internal model, the supervisory authorities shall approve the policy for changing the model of the insurance or reinsurance undertaking. Insurance and reinsurance undertakings may change their internal model in accordance with that policy.*

*The policy shall include a specification of major or minor changes to the internal model.*

*Major changes to the internal model, as well as changes to that policy, shall always be subject to prior supervisory approval, as laid down in Article 112.*

*Minor changes to the internal model shall not be subject to prior supervisory approval, insofar as they are developed in accordance with that policy.*

### Application of proposed level 2 requirements to Lloyd's managing agents

#### Article 115/CEIOPS Doc 28/09: 3.94-3.112

A managing agent must produce a model change policy covering the internal models for all the syndicates it manages.

Areas that are relevant to the internal model, changes of which may lead to a need to change the model, include: 'system of governance' (Articles 41-49 of the Level 1 text) and 'SCR: full and partial models' (articles 112-126 of the Level 1 text), as well as any other changes to the risk profile of the undertaking.

The model change policy must cover any change which impacts these areas of relevance.

Model changes must be classified into major changes and minor changes. Model changes may be further subdivided into those relating to:

- the calculation kernel
- the risk management framework
- the internal model governance regime
- the model change policy

- other aspects of the internal model

CEIOPS proposes to produce guidance to assist the classification of model changes as major or minor.

Changes to model change policy require prior supervisory approval.

Major changes must not be broken down into a succession of minor changes, so as to reduce the overall level of regulatory scrutiny of the change.

Model scope extensions are subject to the same approval process as the original model. They must go through that process, are not considered model changes and, hence, are not covered by the model change policy.

The model change policy must cover the internal governance process for changes to the model.

Applications for approval of major changes:

- must be made well in advance of their implementation.
- must be accompanied by a qualitative and quantitative impact study and have been approved by the managing agent's board.
- may trigger an on-site inspection prior to approval.

May be granted provisional prior conditional approval in exceptional cases, based on the documentation submitted. In such circumstances, there may be a subsequent on-site inspection. Approval will be withdrawn if the undertaking fails or ceases to comply with the conditions.

Minor changes to the internal model must be reported to Lloyd's in a summarised report on a quarterly basis. The report must describe the quantitative and qualitative impact on the internal model of each change individually and of all the changes cumulatively. The report must be approved by the board of the managing agent.

Any model changes not covered by the scope of the approved model change policy are subject to the same approval process as the original model. Further, the model change policy will need to be amended and reapproved to bring such changes in scope in future.

Lloyd's will have processes in place to record and track notification requirements.

Lloyd's may perform in-depth reviews of minor changes to the internal model, at its discretion.



# MODEL SCOPE

## Introduction

The internal model of a syndicate must:

- be able to provide an appropriate calculation of the SCR (Solvency II Framework Directive Article 101)
- be an integrated part of the undertaking's risk management process and systems of governance (Articles 44, 112.5 and 120)
- satisfy the tests and requirements as set out in Articles 120-125

### Use test (article 120)

The use test will require agents to demonstrate that the internal model is widely used in, and plays an important role in, their system of governance (Articles 41-49) and, in particular, their risk management system, decision making processes and the ORSA.

### Articles 121-125

- Statistical quality standards
- Calibration standards
- Profit & loss attribution
- Validation standards
- Documentation standards

The internal model will need to satisfy all of these requirements to meet Solvency II standards.

## Model scope

Managing agents should note that the scope of the internal model under Solvency II is significantly broader than the capital calculation kernel alone and it will not be sufficient just to have a sophisticated capital model. To secure internal model approval, agents will need to demonstrate that the internal model plays a key part in the running of the business, that there is sufficient governance and standards around the model and that the risk management process is embedded within capital setting. An internal model not meeting these requirements will not be approved for Solvency II capital setting purposes.

Agents must be able to define the scope of the internal model for each managed syndicate. Lloyd's will not mandate use of a specific scope for internal models as this should be relevant to the business and risk profile of each syndicate. Internal model scope does not need to be consistent across agents for the purposes of the Lloyds internal model (LIM) but agents will need to ensure that they satisfy both the SCR calibration requirements and model outputs required by the LIM.

Agents should note that any component or process that can have a significant impact on the SCR must satisfy the requirements of Solvency II, irrespective of whether or not it has been defined as "within scope" of an internal model.

Agents should also note that Lloyd's review process will not be limited by the scope of the internal model but will cover anything which is considered material to its review and decision making process.

### Issues to consider when choosing scope

There is a wide range of elements that could be defined as being within the scope of an internal model and the choice of whether or not to include these may impact how the requirements of Solvency II are to be met. Agents must understand the implications of including or excluding certain elements from the scope of an internal model and should be able to explain how the scope of the model was determined and why specific elements are included or excluded. In defining the scope of an internal model, an agent must consider a number of issues. Examples of the types of issues to consider are set out below.

### **Coverage of material risks**

Managing agents must demonstrate that the internal model covers all material risks. Lloyd's recommends that all risks included in the managing agent's risk register (or emerging from its risk assessment process) are listed and individually identified as being included within the internal model or not. If a risk is not covered by the internal model then an explanation should be provided.

This demonstration must be based on a combination of qualitative and quantitative 'risk indicators' and examples are given in the level 2 text.

### **Demonstrating the use test**

The wider the scope of the internal model, the easier it may be to demonstrate that the internal model is widely used within the risk management of the company. This is one of the potential drivers for broadening the scope of the internal model.

Agents should note however that it will also be possible to demonstrate the use of a more narrowly scoped internal model if the outputs from the internal model feed into other key business processes. For example, the internal model may allocate capital to class of business, with return on allocated capital used to inform business decisions and to remunerate underwriters. Such activity is a strong demonstration of the use of the internal model.

### **Documentation**

Documentation tends to be resource intensive, and it is potentially difficult to demonstrate the value-added from documentation, other than managing key-person risk (which in itself is important). As more processes are included within the scope of the internal model, each of them needs to be documented to a suitable standard for Solvency II. This will obviously increase resource requirements for supporting the internal model.

Excluding a process from the scope of the internal model does not mean however that Solvency II requirements can be ignored, and other documentation standards will still apply consistent with the overall risk management system of the business.

### **Model change policy**

All syndicates are required to have in place a model change policy, detailing the processes by which changes will be applied to the internal model. If the managing agent's change policy categorises a change as being major, then making that change will require re-submission of both the model and an amended model change policy. Minor changes will also need to follow certain submission requirements.

Changes that expand the scope of a model may be classified as a model extension, and could fall outside the scope of the model change policy. Agents will therefore need to consider how the scope of the model may affect how model change policies and governance processes operate.

### **Validation**

Managing agents will be required to develop a comprehensive validation process to demonstrate that an internal model is suitable for setting capital under Solvency II. Many validation processes are mandatory under the level 2 guidance, including stress and scenario testing, sensitivity testing, back testing and profit and loss attribution.

The scope of the validation will depend on the scope of the internal model itself. The validation policy must cover all quantitative and qualitative aspects of the internal model. If, exceptionally, there are parts of the internal model not covered by the policy, agents will be required to state this and detail why it is appropriate to exclude those parts from the validation process.

### **Possible process to decide upon scope**

As a starting point, managing agents could draw up a list of the processes that underlie the calculation kernel of their internal model. These processes may be integral to the capital calculation, may be data feeds or may be part of the surrounding governance, risk management and validation framework. These may include, but not be limited to, the following examples:

- business planning process

- assessment of variability around key elements of the business plan (e.g. large losses)
- realistic disaster scenarios and cat data
- technical provision calculation process
- assessment of reserve risk around best estimate reserves
- counterparty default (e.g. reinsurance credit risk) assessment
- investment risk assessment
- operational risk assessment
- validation and feedback processes

Each process could be considered systematically along the following lines to help decide if it should fall within the internal model scope:

- does the process consider a key risk within the business?
- is the process material to the decision making processes with the business?
- is the process material to the governance around the internal model?
- do changes in the process materially impact calculation of the SCR?
- are sufficient resources available to include the process within the internal model and be able to satisfy the six internal model tests with it?

When a process is included within the scope of the internal model, then any others which feed into this process should also be assessed as to whether they should be included.

By following the risk assessment processes back from the calculation kernel, agents should end up with a flow-diagram of processes that are material to the risk assessment of their internal model.

There will be additional processes (for example the validation policy) that may not feed directly into the calculations of the model, but are material to the overall model governance and risk framework. Such processes, both qualitative and quantitative, could additionally be included in the scope of the internal model.

The final internal model scope should then be fed into the decision around what the internal model change policy should incorporate. At all points, the thought process behind the model scoping should be documented and should form part of the overall documentation for the internal model.





# THE USE TEST

## Introduction

As well as using the internal model to calculate the SCR and support the ORSA process, managing agents must be able to demonstrate that the internal model is widely used in, and plays an important role in the system of governance. The uses of an internal model may vary according to the definition and scope of the model.

Examples of where an internal model may be used within the operations of a business have been set out by CEIOPS in the proposed level 2 text and are reproduced in Appendix 2a. Illustrative examples which would be particularly relevant for agents have been given in Appendix 2b. Agents should note, however, that these examples are not to be considered exhaustive or a “check-list” for meeting the use test.

Agents must be able to clearly demonstrate the use of the internal model and its role in governance. This will include evidencing:

- how the model has been used to support and verify decision-making;
- how the model fits the business model;
- how senior management demonstrate understanding of the model;
- how the internal model is integrated within, and used to improve, risk management; and
- how recalculations can be triggered, either for regulatory purposes or for decision-making.

## Evidencing use for decision-making and risk management

It is not expected that the outputs of the model will always be followed in terms of decisions made. However, it is expected that the outputs are an important consideration as part of those decisions and that this consideration is demonstrable.

Minutes should be taken of the relevant committee or board meetings at which model output is discussed, coupled with clear evidence of the information presented to the meeting. If different options or approaches are discussed these should be clearly presented in papers circulated to those present at the meeting and/or clearly outlined in the minutes of the meeting.

Outputs from the internal model may be used more extensively than simply within committee or board meetings and form part of the information used on a day-to-day basis to manage the business. Such information may be produced for many different functions within the business and may take many different forms. Managing agents should provide examples of such information derived from the internal model and identify where this is used to help with both governance and decision-making.

## Evidencing model understanding

An essential part of the embedding process for agents is the demonstration that a process of education and communication has occurred. Examples of how this could be achieved may include:

- a training programme assigning categories to the board and senior management in accordance with the appropriate level of knowledge of the model that is required.
- documenting elements of understanding that are appropriate for each grouping.
- evidence that training sessions and workshops were held, attendees present and the information presented. Agents should note that whilst receipt of training will help demonstrate understanding, it does not equate with “use”: this can only be demonstrated through the utilisation of the model in material business decisions.

The board and senior management of the agent will be expected to know the principles of:

- how the model is governed as well as the committee or forum charged with developing the model, overseeing the framework for designing the model and ensuring the effective operation of the model;
- main uses of the model, and how it can inform certain decisions; examples of its use within the agent;

- the process, in general terms, by which the model is validated;
- how the model is materially consistent with the business profile of each syndicate managed by the agent; and
- (Material) limitations of the model.

The board and senior management (including non-executive directors) will be expected to be able to discuss these areas.

It is recognised that the level of knowledge expected from senior management and board members will vary according to their role. For example, the Chief Actuary would be expected to have greater technical knowledge of some parts of the model than, say, the non-executive chairman. The Finance Director may have greater understanding than the Business Development Director. However, where the model is used to inform certain decisions or as part of specific business processes, then the individuals involved in, and those who own, those decisions or processes should have a detailed understanding of the model, its outputs and limitations. For example, the Reinsurance Manager and Active Underwriter should understand the reinsurance modelling process in some depth.

Senior management on the committee primarily charged with responsibility for the design, implementation and enhancement of the model will be expected to have more detailed knowledge of the model than those not on such a committee.

## **Recalculation**

Agents will be expected to document how and when internal model recalculation is required. Keeping a record of major recalculations required and the reasons behind each may also help agents to evidence use of the model.

# INTERNAL MODEL GOVERNANCE AND MODEL CHANGE POLICY

## Internal Model governance

As part of satisfying Solvency II standards for the internal model, agents will be expected to demonstrate that there is sound and robust governance over their model. Some examples of this would be:

- link to historic development log of the model
- detailed model change policy
- clear levels of authorisation over changes to the model
- clear communication or procedures on what types of circumstances or events would trigger a change to the model
- clear documentation of appropriate approval being given by relevant management and committees etc to changes to the internal model, including the calculation kernel
- version control and an audit trail over changes to the calculation kernel
- robust operating platform and IT environment for the calculation kernel
- documented review of the model change policy by the appropriate management and committee
- periodic assurance that procedures had been adhered to, for example reports from Internal Audit

## Model change policy

Managing agents will be required to develop a model change policy for the internal model. This policy will be subject to review and agreement by Lloyd's and will define the process by which a managing agent may develop its internal model, and the interaction necessary with Lloyd's.

Under Article 120, agents will have a responsibility to ensure the ongoing appropriateness of the design and operation of the internal model, and that it continues to appropriately reflect the risk profile of the insurance undertaking. Indeed, the Foundation Principle which CEIOPS has recommended for assessing compliance with the use test requirements of internal models encourages their ongoing development:

*Foundation Principle: the undertaking's use of the internal model shall be sufficiently material to result in pressure to improve the quality of the internal model.*

Therefore, changes in the business of the insurance undertaking may give rise to the need to alter the internal model. Potential changes may also be identified as part of the validation process of the model, or arise from changes in available data or modelling techniques. Whilst it is recognised that on-going development of internal models is desirable, it is important that model developments do not alter the model in ways which affect its suitability for setting capital requirements.

The model change policy forms one element of the overall governance of the internal model and there is an interaction between the definition of the internal model and the model change policy. If the definition of the internal model is very wide then it is more likely that there could be changes to elements of the model which would not have a significant effect on the SCR (or other criteria used to assess the impact of model change).

## Example model change policy

The table below sets out an example format for a model change policy.

<b>Proposed section header</b>	<b>Example fields</b>
<b>Title page</b>	With Managing Agent / Syndicate name
<b>Approval record &amp; document history</b>	Document owner, author, date, version number Person(s) approving the Policy, date, version version history, changes made, date, author
<b>Table of contents</b>	Summary of all headings and sub headings with applicable page number
<b>Purpose and scope of the Policy</b>	Why the Policy is needed and its desired outcome What is in scope of the model change policy
<b>Executive summary</b>	Background (explain the need for the Policy) Business objectives for the Policy  Policy ownership  Key stakeholders, signatories and period for Policy review  Communicating key uncertainty
<b>Terminology</b>	Interpretation of terms used by managing agent, including:  Internal model  Model change
<b>Policy maintenance</b>	Policy update process & frequency
<b>Overall model change governance process</b>	Detailed process for: <ul style="list-style-type: none"> <li>• Notification of possible change requirement and escalation to relevant internal group</li> <li>• Process for determining type of change and classification as major or minor, including: <ul style="list-style-type: none"> <li>○ Qualitative criteria</li> <li>○ Effect on SCR</li> <li>○ Effect on sensitivity of SCR</li> </ul> </li> <li>• Reporting and resubmission procedures for both: <ul style="list-style-type: none"> <li>○ Major change</li> <li>○ Minor change</li> </ul> </li> <li>• Procedures for making and checking model changes</li> <li>• Procedures for sign-off of model change and release into “live” model</li> <li>• Documentation of model change</li> <li>• Validation</li> </ul>

## Drivers of model change

Model changes should not be considered solely in the context of the resultant change in SCR and changes may be of a qualitative nature as well as quantitative. For instance there may be changes that cause no immediate material change in SCR such as change of model platform

There may be many different drivers of the proposed internal model change, each of which may affect how the model change governance process will operate and managing agents should consider how each possible change would need to be dealt with by a model change policy. Appendix 2c contains an example process which could be used to consider both the type and impact of a model change. The notes provided below explain this in more detail and refer to the change types shown on the diagram. This is intended to be illustrative only and agents should ensure that any process established is relevant to their own internal model and the governance surrounding it.

### **Change to underlying risk profile (type 1 and 2 changes)**

This represents a fundamental change to the risk profile of the syndicate. It may be voluntary, e.g. the addition of a new class of business, or involuntary, e.g. a large increase in reserving risk post a major loss event or a collapse in Sterling versus the US Dollar. Significance should be justified on a quantitative and qualitative basis.

### **Change to model parameterisation (type 3 change)**

This represents a change in the managing agent's assessment of a risk, absent any change in the underlying risk profile, e.g. reducing the variance of the severity of a certain type of claim or increasing the underwriting correlation between two classes. Such changes may arise due to new data or improved analysis becoming available. Significance should be justified on a quantitative and qualitative basis.

### **Change to model design (type 4 change)**

This represents a change in the underlying design of the model, e.g. switching from bootstrapping to claim simulation to measure reserving risk, or moving from scenario testing to stochastic methods for a certain risk module. Significance should be justified on a quantitative and qualitative basis, depending on the nature of the change. For instance, using the examples given above, the reserving risk methodology change is qualitatively significant but could also give rise to a significant change in the measurement of reserving risk. However, in changing from a scenario test to stochastic methods, the stochastic model may actually be calibrated to the scenario test so that there is no quantitative effect at the 1:200 level.

### **Change to model governance/controls (type 5 change)**

These represent changes to the control framework in which the model is operated, e.g. a switch from internal to external independent review, or to the governance framework within which model output is used, e.g. incorporation of modelled results into the decision process for reinsurance purchases. The significance of these changes will always be determined qualitatively.

## Classification into major and minor changes

Article 115 states that a model change policy must include a specification of major or minor changes to the model. The model change process, as set out in the model change policy, will differ according to whether changes have been classified as either a minor or a major change. This classification will affect, in particular, how model changes are to be reported and reviewed by Lloyd's, with all major model changes requiring prior agreement.

As well as being different in nature, model changes will also differ in terms of materiality to the internal model and the resultant output and use of the model. Managing agents must consider a range of criteria in determining whether a change is to be treated as major or minor, and must not focus solely on the impact on the SCR. There could also be other reasons why a change is classified as major, for example if the model approval was granted subject to certain conditions then any change that violated those conditions would be a major change.

All model changes will need to be reported to Lloyd's but the process will vary according to whether it is deemed to be a major or a minor change. The board or committee responsible for model oversight must decide whether the potential change is major or minor as per the model change policy control process.

Lloyd's would expect agents to estimate the potential effect of any change before the model is amended so that the board or relevant committee can approve development work on the change. Agents will also be required to notify Lloyd's at an early stage that a major change is expected.

A number of the criteria that a managing agent should take into account in determining whether a change is minor or major are set out below.

### **Impact on the SCR**

The criteria for deciding whether a model change is major or minor should take into account the effect the change has on the SCR.

The criteria must also take into account the change in the sensitivity of the SCR. For example, a change in methodology increasing the capital requirements in respect of holding equities would have no effect if no equities are held at that point in time; the SCR may remain constant. However, a change in investment portfolio in the future could then increase the SCR significantly and this type of effect must be considered when determining if a model change is major or minor.

### **Impact of all changes separately and in aggregate**

Assessment should also be made of the aggregate effect of minor changes being made at any one time and also accumulative minor changes over a period of time. If the aggregate effect exceeds the criteria for a major change then Lloyd's must be informed in accordance with the procedure for notifying major changes.

The criteria for assessing model change should make allowance for the effects of all changes separately to capture all relevant movements in the model. For example, two major changes that have offsetting effects on the SCR should not be defined as a minor change in aggregate.

### **Qualitative criteria**

There must be allowance for qualitative criteria in determining whether a model change is major or minor. For example, a significant change in methodology may result in an immaterial change in the SCR but such significant changes should still be classed as major.

## **Governance process for model change**

The internal model has a key role in the system of governance and agents will need to ensure that the model continues to reflect appropriately the risk profile of the syndicate. Therefore there must be appropriate internal governance around changes to the model as well as appropriate communication of these both internally and to Lloyd's.

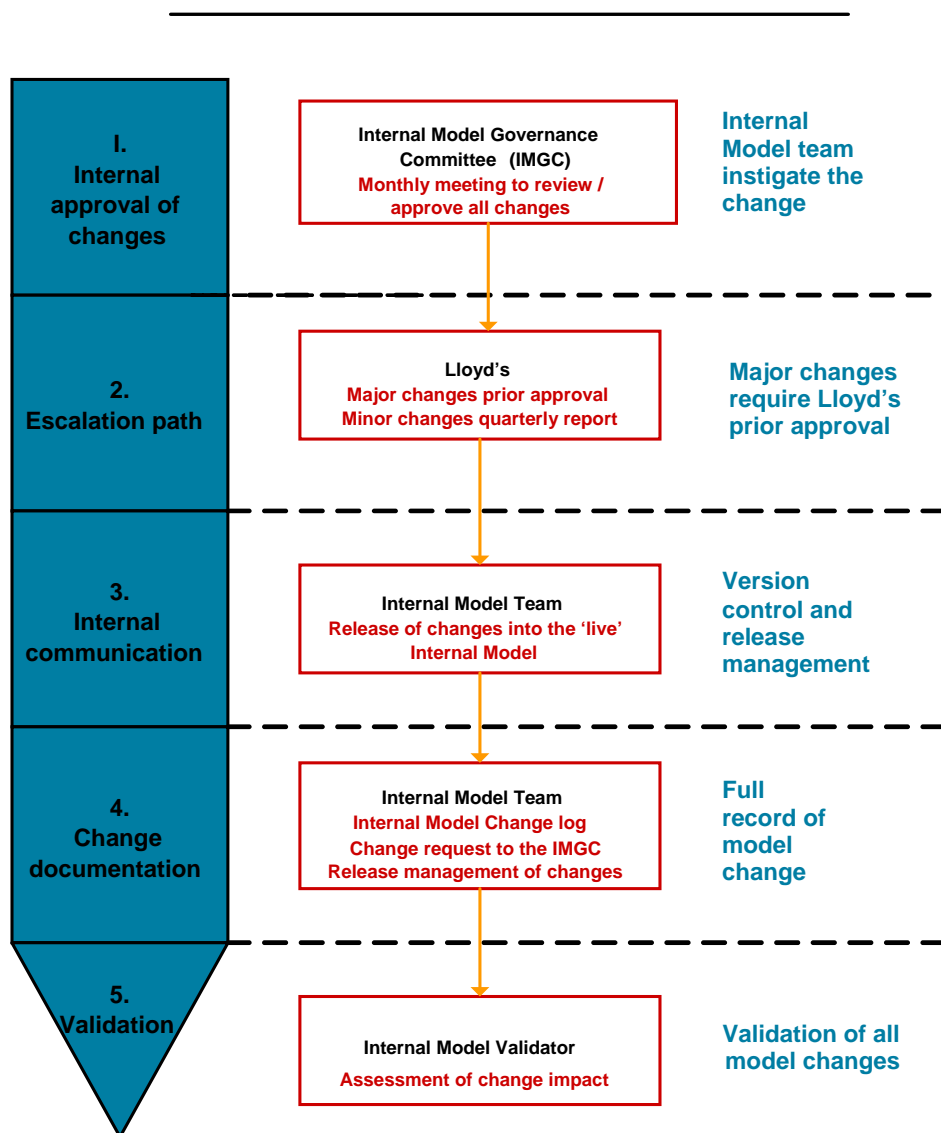
### **Governance procedures**

No changes should be made to the internal model without following the relevant governance procedures which must be set out in the model change policy. These procedures should be clearly documented and understood by all staff for whom they are relevant.

The model change policy should be reviewed regularly (at least annually) and should be re-approved for continued use. Changes to the model change policy must be approved by the board and notified to Lloyd's for review and approval.

The diagram below sets out a high-level example of the stages that may be included within the governance procedures around internal model change:

## Example governance process for model changes



### Internal approval

Potential changes to the internal model may be notified to an appropriate function within a managing agent (such as a Model Steering Committee) who will assess the potential change in accordance with the internal model change control process. This process may be used to identify the necessary actions in response to the potential change. One of the initial stages of this process would be to determine what type of change is proposed and to classify the change as either minor or major.

### Escalation path

As part of the model governance, proposed model changes must be classified into either major or minor changes, according to a process set out in the model change policy. Further details on this classification process are set out below. The classification will affect how changes are to be recorded and reported to Lloyd's, as well as defining the timetable for recalculating and resubmitting the SCR to Lloyd's. This process for interaction with Lloyd's will be confirmed in due course.

Whilst managing agents are free to adopt a model change policy which is consistent with their own internal governance requirements, the policy will need to be consistent with Lloyd's requirements. Therefore the definition of major changes which need to be notified to Lloyd's for prior approval will need to be consistent with Lloyd's assessment of how syndicate internal models affect the overall Lloyd's internal model.

Lloyd's will be working on its own change process and requirements for agents in this regard over the coming months and will seek to provide further clarification during both the qualitative and quantitative review processes and as the LIM develops.

### **Major changes**

Potential changes classified as major should be notified to the board and senior management of the Managing Agent for approval. The model change policy should specify a process for notifying Lloyd's of the potential major change within a defined period of approval by the agent. The process for recording and notification must also be consistent with Lloyd's requirements.

The managing agent may continue with the development, testing and validation of the development version of the internal model. However, major changes should not become part of the live internal model used to calculate the syndicate SCR until they have been reviewed and agreed by both the board/senior management and Lloyd's.

### **Minor changes**

Minor changes should be recorded and reported to the board and senior management within defined timeframes. These should be notified to Lloyd's on a regular basis or as required by Lloyd's. The internal model may be modified for minor changes without prior approval of Lloyd's. However, agents should be aware of the cumulative impact of a series of changes, classified as minor, but creating an aggregate change that should be classified as major.

### **Internal communication**

Agents should ensure that all appropriate individuals have been advised of the change and this notification must be wider than the board or committee approving the change. The level of understanding required of changes will vary across the business but sufficient notification and explanation will be key to maintaining a good understanding of the model and its uses.

### **Change documentation**

Internal model documentation must be updated to ensure all model changes are recorded, both in terms of historical development of the model and documented methodology. Agents should also consider any update needed to the model change policy itself.

### **Validation**

Where changes are made to the internal model, whether major or minor, the model validation procedures will need to be followed to confirm appropriate governance over the application of these changes. As part of reviewing any proposed change and its impact Lloyd's will expect agents to have carried out a validation process and agents should be able to provide the results to Lloyd's as part of the change application.



## APPENDIX 2A

### LIST OF EXAMPLE USES REFERRED TO BY CEIOPS

Within “Advice for Level 2 Implementing Measures on Solvency II: Articles 120 to 126 - Tests and Standards for Internal Model Approval” (Formerly CP56)

The following are listed as illustrative examples only and are not intended to be prescriptive or exhaustive. The list should not be considered a check-list for meeting the use test.

- Adequate pricing
- Assessing customer benefits, for example, bonus setting
- Asset / liability management
- Business planning / strategy
- Capital Management
- Development and monitoring of risk appetite
- Development of risk strategies
- Efficient use of capital
- Exposure management and limit setting
- External risk reporting
- Financial Reporting - internal model provides market valuations for IFRS
- Incentive / target setting
- Internal Risk monitoring (through MI)
- Investment decisions e.g. strategic, tactical and operational decisions
- M&A
- Measurement of material risks
- ORSA
- Other risk mitigation
- Portfolio transfer pricing
- Producing MI
- Product development / Pricing
- Reconciliation between internal model and technical provisions
- Reconciliation between internal model and the technical implementation of management actions, e.g. for with-profit business.
- Reconciliation between internal model outputs and internal and external financial reporting
- Regulatory capital (SCR for solo and for groups)
- Reinsurance decisions e.g. strategic
- Reinsurance programme design
- Reinsurance strategy and development of reinsurance programme
- Reporting on business performance

- Reporting on performance including return on capital
- Reporting on technical provisions
- Risk balancing (efficient use of capital)
- Risk Mitigation
- Setting profit targets
- Setting return on capital targets and remuneration
- Underwriting policies

### ILLUSTRATIVE SYNDICATE-SPECIFIC USE EXAMPLES

The following examples of model use are intended for illustration rather than prescription. Agents should give consideration not only to using the model but also how to adequately evidence model use in each instance to a suitably independent, knowledgeable third party.

#### Business plan

An agent runs a draft of their syndicate(s) business plan(s) for the following year through their internal model. Following senior management review of the output, further analysis is performed on:

- Most effective allocation of capital to each major line of business on a risk-adjusted basis;
- The risk exposure implications of the plan and how this compares with the agent's risk appetite;
- Optimal reinsurance purchase for the following year; and
- Implications on target pricing levels.

[N.B. Some of the above are explored in further detail below].

Following this review, which should be documented, the agent runs further iterations of the plan(s), each major re-run being reviewed by senior management, and the review being evidenced before the final plan is formally agreed.

#### Reinsurance purchase

An agent models potential reinsurance purchase taking into consideration not just optimal cost but also reinsurance credit risk and other softer considerations. Evidence of this consideration is documented. Initial quotes from the reinsurance market are analysed through the model, if time permits during renewal season.

The final purchase is modelled so that the agent can consider whether the actual programme and its terms and conditions have made any material difference to the ultimate plan and residual risk exposure. Naturally, the experience of the purchase one year will be factored into the planning of reinsurance purchase the next.

#### Reinsurance credit risk

The agent has set risk appetite for any one reinsurer, based on categories determined by current security ratings.

After the reinsurance programme has been purchased for the underwriting year, a particular reinsurer is downgraded. The agent considers output from the model which gives an analysis of the probability that gross losses during the year will cause the syndicate to exceed the risk appetite for that reinsurer, given their new rating. The agent considers both analysis from the model and other factors, such as reputational issues and market conditions and decides on a course of action. This action could include, but would not be limited to, any of the following:

- Cancelling the reinsurer's participation on the programme (subject to contractual ability to do so);
- Accepting the potential breach of risk appetite for the current year but aiming to replace the reinsurer on renewal of the programme;
- Purchasing additional coverage; or
- Approaching the reinsurer for collateral.

## **New Line of business**

The agent considers underwriting a new class of business and uses the model to consider the potential impact that this class would have on their capital requirements.

Using market data for the new class, the business plan is re-run through the model taking into consideration the larger and more diversified portfolio.

Management review the output, taking into consideration potential differences between market data for the class and what their own experience might be, and documenting this review, in particular the use of expert judgment in this analysis.

Consideration of the extra risks a new class of business brings and possible scenario analysis (e.g. mispricing, not achieving volumes, reputational and operational risks)

Market conditions and management's view of the quality of the individuals who would be underwriting the new class are also part of the consideration.

A decision is made that (subject to Lloyd's approval) the new class will be underwritten. The decision, and the reasons for the decision, must be documented.

## **Risk Appetite\ Management Information on Risk position**

The model is used to provide reports to the board and senior management of the syndicate's exposure to areas of risk at different percentiles\ return periods. The discussion, which is documented, may lead to the board issuing instructions that lead to changes in the syndicate's exposures, as appropriate.

## **Catastrophe Exposures**

The agent considers analysis by the model of catastrophe exposures against the agent's risk appetite. This leads the agent to issue instructions to the syndicate with regard to changing their exposure profile (e.g. reducing windstorm exposure in Florida).

## **Pricing**

Review of a syndicate's IBNR pack by the agent causes the agent to believe that the mean loss ratio for a particular class of business may need to be increased within the business plan. The loss ratios for this class are changed within the model and information is produced from the model that assists management in selecting a new target technical ratio for the class of business.

## **Capital Allocation**

The agent uses output from the model to inform allocation of risk adjusted capital for each major class of business taking into consideration underwriting, reserving, credit, market, liquidity and operational risk. The agent then considers varying the business plan for the next underwriting year of account to enhance its optimisation of capital, taking account of other factors such as the feasibility of increasing certain lines of business in current market conditions.

## ILLUSTRATIVE PROCESS FOR CONSIDERING MODEL CHANGE

### CHANGES TO THE SCR AND/OR THE INTERNAL MODEL

