





BMA Consultation Paper: Proposed Enhancements to the Regulatory Regime for Commercial Insurers (CP2)

Connecting the Dots | CP2 Governance and Risk Management Series | Part 4

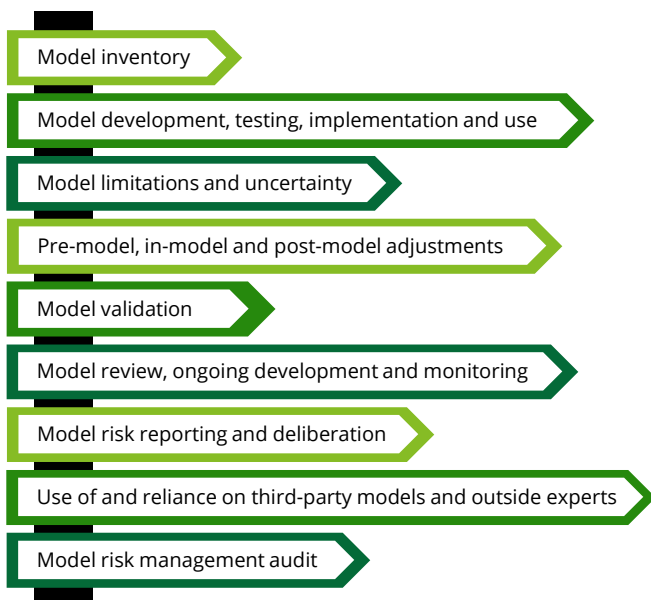
Part 4 of Deloitte’s Connecting the Dots | CP2 Governance and Risk Management Series will summarize the key updates to the regulatory regime as outlined in Section 2.15 ‘Model Risk Management’ of the BMA’s consultation paper, Proposed Enhancements to the Regulatory Regime for Commercial Insurers.

Section 2.15 – Model Risk Management

Before diving into the detail surrounding the governance of the SBA model risk management. The below 4 areas are crucial to get started:

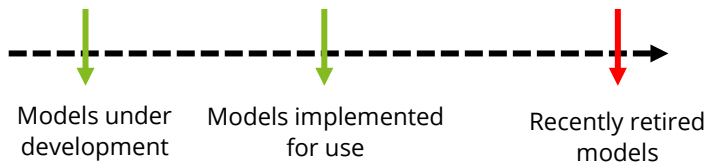
-  Model risk management activities shall be guided by the insurer’s **model risk management policy** (See section 2.14) and supporting standards.
-  The insurer needs to **establish a materiality definition** specific to the use of the SBA model. The definition should focus on whether the model and assumption changes, enhancements, findings, and any other relevant considerations are material.
-  The **first and second line** should collaborate to ensure a clear definition of ownership for the model risk management activities (including the need for independence for some activities)
-  An **attestation** of the adequacy of the model risk management practices and compliance with the regulatory requirements should be obtained from both the company’s **CRO and CEO**.


We can now focus on **the 9 components of the model risk management** framework prescribed by the BMA:



(1 of 9) Model Inventory

Insurers should maintain a **comprehensive list of the models** used for the SBA as part of their best practice model risk management. The list should include:



 **Alert:** The model inventory should also include all associated downstream and upstream models (e.g., liability, asset, and stress testing models)

(2 of 9) Model Development, Testing, Implementation, and Use

As part of model development, the following aspects should be considered:

The software used	Computer code	Algorithms
Mathematical formulas	Other IT systems used to implement the model	

All of which should undergo **rigorous quality control** and **change control** procedures, even though they may not be considered models. This ensures that the code and its implementation is correct, and these aspects should **only be edited by authorized parties** and all changes should be **recorded** and **auditable**. Controls over **spreadsheet** should also be implemented.

When testing a model its overall functionality is assessed to see if it functions as intended. This comprise determining the model’s:

Accuracy	Proving its stability	Validating its robustness
Identifying potential flaws	Analyzing how it responds to various inputs and scenarios	

Testing activities should include:

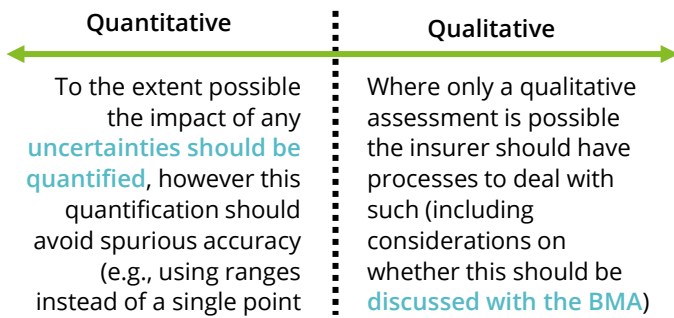
The goal	Design of test plans	Execution of test plans
Summary of the results with commentary and evaluation	Detailed analysis of samples	The documentation of the test activities should be fit for purpose



Alert: Model users can provide **feedback** on whether or not models are functioning as intended. Feedback should be sought for both the SBA model and any up or downstream models. It's important to make sure processes are in place to address feedback.

(3 of 9) Model Limitations and Uncertainty

All models by definition have limitations and create uncertainty. The insurer should demonstrate that they understand the limitations and uncertainty of their SBA models by doing both a **qualitative** and **quantitative** analysis:



Alert: This assessment on the impact of the model limitations and inaccuracies should be **viewed separate from the risk margin**, and the quantitative and qualitative assessment results should be **reported as part of the model risk reporting**, including a determination on whether or not adjustments are needed to the BEL.

(4 of 9) Pre/ In & Post Model Adjustments

Pre-adjustments	In model adjustments	Post-adjustments
Refer to cases where an insurer overrides a date input or assumption to a model	Refer to cases where an insurer override (e.g., through a cap or floor) a calculated value in a model	Refer to cases where an insurer overrides a model output by applying a model overlay



Alert: The model risk management policy should dictate when **model adjustments may or may not be used**. It should also include guidance on the review and approval process, continued use of.



Alert: All adjustments should be well documented as prescribed by the company's **documentation requirements**, and when reported through the Insurer's internal governance **process both adjusted and unadjusted versions should be provided** to enable decision makers to understand the impact of the adjustments.

(5 of 9) Model Validation

Model validation is the set of processes and activities intended to verify that models perform as expected. Validation can also reveal deterioration in model performance over time and should set acceptable levels of error.



Individuals who develop change update, run, and use the models **should not be model validators**.



Model validators should be individuals (external or internal) who are **independent and** have the appropriate: incentives /competence/ influence and authority.



Initial model validation should be in-depth, and **subsequent validations should be every 3 years, or earlier**, depending on the companies documented risk management policy. Subsequent validations should be proportionate to the use and materiality of the SBA, as well as the extent of model changes since the last validation.

The model validation process should at a **minimal specify** the following:

Scope of the Validation	-	Controls and governance
- Data and other input	-	Model review process
- Assumptions	-	Output and use
- Processing	-	Documentation
- Methodologies	-	
Process, methods, and tools to be used		
Frequency of validation		
Model changes		
People involved, roles, reporting lines and escalation paths		
Output and reporting		

As part of the model validation process the insurers could **consider** a number of **the following activities**:

Review of conceptual soundness elements, including developmental evidence
Sensitivity, stress, and scenario testing
Dynamic and static validation
Roll-forward analysis
Unit/Cell testing
Reconciliation against the input source or ledger
Output analysis, including back testing
Trend analysis and stability testing
Profit and loss attribution
Independent full model replications, sample recalculations and formula inspection (as appropriate)
Process and controls verification
Benchmarking and alternative design methods/ models
Other validation tools as determined to be relevant and appropriate

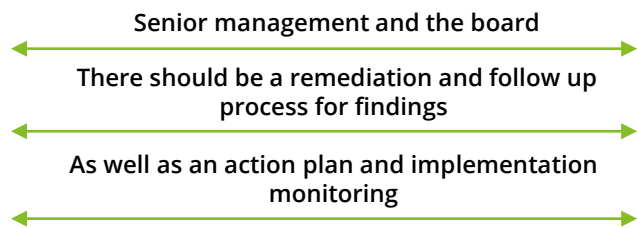


Key Controls

The validation activities mentioned above are **not expected to be limited to independent validation work**. Many of the activities could be assigned to the first line actuaries.

Insurers are required to produce a **detailed model validation report**. This report should document the model validation process and conclude on the adequacy of the model being validated, and the appropriateness of the end provision raised.

Reporting lines and structure should be clearly defined for:



Alert: If significant findings are noted as an outcome of the validation process, the model's use shall not be allowed, or shall only be allowed under very tight constraints (including escalation to and approval by the BMA).



Alert: With regards to the term "significant" in this case it does not refer to all material findings, the BMA has provided insurers with the free will to define what significant means to them. The determination of significant findings are therefore to be made internally in consultation with the model validators and the internal control Function.

(6 of 9) Model review, Ongoing Development and Monitoring

Insurers shall also establish a requirement to periodically review the SBA model as part of the model risk management program.



Individuals who perform the model review does not need to be independent. It can be done by model developers, implementers, or users. The purpose of the review should be to highlight any potential changes since the last validation or reporting cycle.



The model review should be carried out regularly but no less frequently than annually.

Model reviews should not be as detailed as model validations, but the level and scope of the review should be fit for purpose. In fact, the work done by the first line actuarial team as part of ongoing reporting does qualify as model reviews. The BMA does not expect a separate model review team but would expect the model review to be imbedded into the first line actuarial duties.

No further documentation is required to evidence the reviews other than a review log. The review log should include a listing off all model updates and changes, with any updates that are considered material also requiring testing, (including updating the log with the testing results).



Key Controls

The model review log shall be subject to an annual review by the approved actuary.

As part of the model's performance review an assessment should be carried out in order to determine if the modes performance in production is in line with the model development and testing stage expectations /results.

The following key controls are recommended:

- BEL and or spread movement analysis. This is done by comparing the current period BEL and/or spread to that of the prior period to analyze the movements.

(7 of 9) Model Risk Reporting and Deliberation:



The board is the ultimate owner of the SBA model, and as such is expected to have / and be able to demonstrate an overall understanding of the application of the SBA and its importance to the Insurers business.

Model risk should be captured and reported to a management committee regularly. This can be achieved either through standalone model risk management reports, or combined with reporting that is already in place.

The insurer's risk, investment and actuarial functions should collaborate and ensure that there is clear ownership within the firm for model risk reporting for both the SBA and feeder models (to avoid leakage in reporting).

Management should be able to demonstrate (either through management committee minutes, report improvements or ultimate decisions taken) that the level of deliberation on model risk reports offer appropriate challenge and is adequate considering the insurer's nature scale and complexity.

Information submitted to the management committees on the use and application of the SBA model should include at a minimum:

A reasoned analysis of the reliability and adequacy of the calculations.

A reasoned analysis of the reliability and adequacy of the sources used.

The degree of uncertainty of the outputs.

A sensitivity analysis that includes an investigation of the sensitivity of the output to each of the major risks underlying the obligations covered in the technical provisions.

An assessment of the impact of any identified limitations.

Any concerns regarding the adequacy of the BEL and technical provisions.



Alert: Similar to what was discussed under section 2.3 with regards to the company's liquidity risk appetite, the board should set clear tolerance levels when it comes to model risk reporting. These tolerance levels should be reviewed periodically to ensure they are not set too high or too low in line with the Insurer's definition of materiality (see also the start of Section 2.15).

Model risk reporting should include, but not be limited to:

The number of models considered to be high-risk.

Models with temporary exemptions or provisional approvals.

Status of model issues (e.g., past due, WIP, partially completed)

Summary of model performance metrics, including a list of underperforming models and action being taken.

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Lists and trends by the tier of the number of models that:

- Has past due validations
- Is in use without validation
- Is being used outside of their approved purpose
- Is being used despite rejection outcome from review/validation

Model risk events / incidents that has been reported for the period.

Quantification and treatment and/ or aggregate model uncertainties.

Model development and enhancement efforts in progress and allocated resources.

Resource related indicators (budget, people, infrastructure) and an assessment of the impact on other areas (such as how they impact model testing, documentation, or on-going monitoring).

A summary of key model outputs plus the outputs of key model risk management activities for the period under review.

(8 of 9) Use and Reliance on Third party Models and outside experts

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For third party models and outside experts the insurer should obtain the following 11 items:

- 1 Developmental evidence explaining the model's components, as well as its design and intended use, to determine if the **model is appropriate** for the insurer's **products and risk**.
- 2 Information regarding the **data used** to develop the model.
- 3 Sufficient detailed **testing results** that show the third party's model works as expected.
- 4 Documentation regarding the **model's limitations**, and assumptions about when the model's use may be unsuitable or problematic.
- 5 Clear instructions for **model implementation**, including any decisions that should be made regarding parameters or thresholds.
- 6 Require vendors to **conduct ongoing performance monitoring and outcomes analysis**, with disclosure to their clients, as well as to make appropriate modification and updates over time.
- 7 **validate** the use of Vendor products.
- 8 Obtain information regarding the **data used** to develop the model and assess the extent to which the data is representative of their circumstances.
- 9 **Conduct ongoing monitoring** and an outcome analysis of vendor model performance using the insurer's outcomes.
- 10 Additionally, where third party vendor models do not provide complete access to development codes, the insurer should be able to demonstrate **how they obtain confidence from using third-party models** (i.e., using inhouse models for benchmarking or building challenger models).
- 11 A **contingency plan** for instances when the vendor model is no longer available or cannot be supported by the Vendor

Vendor models should be included in the insurer's broader model risk management framework and should follow the **same principles as applied to in-house models**.

When Reliance is placed on outside experts and third-party models in developing the SBA model, systems and processes should be in place to determine the appropriate level of reliance, the following should be **considered at a minimum**:

Are the individuals experts in the applicable field

The extent to which the model has been reviewed or validated by experts in the applicable field

Whether there are industry or regulatory standards that apply to the model, and whether the model has been certified as having met such standards

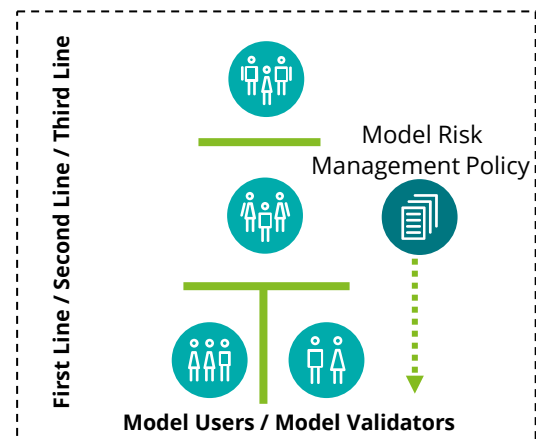
Whether the science underlying the expertise is likely to produce useful models for the intended purpose



Alert: If the insurer cannot comply with all the requirements due to use of and access to proprietary info, they should identify gaps subject to internal challenge and report them to the BMA

(9 of 9) Model Risk Management Audit

Internal audit (The third line) shall review model risk management to ensure there is an effective challenge provided by the **second line** and **the model validators** to the model owners, developers, users, and implementers and that the **model risk management policy** and procedures are kept current in keeping with regulatory requirements and Best Practice.



Key Controls

Internal audit shall provide assurance:

- On the level of critical review and challenge provided on the model validation.
- The model review activities
- The adequacy and frequency of model risk reporting
- The manner of challenge (and decisions thereof) by management and the board to such reporting

Overall **internal audit should form its own independent opinion** and provide assurance or otherwise on the adequacy of the model risk management activities performed by both the first and the second lines of defense