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Model Risk Management - Is there more to (non)life than validating an internal model?

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Contents

- **What do we mean by Model Risk Management (MRM)?**
- Why should we care about MRM?
- State of the market
- Simplified framework



What do we mean by Model Risk Management (MRM)?

- SR11-7 model risk definition:
 - The risk of adverse consequences (e.g. financial loss, poor business or strategic decisions, reputational damage) arising from decisions based on incorrect model outputs or misused model outputs



What do we mean by Model Risk Management (MRM)?

- SR11-7 model risk definition:
 - The risk of adverse consequences (e.g. financial loss, poor business or strategic decisions, reputational damage) arising from decisions based on incorrect model outputs or misused model outputs
- Model risk management aims to ensure that companies put in place the right level of controls for all material models supporting their business and decision-making processes...

...and addresses the entirety of a firm's model landscape, not just regulatory models



What do we mean by Model Risk Management (MRM)?

- SR11-7 model risk definition:
 - The risk of adverse consequences (e.g. financial loss, poor business or strategic decisions, reputational damage) arising from decisions based on **incorrect model outputs** or misused model outputs
- LTCM was a hedge-fund operating between 1994 and 2000. The fund's strategy relied on using quantitative models to find arbitrage opportunities between liquid securities, combined with high financial leverage. In 1997/1998 markets moved unfavourably for LTCM, causing significant losses and redemption requests by capital providers. LTCM lost \$4.6bn as a result of high leverage combined with a reliance on mathematical models that did not capture the potential market movements accurately



What do we mean by Model Risk Management (MRM)?

- SR11-7 model risk definition:
 - The risk of adverse consequences (e.g. financial loss, poor business or strategic decisions, reputational damage) arising from decisions based on incorrect model outputs or **misused model outputs**
- The Mercator projection converts the surface of a sphere onto a flat map in such a way that the straight lines maintain their bearing, helping sailors to reach their destination. To achieve this, North-South distances are stretched at higher latitudes and as a result the map is not appropriate for measuring distances or areas.



What do we mean by Model Risk Management (MRM)?

- Not just validation and definitely not just validation of the internal model!

Dimension	Model Validation	Model Risk Management
Nature	Control activity	Control process: <ul style="list-style-type: none">• Managing the model inventory• Setting model governance standards (e.g. development, testing and monitoring)• Measuring model risk• Ongoing monitoring of model risk• Reporting to the board on model risk• Managing committee authorising exceptions for model use
Scope	Regulatory models	Material models (as defined by business)
Responsibility	2 nd line of defence	All 3 lines of defence
When is it applied	Mostly at the end of the modelling process	Throughout the modelling process

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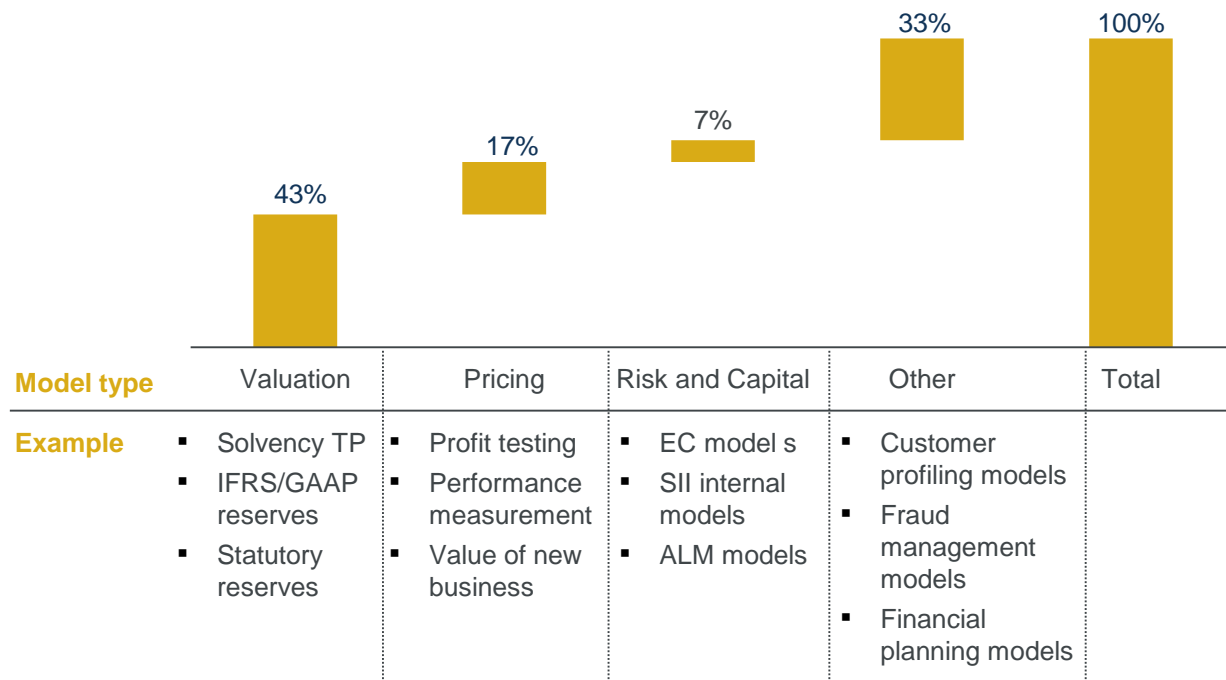
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Why should we care about MRM?

Number of models – global insurance company (example)



3 key challenges ...

1. **Increasing cost** of building and maintaining large numbers of models. Models are at the heart of the insurance company, spread across all business, risks and support functions
2. Issues in **model risk management oversight** and **consistency of control activities** leading to inefficiencies or wastage of resources
3. Financial losses and **negative reputational impact** vis-à-vis external stakeholders **due to deficiencies in the Model Control Framework (MCF)**



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Why should we care about MRM?

Challenges

Increasing cost of building and maintaining large numbers of models

Issues in MRM oversight and consistency of control activities

Financial losses and negative reputational impact vis-à-vis external stakeholders



What are the benefits of implementing MRM ?

Holistic View



Modelling cost reduction



Control and process optimization



Enhanced Reputation



Capital add-on



- ✓ Framework applied to **material models beyond traditional SII regulatory models**
- ✓ Helps to communicate that insurer's models and model outcomes are inherently uncertain. This can also help **broaden the model risk culture** across the organisation
- ✓ Comprehensive validation framework that will meet regulatory requirements and leverage best practices. This can reduce potential **redevelopment costs**
- ✓ Optimal **allocation** of **resources** based on where models are needed or need to be improved
- ✓ Improve **efficiency** of the **control framework** to enable the identification of duplications or inefficiencies in the controls, processes, etc. (e.g. excessive use of manual procedures, overlapping controls, etc.)
- ✓ Enhance control framework for **key processes** i.e. business planning that enables portfolio optimizations and early warning systems
- ✓ Improved understanding of **model assumptions** and **limitations**
- ✓ Identify opportunities for **process automation**
- ✓ Positive reputational impact vis-à-vis **regulators** and **peers** from **reduced errors and model uncertainty**
- ✓ Better view on capital buffers, **reduction** of **capital requirements** through lower likelihood of **internal uncertainty loadings**
- ✓ Low probability of a **regulatory capital add-on** due to model risk

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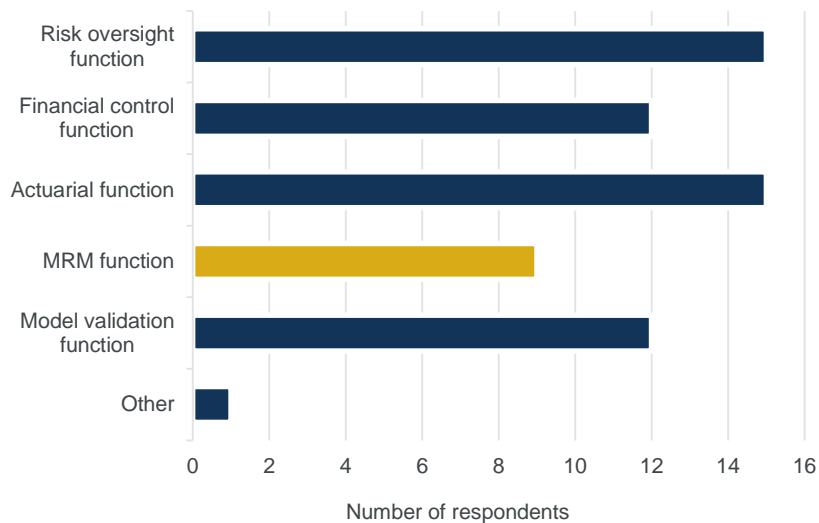
State of the market

1. Model Risk Management is an **emerging topic on the insurance CRO agenda** across Europe. Some **large insurers have or are looking into setting up MRM functions**. Typically this has yet to appear on the agenda of firms who are still substantially focused on an IMAP process
2. Most insurers remain focused on regulatory models. Large insurers have expanded their scope into mainly valuation and pricing models. Insurers involved in our discussions agree that MRM should focus on **providing assurance that all material models (not just regulatory ones) are properly controlled**
3. Insurers participating in our discussions acknowledge that it is in the best interests of the industry to **develop MRM from an industry perspective rather than to be led by regulation** (as happened in the banking industry or for Solvency II internal model validation)
4. Most insurers see substantial benefit in a **proportionate approach focussed on the most material models from a business use perspective**. The list of the most material models needs to be determined by the institution and will be insurer specific
5. All insurers we have spoken to prefer a **top down approach** starting from their model landscape and then identifying their most material models. Such an approach will be **more efficient and effective** in demonstrating the benefits of MRM

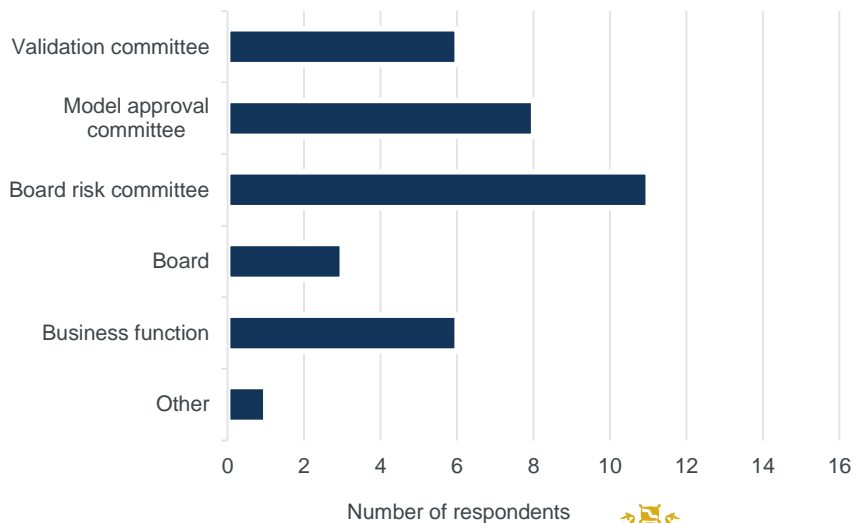


State of the market

Which model control functions does your company have?



Who is responsible for model approval?



Source: IMIF: The Journey from Model Validation to Model Risk Management



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Developing the MRM framework

Define model universe and landscape

Define the MRM scope

Define the model risk classification

MRM policy and inventory

- Insurers should look to define a MRM framework that is in line with their general risk management and governance processes
- However, despite specificities in implementation due to an insurers culture, the suggested framework components should be considered by all firms when establishing their model risk management framework



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Developing the MRM framework

Define model universe and landscape

Define the MRM scope

Define the model risk classification

MRM policy and inventory

- A model definition is required to identify what is and what is not considered a model
- Bottom-up or Top-down approach to defining the model universe?
 - Bottom-up theoretically provides a comprehensive coverage of all models
 - Top-down may be considered more focused



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Developing the MRM framework

Define model universe and landscape

Define the MRM scope

Define the model risk classification

MRM policy and inventory

- At a minimum, the scope will cover all regulatory models
- The scope could be extended to cover all models
- An effective approach would allow insurers to effectively apply and manage their controls framework through a principles based approach with specific reference to their own view of risk and materiality



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Developing the MRM framework

Define model universe and landscape

Define the MRM scope

Define the model risk classification

MRM policy and inventory

- The model risk classification approach should define the relative importance of each model to the insurer
- Classification factors may include model materiality, use criticality, complexity and/or regulatory scrutiny
- Regular review of the classification is required to ensure the relative extent of MRM activities remains appropriate for each model



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Developing the MRM framework

Define model universe and landscape

Define the MRM scope

Define the model risk classification

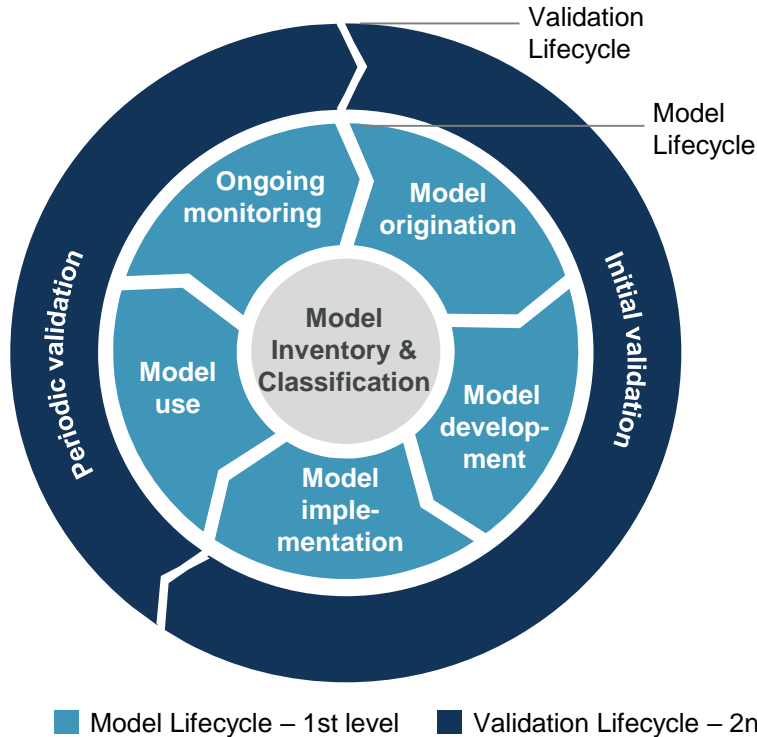
MRM policy and inventory

- Inventory should contain all material models along with model metadata, outputs, classification results, risk assessment results, etc
- Model Risk Policy should cover the MRM function mandate, MRM committee, model identification, model classification and model risk scoring approach, MLC, MV and model risk mitigation approaches



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The ongoing MRM cycle

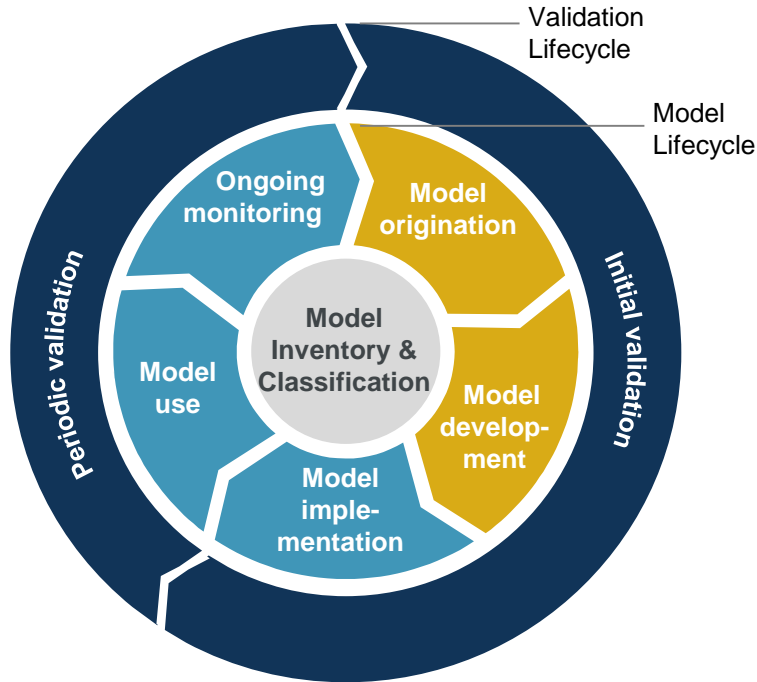


Once a framework has been established it is important to develop a robust **ongoing MRM cycle**. The cycle should ensure that each model adheres to the MRM policy in the sense of when the reassessment of risk takes place as well as how, when and to where the results are ultimately reported

The diagram provides one possible approach, with a clear distinction drawn between activities of the model and validation lifecycles



The ongoing MRM cycle



■ Model Lifecycle – 1st level ■ Validation Lifecycle – 2nd level

Each model should have a clearly defined owner for each purpose determined at **model origination**

Model requirements are derived from the purpose and the mitigation of model risk should be considered

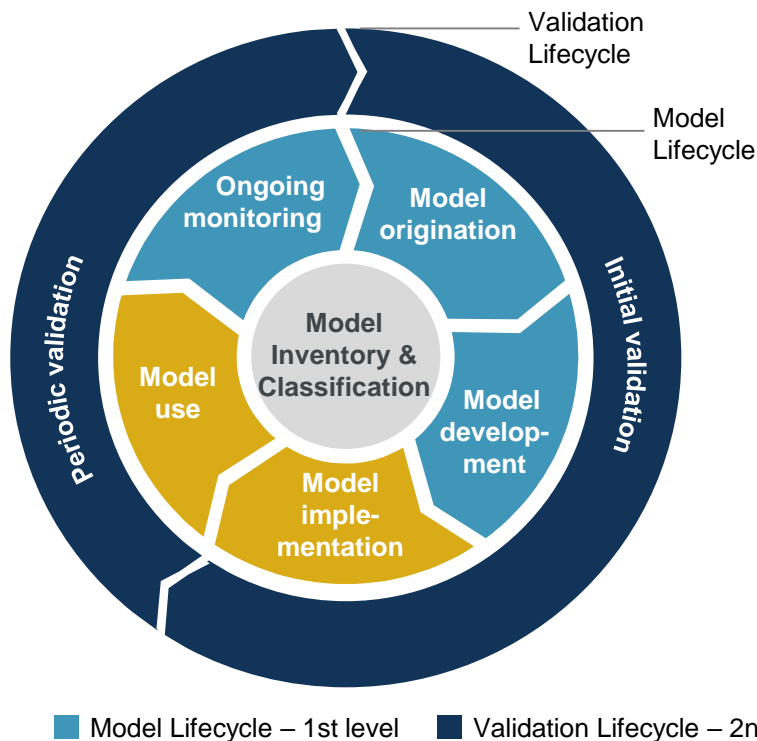
Model developer should define acceptance criteria with the model owner during the **model development**

Criteria should be defined with reference to the overall MRM policy and specifically the risk appetite and materiality set by the function



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The ongoing MRM cycle



Model implementation should take place in a secure production environment with sufficiently robust controls ensuring results are reliable

The model users responsible for each model change and run should be recorded

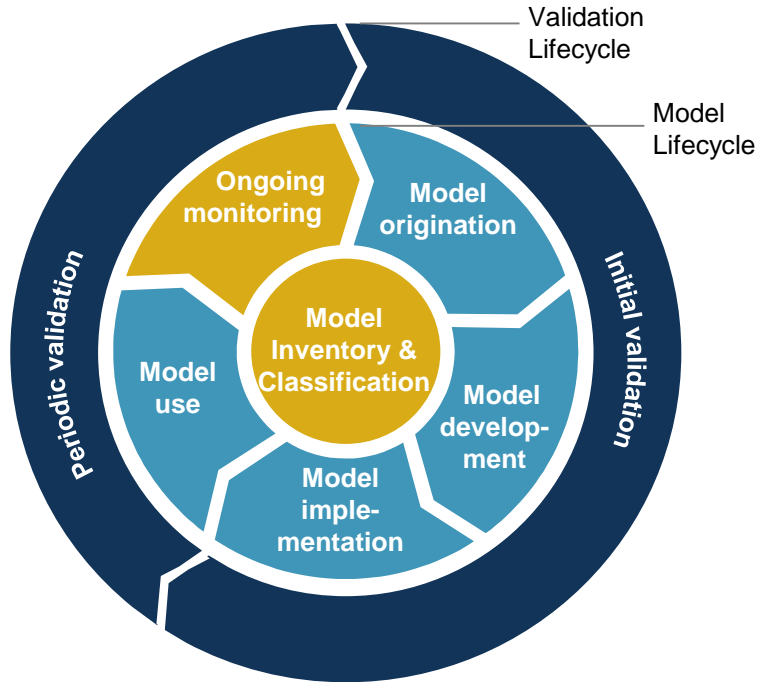
Controls should be applied to both the running of the **model** and the **use** of the results to ensure model risk is appropriately managed

The provenance and sign-off of data and assumptions should be traceable from model input through to output



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The ongoing MRM cycle



Ongoing monitoring ensures models remain relevant and appropriate for use

Regular board reports may feature metrics such as the proportion of models that are compliant with the policy or the number of risk events involving models

The Model Inventory and Classification is an important element and will remain within the ongoing MRM cycle

Some model inventory fields are shown on the next slide



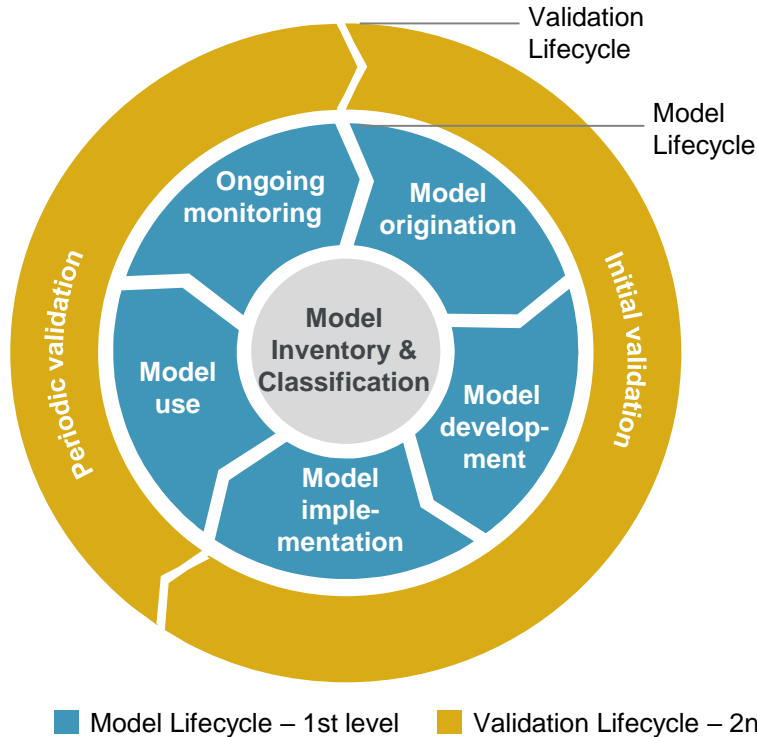
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Sample model inventory fields

Dimension	Sub-dimension	Field name
Model characteristics	Item description	ID, name, version, category, champion/challenger, in-house/vendor, data source(s), methodology, output, platform/system
	Model use	Use category, detailed use, use frequency
	Model dependency	Upstream models, downstream models, associated challenger/champion models
Governance	Key stakeholders	Vendor (if applicable), legal entity, geography, business unit/LoB, owners, developers, validators, users, implementer, business sponsor
	Key dates	Submission date, approval date, deployment date, last validation date, next scheduled validation date
Classification	Key dimensions	Materiality, model usage, external impact, classification result
Risk & Control	Validation	Validation status, last validation type, model risk assessment results, validation frequency
	Risk	Issues from validation (findings), regulatory/audit issues, limitations, ongoing monitoring status
	Mitigation	Compensating controls, remediation action plans, use restrictions



The ongoing MRM cycle



Models should undergo an **initial validation** to ensure the model is fit for purpose and to reduce the probability of expensive failures due to late changes. **Periodic validation** should be carried out to ensure models remain relevant for their use within the decision making process

The frequency and depth of any validation activities will be defined within the model risk policy documents with reference to the model classification. The general principle is that the more important the model, the greater depth/frequency of validation activities



Key takeaways

- MRM does not seek to harmonise the controls applied to all models across an organisation but rather to ensure appropriate controls are in place to minimise the probability that models will produce misleading outcomes or outcomes that are misinterpreted and lead to poor decision making
- By getting out in front of the MRM issue, the insurance industry is in a position to define a framework that best suits its needs rather than waiting for a regulatory lead approach as has been the case in the American banking industry
- The model universe should include consideration of all model types; with the MRM scope being defined in a manner that allows for appropriate focus on the models that matter most to an insurer
- MRM does not mean model validation! Model validation is a component of a robust model risk management framework



Questions

Comments

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