

A Guide to PRA's Model Risk Management Principles

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Financial institutions use qualitative and quantitative models for a wide range of activities, such as internal analysis, enterprise risk management, and determining capital and reserve adequacy. The use of models is expanding to include complex products and emerging technologies like artificial intelligence (AI) and machine learning (ML).

While models can provide many benefits, such as enabling better decision-making and risk management, they can also fail. When models fail, it can lead to adverse consequences for financial institutions, such as financial or reputational risk. This risk, which arises due to model errors or the inappropriate use of modelled outputs to inform business decisions, is called model risk.

The Prudential Regulatory Authority (PRA) has recently issued Supervisory Statement (SS) on Model Risk Management. This document provides guidance on how financial institutions can manage model risk. These guidelines are much more prescriptive than the SR11-7 guidelines.

The views expressed in this document are a combination of our point of view as well as industry high-level thoughts. These views are based on a roundtable that we recently conducted with some MRM heads to understand the industry's current state.

Principle 1 – Model Identification, Classification & Tiering

Expanded model

One of the key changes in the PRA's new guidelines is the expanded definition of a model. The PRA now considers any quantitative or qualitative output that has a material bearing on the firm to be a model. This means that a wider range of models will now be subject to the PRA's model risk management requirements. PRA further has clarified that inclusion of qualitative output in model definition is to ensure that recommendation systems in client services and other AI/ML models that deliver qualitative output are within the scope of the MRM Policy. For example, machine learning models that use data mining to seek to predict, narrow down and find relevant content for users or recommend additional products to consumers. By this definition, AI/ML Models such as Classification, categorization models will fall under the scope of a model as per this clarification.

The expanded model definition includes models that are used in non-core business functions, such as banking operations, HR, and cyber security. This could create challenges for financial institutions, as they will need to:

- Create awareness of the new definition of a model among employees in these non-core business functions.
- Understand the quantitative methods and systems that are used in these functions.
- Identify which of these methods and systems are considered models under the new definition.
- Capture these models in the model inventory.

Financial institutions can address these challenges by:

- Conducting training sessions for employees in non-core business functions on the new definition of a model.
- Developing a process for identifying and capturing models in the model inventory.
- Working with employees in non-core business functions to understand the quantitative methods and systems that they use.

By taking these steps, financial institutions can ensure that they are in compliance with the PRA's new definition of a model and that they have a comprehensive model inventory.

Robust model inventory tool

Another key change is the increased level of detail that the PRA expects financial institutions to record in their model inventory. The inventory must now include information on the model's purpose, use, outputs, and any significant changes that have been made to the model, post model adjustments, actual vs intended use etc. The PRA also expects financial institutions to record information on decommissioned models, including the rationale for decommissioning the model.

The documentation requirement about the decommissioned models along with the rationale is a significant step towards understanding the modelling evolution. Some of the examples can be replacement of linear regression models using AI/ML models or replacement of VaR models with ES models. This could help the developer to refer prior models

and improve future generation of models. Here, PRA does not specify on how long banks should retain the data on decommissioned models / the history of decommissioned models to be recorded now. Generally speaking, data retention policy requires firms to retain the data of a minimum of past 7 years and firms can refer such policies for reference.

Models tiering

The PRA has also increased the number of factors that are used to determine the tiering of models. The tiering of models is important because it determines the level of risk management controls that must be applied to the model. The PRA now considers a wider range of factors when tiering models, including the materiality of the model, the complexity of the model, and the risk of the model's outputs.

Many of the industry participants require clarity around whether judgement-based models should be considered as a model separately or is it sufficient to validate them as part of downstream model where they are used as input. Further, if considered as model on its own, there is lack of clarity around whether the existing MRM Framework be applied or a new MRM policy and framework to be defined separately for judgement-based models.

Principle 2 – Governance

Board of directors / SMF responsibilities

The PRA expects the board of directors to be aware of the material and complex models that the bank possesses. They are also expected to understand the underlying risks and mitigants for all such "material" models. The board of directors may delegate the responsibility for executing and maintaining an effective MRM framework to senior management. Senior management is then responsible for regularly reporting to the board of directors on significant model risk and associated policy. This may be done directly or through appropriate subcommittees.

The PRA has also clarified that there can be multiple SMFs (Senior Model Function) and hence a team of SMFs can be structured. The SMF is responsible for a broad range of activities, ranging from first line to third line of defence. One option to comply with the framework is to have a committee of SMFs. The SMF committee can be structured to comprise of permanent and temporary members. Permanent members can include the CRO (Chief Risk Officer), Head of Model Development, Model Validation, and Independent Audit. Temporary members of the committee can include relevant model users (business individuals), and people involved with the model being discussed in the meeting (model developer, model validator and independent auditor).

Third-party vendor models

In the case of models that are developed and validated by a third-party vendor, the subsidiary needs to maintain a separate model tiering for the models used in the subsidiary. The MRM framework needs to be applied proportionally to the subsidiary's model tiering results. Subsidiaries cannot consider models developed and validated by the parent as validated for the use of the subsidiary by default. The relevance of the underlying data and the underlying methodology may be different for the parent and subsidiary, and therefore subsidiary models need to be independently validated. Firms need to ensure that the level of documentation of third-party vendor models is sufficient to validate the firm's use of the model.

Principle 3 – Model Development

The PRA expects firms to have a robust model development process with standards for model design and implementation, model selection, and model performance measurement. Testing of data, model construct, assumptions, and model outcomes should be performed regularly to identify, monitor, record, and remediate model limitations and weaknesses.

However, the PRA has additional expectations for firms in areas such as the use of data, model development testing, model adjustments and expert judgement. These are detailed below.

Data

Data used to develop a model should not be biased and should comply with data privacy regulations (BCBS, Mifid etc). The use of alternative and unstructured data, as well as interconnected data sources, should be reflected in model tiering to ensure that the appropriate level of rigor and scrutiny is applied to the model.

Model development testing

Performance testing should include the variance of the outputs of the champion model against challenger models. The extent of implementation of challenger models or other benchmarks should be one of the factors to reflect model uncertainty and should be recorded in the model inventory.

Model adjustments and expert judgement

Model uncertainty and limitations should also be considered as factors that determine model tiering and model risk rating. Model adjustments identified during model development stage should be adequately justified and recorded in the model inventory. The model inventory should record how model adjustments should be calculated and the reasons for model adjustments. Independent validation must be performed on the decisions taken with respect to model adjustments.

When a model (whose input or output data is adjusted) output data is fed to a downstream model, both unadjusted and adjusted output data needs to be sent to downstream model users and owners. When material changes are made, both the model in scope and downstream models need to be independently validated.

Firms should evaluate whether the model adjustments are material in nature or if they are recurring (for the same model limitations) to identify if there is a flawed model design or misspecification in model construct. Firms should consider remedial actions such as model recalibration or model redevelopment to address these issues.

The requirements around independent validation of downstream models also when the upstream model output is changed is a significant requirement. Overall, the requirements of the PRA from model development perspective would imply usage of more robust data, stronger models' choice and governance around model changes across the cycle.

Principle 4 – Independent Validation

The validation function is responsible for conducting independent validation to assess the suitability and conceptual soundness of models, input data, and output data. The validation function is also responsible for independent review, periodic revalidation of models, and providing recommendations on model approval. The depth of validation should be commensurate with the model tiering and the purpose of the validation (baseline, annual, or revalidation). The validation function also shares the responsibility for reviewing ongoing model performance monitoring and process verification.

The PRA's supervisory statement (SS) on model risk management (MRM) diverges from current industry practices in two areas: system implementation testing and ongoing model performance monitoring.

System implementation testing

Some banks do not have a framework for system implementation testing, but the PRA has made it mandatory. Banks will need to decide which team will be responsible for this testing.

Ongoing model performance monitoring

The PRA requires independent validation of ongoing model performance monitoring reports. This monitoring should be comprehensive and include benchmarking, sensitivity testing, analysis of overrides, and parallel outcomes analysis. It should not only assess changes in products, exposures, activities, clients, or market conditions, but it should also ensure that:

- Parameter estimates and model constructs are appropriate and valid.
- Assumptions are applicable for the model's intended use.

Currently, banks do not have such an extensive level of testing done as part of ongoing model monitoring. We expect that banks will need to make a significant effort to comply with these expectations.

Principle 5 – Model Risk Mitigants

The final principle of the PRA's supervisory statement (SS) on model risk management (MRM) covers post-model adjustments (PMAs), restrictions on model use, exceptions to model use, and escalation of exceptions. When compared to the previous SS, SR11-7, the industry is already compliant with most of the requirements listed in this section. However, there are a few specific requirements from the PRA that firms should take into consideration:

- The PRA expects firms to develop a consistent firm-wide process for the application of PMAs.
- The use of PMAs should be properly justified, time-bound, and should be linked to model limitations.
- The scope of model validation should be enhanced to include a thorough review of PMAs. Documentation for PMAs should also be created or enhanced.
- Firms should establish SMRs (Senior Model Risk Function) to validate quantitative PMAs.

View on AI/ML Models

Key highlights of responses provided by PRA on AI/ML models is given below.

- AI/ML Models that change / recalibrate frequently may present additional challenges including ensuring adequate oversight and review
- The use of AI/ML models can raise ethical challenges including fairness and bias – such ethical challenges could increase conduct and reputational risks, and better management and oversight of such risks may be needed.
- The PRA, the Bank and the FCA are in the process of analysing the responses to DP5/22. The PRA will consider the outcome of the analysis, together with the results of the 2022 machine learning survey and the responses to the MRM CP, to inform any decisions on further policy actions.

A new policy on the MRM framework for AI/ML Models is expected from PRA soon.

Way Forward for Banks

To comply with the PRA's new guidelines on model risk management (MRM), banks should establish at least three different squads of teams to focus on the following major areas:

- Model inventory tool: Banks should invest in improving their existing model inventory tools to make them more exhaustive. The tools should cover extensive features such as model limitations, assumptions, linkages to upstream and downstream models, post-model adjustments, and rationale.
- New models discovery: MRM teams should interact with all business functions and conduct interviews to identify the bank-wide potential models or tools that would come under the MRM framework. Given that many businesses may not be familiar with MRM guidelines, MRM teams should set up strategic bootcamps to create awareness of these guidelines.
- Ongoing performance assessment (OPA): Most global banks currently perform OPA, which includes sensitivity analysis and backtesting using new data. However, with the new requirement of model monitoring teams performing parallel outcome analysis, building challenger models, and MRM teams validating all OPAs in a

timely manner, the frequency of OPAs should be aligned with the frequency of model monitoring. This exercise is expected to increase the number of models in the inventory.

In addition to the above three activities, MRM teams should update their policy to cover at a minimum the following aspects:

- The role of the board of directors in MRM
- The responsibilities of the SMF (Senior Model Function)
- Clear guidelines on the identification and tiering of new models (including AI/ML models and legacy tools)
- A template for the validation of new discovered models and OPA models

With the May 2024 deadline looming, banks face a tough ask to comply with the PRA's new guidelines on model risk management. However, by taking the steps outlined in this article, banks can position themselves to successfully meet these new requirements.

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References

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